Competency-Based Dynamic Curriculum for MD/ MS Unani

(PRESCRIBED BY NCISM)

Semester III-VI

Manafeul Aza

(Human Physiology)

(SUBJECT CODE : UNIPG-MZ)

(Applicable from 2024-25 batch, from the academic year 2025-26 onwards until further notification by NCISM)

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Preface

The study of Manafeul Aza (human physiology) involves understanding the intricate mechanisms of the human body and its dynamic interaction with the environment. For centuries, Unani medicine has contributed significantly to the advancement of medical knowledge, blending traditional wisdom with empirical evidence to promote health and treat disease. In today's rapidly evolving scientific landscape, there exists an unprecedented opportunity to enrich Unani education by integrating traditional principles with contemporary medical and technological advancements. This curriculum for postgraduate Unani doctors represents a pioneering effort to bridge this gap, providing a comprehensive framework for the advanced study of human physiology. Designed with the dual objectives of preserving the integrity of traditional Unani knowledge and equipping students with cutting-edge technical expertise, the syllabus covers five carefully curated papers. This paper **Applied Basics of Manafeul Aza**: provides a deep dive into the functional anatomy and physiology of organ systems, emphasizing their relevance in Unani concepts such as Mizaj (temperament), Akhlat (humors), Aaza, Quwa and Afaal. The other four papers are:

1. **General and Applied Physiology**: It includes modules on different physiological sytem and application of physilogical processes in understanding health and disease.
2. **Biochemistry, Genetics and Bioinformatics**: Includes expansive modules covering topics like Biochemistry, medical genetics and bioinformatics.
3. **Clinical Physiology**: A focus on diagnostic and therapeutic applications, enabling students to correlate physiological mechanisms with clinical practices in both Unani and contemporary medicine.
4. **Integrative Physiology and Recent Advances**: Integrating cellular, molecular, and systemic functions with classical Unani perspectives. Also covers medical education technology and breakthroughs in physiology, ensuring Postgraduates remain at the forefront of global medical science.

The curriculum is structured into 40 modules, offering an extensive yet cohesive exploration of the subject. Each module is crafted to foster critical thinking, encourage research, and promote interdisciplinary learning, enabling postgraduate students to approach physiology from both traditional and innovative perspectives. We envision this syllabus as a milestone in the evolution of Unani medical education, aligning it with international standards while preserving its unique identity. By equipping future Unani doctors with a profound understanding of physiology, this curriculum aims to empower them to contribute meaningfully to healthcare and research, blending the wisdom of the past with the promise of the future.

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Competency-Based Dynamic Curriculum for MD/ MS Unani

Manafeul Aza (UNIPG-MZ)

Summary & Credit Framework

Semester III-VI

Module Number & Name	Credits	Notional Learning Hours	Maximum Marks of assessment of modules (Formative Assessment)
Semester No : 3			
Paper No : 1 (عمومی واطلاقی منافع الاعضاء General and Applied Physiology)			
M 1 سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis	2	60	50
M 2 معدی امعائی، کبدی وصفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology	2	60	50
Paper No : 2 (حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics)			
M 9 حیاتیاتی سالمات Biomolecules	2	60	50
M 10 مسارات استقلابیۃ اور انکی تنظیم Metabolic Pathways and Regulation	2	60	50
Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)			
M 17 طبی تغذیہ Clinical Nutrition	2	60	50
M 18 مَعدَہ-کبدی وصفراوی نِظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System	2	60	50
Paper No : 4 (تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances)			
M 25 طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology	2	60	50

M 26 یونانی تصور ریاضت اور اس کا اسپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology	2	60	50
Semester No : 4			
Paper No : 1 (عمومی و اطلاقی منافع الاعضاء General and Applied Physiology)			
M 3 قلبی نظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system	2	60	50
M 4 نظام تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system	2	60	50
Paper No : 2 (حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics)			
M 11 جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques	2	60	50
M 12 طبی حیاتی کیمیا Medical Biochemistry	2	60	50
Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)			
M 19 نظام قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System	2	60	50
M 20 نظام تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System	2	60	50
Paper No : 4 (تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances)			
M 27 موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change	2	60	50
M 28 ارتقائی فزیالوجی Evolutionary Physiology	2	60	50
Semester No : 5			
Paper No : 1 (عمومی و اطلاقی منافع الاعضاء General and Applied Physiology)			
M 5 کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation	2	60	50
M 6 تناسلی و نشوونمائی فزیالوجی Reproductive & Developmental Physiology	2	60	50
Paper No : 2 (حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics)			
M 13 اساس جینیات Foundations of Genetics	2	60	50

M 14 Human Genetic Disorders and Diagnostic Approaches	2	60	50
Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)			
M 21 نظام کلیہ و تولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems	2	60	50
M 22 دموية سريرية، مناعت، شیخوخة، اور التہاب Clinical Haematology, Immunology, Aging, and Inflammation	2	60	50
Paper No : 4 (تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances)			
M 29 طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Physiological Tools for Validation of Unani Medicine	2	60	50
M 30 طبی تعلیمی ٹیکنالوجی Medical Education Technology	2	60	50
Semester No : 6			
Paper No : 1 (عمومی و اطلاقی منافع الاعضاء General and Applied Physiology)			
M 7 غدودی اور میٹابولک انضمام Endocrine & Metabolic Integration	2	60	50
M 8 نیوروفزیالوجی، تناؤ، اور خاص حسّات Neurophysiology, Stress, and Special Senses	2	60	50
Paper No : 2 (حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics)			
M 15 Medical Genetics, Genomic Applications, and Population Genetics	2	60	50
M 16 طبی معلومیات Bioinformatics	2	60	50
Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)			
M 23 نظام غدد کی کلینکل فزیالوجی Clinical Physiology of the Endocrine System	2	60	50
M 24 کلینیکل نیوروفزیالوجی Clinical Neurophysiology	2	60	50
Paper No : 4 (تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances)			
M 31 برمائی و فقاری فزیالوجی Vertebrate and Amphibian Physiology	2	60	50

M 32 جدیداضافات Recent Advances	2	60	50
	64	1920	1600

Credit frame work

UNIPG-MZ consists of 32 modules totaling 64 credits, which correspond to 1920 Notional Learning Hours. Each credit comprises 30 hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Important Note: The User Manual MD/MS Unani is a valuable resource that provides comprehensive details about the curriculum file. It will help you understand and implement the curriculum. Please read the User Manual before reading this curriculum file. The curriculum file has been thoroughly reviewed and verified for accuracy. However, if you find any discrepancies, please note that the contents related to the MSE should be considered authentic. Each paper has 16 credits and each semester covers 16 credits across 4 papers. In case of difficulty and questions regarding the curriculum, write to syllabus24uni@ncismindia.org

Credit Analysis Overview					
Sem/Paper	**Paper No 1**	**Paper No 2**	**Paper No 3**	**Paper No 4**	**Credits**
Semester 3	M-1 | 2 Crs M-2 | 2 Crs	M-9 | 2 Crs M-10 | 2 Crs	M-17 | 2 Crs M-18 | 2 Crs	M-25 | 2 Crs M-26 | 2 Crs	**16**
Semester 4	M-3 | 2 Crs M-4 | 2 Crs	M-11 | 2 Crs M-12 | 2 Crs	M-19 | 2 Crs M-20 | 2 Crs	M-27 | 2 Crs M-28 | 2 Crs	**16**
Semester 5	M-5 | 2 Crs M-6 | 2 Crs	M-13 | 2 Crs M-14 | 2 Crs	M-21 | 2 Crs M-22 | 2 Crs	M-29 | 2 Crs M-30 | 2 Crs	**16**
Semester 6	M-7 | 2 Crs M-8 | 2 Crs	M-15 | 2 Crs M-16 | 2 Crs	M-23 | 2 Crs M-24 | 2 Crs	M-31 | 2 Crs M-32 | 2 Crs	**16**
Credits	**16**	**16**	**16**	**16**	**64**

Semester VI University examination	
Theory	Practical*

Paper	Marks	Total	Practical Heads	Marks	Total
Paper -1	100	400	Long case or procedure/Major practical as applicable	100	400
			Short case or procedure/Minor practical	50	
Paper -2	100		Spotters	50	
			Assessing teaching ability	25	
Paper -3	100		Assessing presentation skills	25	
			Viva (4 examiners: 25 marks/each examiner)#	100	
Paper -4	100		Logbook (Activity record)	25	
			Practical/Clinical Record	25	
Semester VI University examination – 800 Marks					

* Details in 6H table; # No separate marks for dissertation viva.

Course Code and Name of Course

Course code	Name of Course
UNIPG-MZ	Manafeul Aza (Human Physiology)

Table 1 : Course learning outcomes and mapped Program learning outcomes

CO No	A1 Course learning Outcomes (CO) UNIPG-MZ At the end of the course UNIPG-MZ, the students should be able to	B1 Course learning Outcomes mapped with program learning outcomes.
CO1	Demonstrate competence in the fundamental Unani concepts especially Unani physiological concepts and their integration with other medical sciences.	PO1,PO4,PO7,PO8
CO2	Express high level of comprehension of major physiological systems of the body and how they interact and their applied aspect.	PO3,PO5
CO3	Employ the understanding of Genetics, Biochemistry, molecular physiology, environmental physiology, sports physiology, clinical nutrition, modern technological advances, recent advances in physiology and their application in validation of Unani theories, diagnosis, therapeutics and research.	PO2,PO5,PO7
CO4	Develop proficiency in measuring, assessing, interpreting and communicating clinical physiological parameters and their translational aspect. Interact with the allied departments by rendering services in advanced laboratory investigations.	PO5,PO6
CO5	Apply the principals of Ethics, research methodology, medical statistics and Bioinformatics in conducting research, publish research article, prepare and present research proposals. Acquire skills in conducting collaborative research, entrepreneurship, and innovations in the field of Manafeul Aza & allied sciences.	PO4,PO5,PO8
CO6	Apply general principles of communication and medical education technology in effective teaching of both Manafeul Aza and physiological mechanisms of the human body. Exhibit high levels of morals and professional ethics at every level.	PO7,PO8

Table 2: Course contents (Modules - Credits and Notional Learning Hours)

Paper No : 1 عمومی واطلاقی منافع الاعضاء General and Applied Physiology						
Semester No : 3						
2A Module Number	**2B Modules & units**	**2C Number of Credits**	**Notional Learning hours**			
			2D Lectures	**2E Practical Training**	**2F Experiential Learning including Modular Assessment**	**2G Total**
	M-1 سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis This module introduces key physiological processes at the cellular and muscular levels and explores the principles of homeostasis from both modern and Unani perspectives. It covers signal transduction, membrane transport, muscle contraction, EMG, neuromuscular junction dynamics, and adaptive responses in health and disease. The module also examines Unani concepts like *Aza, Laham, Quwate Muharika*, and *Tabiya*t in relation to systemic regulation and homeostatic balance. **• M 1U 1 خلیہ کی فزیالوجی اور تکیُّف Cell Physiology and Adaptation** 1.1.1 سگنل ٹرانسڈکشن کے مسارات اور ریسیپٹر میکانیہ جات (Signal transduction pathways and receptor mechanisms)	2	10	20	30	60

	1.1.2 غشاء الخلیہ پر نقل وحمل کا میکانزم (Cell membrane transport mechanisms) 1.1.3 اجہاد میں خلوی مطابقت (Cellular adaptation to Stress **• M 1U 2 عضلاتی فزیالوجی Muscle Physiology** 1.2.1 انقباض عضلات کی سالماتی بنیاد (Molecular basis of muscle contraction) 1.2.2 تدریب اور بیماری میں عضلاتی موافقت (Muscle adaptation in training and disease) 1.2.3 عضلات کی طاقت، لچک اور برداشت کی پیمائش کے لیے لیبارٹری آلہ جات (Laboratory equipment for measuring muscle strength, flexibility and endurance) 1.2.4 برقی عضلات نگاری (Electromyography (EMG) 1.2.5 عضلاتی فزیالوجی درج ذیل حالات میں: عضلاتی امراض (مایوپیتھیز)، تھکاوٹ، کریمپس، رِگار مورٹس (Muscle physiology in: myopathies, fatigue, cramps, Rigor Mortis) 1.2.6 طب یونانی کے تصورات: اعضاء، لحم، اور قُوّتِ مُحرِّکہ کا عضلاتی فزیالوجی سے ربط (Concept of *Aza, Laham* and *Quwate Muharik*a and its correlation with Muscle physiology) **• M 1U 3 وصل العصبی عضلی Neuromuscular Junction** 1.3.1 عصبی عضلاتی اتصال کی ساخت (Structure of neuromuscular junction) 1.3.2 عصبی عضلاتی ترسیل (Neuromuscular transmission)					

	1.3.3 عصبی عضلاتی انسداد (Neuromuscular block) 1.3.4 عصبی عضلاتی اتصال محرکات (Drugs stimulating neuromuscular junction) **• M 1U 4 استتباب اور طبیعت Homeostasis and Tabiyat** 1.4.1 استتباب میکانیہ: یونانی و جدید تصورات (Homeostatic Mechanism- Unani and Modern Concept) 1.4.2 طَبیعَت کا خلوی و نظامی تنظیم میں کردار (Role of *Tabiyat* in cellular and systemic regulation) 1.4.3 استتباب میں خلل اور بایومارکرز (Homeostasis Disruption & Biomarkers)					
	M-2 معدی امعائی، کبدی و صفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology This module explores the physiology of the gastrointestinal and hepatobiliary systems, focusing on neural, hormonal, and immune regulation of digestion and gut health. It integrates modern scientific understanding with Unani concepts such as *Hazm, Quwā te-Hāzima*, and *Kabid* functions. Special emphasis is placed on the gut-brain axis, gut microbiome, liver metabolism, and mucosal immunity. Applied aspects include dietary and lifestyle interventions, disease mechanisms, and the clinical relevance of GI and liver dysfunction, along with Unani therapeutic approaches. **• M 2U 1 مَعدَہ وَ اَمعاء کی فزیالوجی Gastrointestinal Physiology** 2.1.1 گٹ-برین ایکسس: معدہ و امعاء کے افعال کا عصبی و ہارمونی ضبط (Gut-Brain Axis: Neural & Hormonal Regulation of GI Functions) 2.1.2 بنیادی غذائی اجزاء کا ہضم و اِجتذاب	2	10	20	30	60

	(Digestion & Absorption of Major Nutrients) 2.1.3 طب یونانی میں ہضم کے تصورات Unani Concepts of *Hazm* (Digestion) 2.1.4 قُوّتِ ہاضمہ کا تجزیہ (Assessment of *Quwā te-Hāzima* (Digestive Faculty) **• M 2U 2 گٹ مائیکروبائیوم، اِمتیازی مدافعت اور گٹ کی صحت کے یونانی اُصول Gut Microbiome, GI Immunity & Unani Approaches to Gut Health** 2.2.1 صحت و بیماری میں گٹ مائیکروبائیوم کا کردار: ترکیب، افعال، میکانیزم (Gut Microbiome in Health and Disease- Composition, Role & Mechanisms) 2.2.2 مراضِ معدہ، گٹ صحت اور طرزِ زندگی کا یونانی تصور (Unani Perspective of *Amraz-e-Maida* (GI Disorders), Gut Health, and Lifestyle) 2.2.3 مخاطی مدافعت و اِمعائی حِصار کی سالمیت (Mucosal Immunity & GI Barrier Integrity) 2.2.4 گٹ مائیکروبائٹا کی تدبیر: غذائی تداخلات، یونانی غذا اور نِظام Modulation of Gut Microbiota: Dietary Interventions, Unani *Ghiza*, and Regimens) **• M 2U 3 جِگر و صَفراوی نِظام کی فزیالوجی Hepatobiliary Physiology** 2.3.1 کاربوہائیڈریٹس، لپڈز، پروٹینز کے اِستحالہ اور زہریلے مادوں کے اِخراج میں جِگر کا کردار (Hepatic Functions in Metabolism of Carbohydrates, Lipids, Proteins & Detoxification) 2.3.2 مناعی تحویر میں جگر کا کردار، حیاتیاتی تبدیلی (بایوٹرانسفارمیشن) اور صَفرا کا اِفراز (Liver in Immune Modulation, Biotransformation & Bile Secretion) 2.3.3 طب یونانی میں کَبِد (جِگر) کے افعال: صحت و بیماری کے تناظر میں (Unani Perspective of *Kabid* (Liver) Functions in Health & Diseases)]					

	• M 2U 4 گٹ۔جگرصحت کے اطلاقی پہلو Applied aspects of Gut-Liver Health 2.4.1 معدے اور آنتوں کی حرکت کے امراض: میکانزم اور طبی اہمیت (Gastrointestinal Motility Disorders: Mechanisms & Clinical Relevance) 2.4.2 معدہ و جگر کی صحت کے لیے طرزِ زندگی اور غذائیات (عِلاج بالغِذا) (Applied Lifestyle, Dietetics *(Ilaj-bil-Ghiza)* for GI & Liver Health) 2.4.3 گر کے عوارض: یونانی اور دیگر طریقہ ہائے علاج کا تقابلی جائزہ (Liver disorders (Unani medicine and other systems approach) 2.4.4 معدہ و جگر کی خرابی کے بایومارکرز: طبی ربط (Biomarkers of GI & Liver Dysfunction — Clinical Correlation)					
		4	20	40	60	120

Semester No : 4

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-3 قلبی نظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system This module provides a comprehensive understanding of cardiovascular physiology, focusing on regulatory mechanisms, vascular dynamics, and	2	10	20	30	60

	hemodynamic health. It covers autonomic control, reflex arcs, heart rate variability, blood pressure regulation, vascular compliance, and endothelial function. Special emphasis is placed on pulse (*Nabz*) assessment, integrating classical Unani methods (*Adilla Nabz*) with modern techniques. The module also explores vascular pathology including atherosclerosis and hemodynamic disorders, highlighting Unani concepts such as *Imtila', Sauda*, and *Su'-e-Mizaj* in understanding disease processes. **• M 3U 1 نظامِ قلب وعروق کی تنظیم Cardiovascular Regulation** 3.1.1 افعالِ قلب کا آٹونومک ریگولیشن (Autonomic regulation of cardiac function) 3.1.2 ریفلیکس آرکس: بیرورسیپٹر، کیموریسیپٹر، بین برج ریفلیکس (Reflex arcs: baroreceptor, chemoreceptor, and Bainbridge reflex) 3.1.3 ضرباتِ قلب کا تقلب (Heart Rate Variability (HRV) **• M 3U 2 ضغط الدم اور عروقی صحت Blood Pressure and Vascular Health** 3.2.1 تنظیمِ ضغط الدم (قلیل المدت وطویل المدت) (Regulation of blood pressure (short and long-term) 3.2.2 عروقی امتثال، شریانی سختی اور موجِ نبض کی رفتار (Vascular compliance, arterial stiffness, and pulse wave velocity) 3.2.3 نیوروہارمونل میکانیزم، ویسوپریسن، نیٹریورٹک پیپٹائیڈز (Neurohormonal mechanisms (RAAS, vasopressin, natriuretic peptides) 3.2.4 طبِ یونانی کے اُصول: خُون کے بہاؤ اور اِمتِلاء سے متعلق (Unani principles related to blood flow and Imtila') **• M 3U 3 نبض کا تقیم اور تفسیر Pulse (Nabz) Assessment and Interpretation**					

	3.3.1 نبض کی لہر کی تخلیق اور ترسیل کے اُصول (Principles of pulse wave generation and propagation) 3.3.2 نبض کی شرح، نظم، ساخت، تغیر (Pulse rate, rhythm, contour, variability) 3.3.3 طب یونانی میں نَبض کے معیارات: اَدِلَّہ نَبض (Unani parameters of *Nabz*: *Adilla Nabz)* 3.3.4 نبض کا جدید آلات کے ساتھ اِندماج (Integration of modern tools with Nabz assessment) **• M 3U 4 عروقی خرابی اور ہیموڈینامک عوارض Vascular Dysfunction and Hemodynamic Disorders Vascular Dysfunction and Hemodynamic Disorders** 3.4.1 اینڈوتھیلیل ڈسفنکشن: نائٹرک آکسائیڈ، التہاب، آکسیڈیٹیو تناؤ (Endothelial dysfunction: nitric oxide, inflammation, oxidative stress) 3.4.2 تصلب شرائین: آغاز، اِرتقاء، طبی مضمرات (Atherosclerosis: initiation, progression, clinical implications) 3.4.3 ہیموڈینامک عوارض (Hemodynamic disorders) 3.4.4 سَوداء اور سُوءِ مزاج کا عروقی امراض میں کردار Role of *Sauda*, and *Su'-e-Mizaj* in vascular pathology					
	M-4 نظامِ تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system This module covers the foundational and applied aspects of respiratory system physiology. It examines the mechanics of breathing, pulmonary ventilation, gas exchange, and neural regulation. Clinical conditions such as hypoxia, dyspnoea, asthma, and ARDS are discussed in relation to physiological	2	10	20	30	60

	dysfunction. Special focus is given to environmental adaptations like high-altitude acclimatization and the effects of deep-sea diving. The module integrates normal function with pathophysiology to enhance clinical understanding of respiratory health and disease. **• M 4U 1 تنفُّس کی میکانیات Mechanics of breathing** 4.1.1 تنفُّس کی اقسام (Types of breathing) 4.1.2 تنفُّس کے دوران دباؤ میں تبدیلیاں (Pressure changes during breathing) 4.1.3 جہدالتنفس (Work of breathing) 4.1.4 حُبَیبَاتِ رِئَوی (الویولائی) کا استحکام (Stability of alveoli) 4.1.5 تنفُّس کا عصبی نظم (Neural regulation of respiration) **• M 4U 2 تہویۃ الرئۃ Pulmonary ventilation** 4.2.1 حُبَیبَاتِ رِئَوی کا تہویۃ Alveolar ventilation 4.2.2 ریہ میں تدفق Perfusion of lungs 4.2.3 پھیپھڑوں میں گیسوں کا انتشار Diffusion of gases in the lungs 4.2.5 گیسوں کی نقل وحمل Transport of gases 4.2.6 گیسوں کا تبادلہ اور ان کی بے ضابطگیاں Gaseous exchange and their abnormalities					

	• **M 4U 3 تنفّس کی اطلاقی فزیالوجی Applied physiology of Respiration** 4.3.1 نقص الأکسجین Hypoxia 4.3.2 اختناق Asphyxia 4.3.3 فرط التنفس Hyperventilation 4.3.4 ضیق التنفس وضعی Orthopnoea 4.3.5 ربو القصبی Bronchial asthma 4.3.6 تلیف الرؤی مجہول السبب Idiopathic pulmonary fibrosis 4.3.7 عسر تنفس Dyspnoea 4.3.8 ضائقۃ التنفسیۃ متلازمۃ حاد Acute Respiratory Distress Syndrome • **M 4U 4 بلندی اور گہرے سمندر میں غوطہ زنی کی فزیالوجی Physiology of high altitude and deep-sea diving** 4.4.1 تأقلم ارتفاعات عالیہ Acclimatization to high altitude 4.4.2 داء الجبال Mountain sickness 4.4.3 ارتفات عالیہ پر اوذیما ریویہ High altitude pulmonary oedema 4.4.4 ائٹروجن نارکوسس اور اضطراب ضغط Nitrogen narcosis & Dysbarism					
		4	20	40	60	120
Semester No : 5						
2A Module Number	**2B Modules & units**	**2C Number of Credits**	**Notional Learning hours**			
			2D Lectures	**2E Practical Training**	**2F Experiential Learning including**	**2G Total**

					Modular Assessment	
	M-5 کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation This module provides an integrated overview of renal physiology and thermoregulation, combining modern biomedical knowledge with Unani perspectives. It covers kidney functions, urine examination, micturition, acid-base balance, and body temperature regulation. Emphasis is placed on clinical interpretation and the correlation of modern concepts with Unani principles such as *Istifrāgh*, *Quwwat-e-Maska*, and *Quwwat-e-Dāfiya*. **• M 5U 1 افعال کلیہ اور اسکے یونانی تصورات Renal Function and its Unani concept** 5.1.1 کلیہ کے افعال اور اِستِفراغ سے ربط (Functions of Kidneys and its correlation with *Istefirag)* 5.1.2 مختلف مزاج میں فحص بول (Examination of Urine in different *Mizaj)* 5.1.3 مختلف فعلیاتی حالات میں فحص بول (Examination of Urine under different Physiological conditions) **• M 5U 2 تبول کا میکانیزم اور اضطرابات Micturition Mechanism and abnormalities** 5.2.1 تبول کا عصبی کنٹرول (Nervous Control of Micturition) 5.2.2 کثرت تبول اور قُوّتِ ماسِکہ کی کمی (ذیابیطس میں) (Correlation of Polyuria with weakness of *Quwate Maska* as in Diabetes) 5.2.3 عمل تبول اور قُوّتِ دَافِیہ کا تعلق (Correlation of Micturition with *Quwate Dafiya)* 5.2.4 اضطرابات تبول	2	10	20	30	60

	(Disorders of Micturation) • **M 5U 3 حمضی قاعدی توازن Acid Base Balance** 5.3.1 حمضی قاعدی توازن کی تنظیم کلوی اور توازن کہارل (Renal Regulation of Acid-Base & Electrolyte Balance) 5.3.2 حمضی قاعدی عدم توازن (Acid-Base Imbalance) 5.3.3 ترکیز و تخفیف بول کا میکانیہ (Concentrating and diluting mechanism of Urine) 5.3.4 مُدِرّات اور اُن کے عمل کے طریقے (Diuretics and their Mechanisms of action) • **M 5U 4 جسمانی حرارت کی تنظیم Regulation of Body Temperature** 5.4.1 جسمانی حرارت کی تنظیم (Regulation of Body Temperature) 5.4.2 جسمانی حرارت کا اِرادی و سلو کی کنٹرول (Behavioural and Voluntary control of body temperature) 5.4.3 جسمانی حرارت کی خرابیاں (Abnormalities of Body temperature) 5.4.4 جسمانی حرارت کی پیمائش (Measurement of Body temperature)					
	M-6 تناسلی و نشوونمائی فزیالوجی Reproductive & Developmental Physiology This module explores the physiological basis of human reproduction and development across the lifespan, integrating neuroendocrine regulation, reproductive transitions, developmental milestones, and infertility. It emphasizes the Hypothalamic-Pituitary-Gonadal (HPG) axis, hormonal	2	10	20	30	60

	influences, and physiological changes during pregnancy, lactation, puberty, and aging. Special focus is given to Unani concepts such as *Quwwat-e-Muwallida*, *Tanasuliya*, *Su-e-Mizaj*, and reproductive hygiene. **• M 6U 1 افعال تناسلیہ کی نیوروایںڈوکرائن تنظیم Neuroendocrine Regulation of Reproductive Function** 6.1.1 نخامی وطائی تناسلی محور (Hypothalamic-Pituitary-Gonadal (HPG) Axis) 6.1.2 مرد وعورت میں دورہ تناسلیہ کا ہارمونی کنٹرول (Hormonal Control of Male & Female Reproductive Cycles) 6.1.3 یڈبیک میکانیزم اور نیوروایںڈوکرائن ریفلیکسز (Feedback Mechanisms & Neuroendocrine Reflexes) 6.1.4 طب یونانی میں قُوَّتِ مُوَلِّدَہ اور تَناسُلیہ کے مفاھیم (Unani Concepts of *Quwwat-e-Muwallida* and *Tanasuliya)* **• M 6U 2 حمل، رضاعت اور سن یاس Pregnancy, Lactation and Menopause** 6.2.1 حمل کے دوران فعلیاتی تبدیلیاں (Physiological Changes During Pregnancy) 6.2.2 افرازشیر کا رسیلیاتی نظم (Hormonal Regulation of Lactation) 6.2.3 سن یاس: رسیلیاتی تغیرات اور نظام جسمانی پر انکے اثرات (Menopause: Hormonal Shifts and Systemic Impact) 6.2.4 تناسلی مراحل پر یونانی نظریات (Unani views on Reproductive transitions) **• M 6U 3 نشوونما کی فزیالوجی Developmental Physiology** 6.3.1 مضغی وجنینی نشوونما					

	(Embryonic and Fetal Development) 6.3.2 بلوغت اور جنسی پختگی (Puberty and Sexual Maturation) 6.3.3 تقدم سن میں تناسلی نظام کی فعلیاتی تبدیلیاں (Physiological Changes in Aging Reproductive System) 6.3.4 زندگی کے مراحل پر یونانی نقطہ نظر (Unani Perspectives on Lifecycle Changes) **• M 6U 4 عقر، صحت انجابیہ اور طرزِ زندگی کے اثرات Infertility, Reproductive Health & Lifestyle Impact** 6.4.1 مرد و خاتون میں عقر کی فعلیاتی وجوہات (Physiological Causes of Infertility in Males and Females) 6.4.2 یونانی ربط: سُوءِ مزاج اور ضُعفِ قُوّتِ تناسُلی (Unani Correlations: *Su-e-Mizaj* and *Zofe Quwate Tanasuli)* 6.4.3 تناسلی صفائی اور اُصولِ حِفظانِ صحت (Reproductive Hygiene and *Usool-e-Hifzan-e-Sehat)* 6.4.4 تناسلی صحت پر ماحول و طرزِ زندگی کے اثرات (Lifestyle and Environmental Factors Affecting Reproductive Health)					
		4	20	40	60	120

Semester No : 6

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E	2F	2G Total

				Practical Training	**Experiential Learning including Modular Assessment**	
	M-7 غدودی اور میٹابولک انضمام Endocrine & Metabolic Integration This module explores the integrative role of the endocrine system in regulating metabolism and physiological homeostasis. It covers mechanisms of hormone signaling, metabolic regulation through hormonal interplay, circadian endocrine rhythms, and common endocrine disorders. Emphasis is placed on the interaction of hormonal pathways in maintaining glucose, lipid, and protein balance, as well as on how disruptions can lead to conditions such as obesity, PCOS, and diabetes. The module also highlights Unani perspectives on *Mizaj*, *Baroodat*, and their relation to endocrine imbalance, offering a comparative approach to prevention and management using both traditional and contemporary frameworks. **• M 7U 1 ہارمونی سگنلنگ اور ہدف عضو کا ردِ عمل Hormonal Signalling & Target Organ Response** 7.1.1 ہارمون سگنلنگ کی اقسام (آٹو کرائن، پیراکرائن، اینڈوکرائن) (Types of hormone signalling (autocrine, paracrine, endocrine) 7.1.2 ہارمون کے عمل کے میکانیزم Mechanisms of hormone action 7.1.3 ہدف عضو کی حساسیت، ریسپٹر اظہار، فیڈبیک ریگولیشن Target organ sensitivity, receptor expression, and feedback regulation 7.1.4 ہائپوتھیلامس-ہائپوفیز پورٹل سسٹم	2	10	20	30	60

	(Hypothalamic-Hypophysial portal system) • **M 7U 2 استحالوی نظم اور رسیلاتی تداخل Metabolic Regulation & Hormonal Crosstalk** 7.2.1 ہارمونز کے ذریعے گلوکوز، لپڈ، اور پروٹین میٹابولزم کی تنظیم (Hormonal regulation of glucose, lipid, and protein metabolism) 7.2.2 انسولین، گلوکاگون، کورٹیسول، نموی ہارمون، اور تھائرائیڈ ہارمون کا باہمی تعامل (nsulin, glucagon, cortisol, GH, thyroid hormone interactions) 7.2.3 توانائی کا توازن، میٹابولک لچک، اور ہارمونل موافقت پذیر ردعمل (Energy balance, metabolic flexibility, and adaptive hormonal response) • **M 7U 3 یوماوی وایںڈوکرائن نظم اور ہارمونوی عوارض Circadian Endocrine Rhythms & Hormonal Disorders** 7.3.1 افراز رسیلات کا یومیہ تغیر (کورٹیسول، میلے ٹونن، رسیلہ نموی) (Diurnal variation in hormone secretion (cortisol, melatonin, GH)) 7.3.2 نظم یوماوی کی خرابی کے اینڈوکرائن صحت پر اثرات (Impact of circadian rhythm disruption on endocrine health) 7.3.3 ہارمونوی توازن کی خرابیاں: ہارمون کی زیادتی یا کمی (Disorders of hormonal balance: Hyper/Hypo secretion of hormones) • **M 7U 4 طرزِ زندگی، استحالوی عوارض اور مزاج Lifestyle, Metabolic Disorders & Mizaj in Endocrine Physiology** 7.4.1 سمن مفرط، پی سی او ایس، اور ٹائپ ٹو ذیابیطس کی پیتھوفیزیالوجی (Pathophysiology of obesity, PCOS, and Type 2 diabetes) 7.4.2 یونانی ارتباط: مزاج، بَرُودَت اور ہارمونی بے ترتیبی (Unani correlation: *Mizaj*, *Baroodat*, and endocrine imbalances) 7.4.3 جدید و یونانی اُصولوں کا تکامل: علاجی و احتیاطی تدابیر					

	(Preventive and therapeutic approaches integrating Unani and modern frameworks)					
	M-8 نیوروفزیالوجی، تناؤ، اور خاص حسّات Neurophysiology, Stress, and Special Senses This module delves into the functional integration of the nervous and neurohumoral systems, the physiology of stress and adaptation, special senses, and higher brain functions. It emphasizes the interplay between neurological, endocrine, and behavioral responses in health and disease. The module also explores Unani regimens such as *Riyāzat*, *Nutool*, and *massage* in neurophysiological regulation, alongside traditional perspectives on *Quwwat-e-Hāfiza*, *Nawm*, and emotional well-being. Stress physiology, sensory processing, cognitive functions, and sleep are studied through both modern and Unani frameworks, fostering holistic understanding and therapeutic insight. **• M 8U 1 عصبی و نیوروہیومورل نظام کا اِندماج Functional Integration of Nervous & Neurohumoral Systems** 8.1.1 عصبی و ہارمونی نِظام کا فعالی اِندماج (Functional Integration of Nervous and Hormonal Systems) 8.1.2 جسمانی افعال کا مرکزی ضبط (آٹونومک و اینڈوکرائن نظم) (Central Regulation of Body Functions (Autonomic & Endocrine Interplay) 8.1.3 یونانی تدابیر کی نیوروفزیالوجی: رِیاضَت، مساج، نُطول، آرام کے طریقے (Neurophysiology of Unani Regimens: *Riyazat*, Massage, *Nutool*, Relaxation Techniques) 8.1.4 نیورو اینڈوکرائن نظم میں گٹ-برین ایکسس کا کردار اور یونانی علاج (Role of Gut-Brain Axis in Neuroendocrine Regulation and Unani Therapeutics) **• M 8U 2 اظطراب، تکیف، اور امراض Stress, Adaptation, and Disorders**	2	10	20	30	60

	8.2.1 اظطراب کی فزیالوجی: حادہ بمقابلہ دائمی اظطراب (Stress Physiology: Acute vs Chronic Stress) 8.2.2 تکیف کے میکانیہ جات (Mechanisms of Adaptation) 8.2.3 اضطراب، اِکتِئاب اور سہر کی نیوروفزیالوجی (Neurophysiological Basis of Anxiety, Depression & Insomnia) 8.2.4 تکیف کے عوارض کا یونانی طریقہ علاج میں اِندماج (Integration of Stress Disorders in Unani Therapeutics) **• M 8U 3 خصوصی حواس کی فزیالوجی اور حسی امراض Physiology of Special Senses and Sensory Disorders** 8.3.1 حِسّی فزیالوجی: بصارت، سماعت، ذائقہ، بُو، لمس (Sensory Physiology: Vision, Hearing, Taste, Smell, Touch) 8.3.2 حواس خاصہ کے امراض (Disorders of Special Senses) 8.3.3 یونانی طریقوں سے اِدراکی صلاحیت میں اِضافہ (Cognitive Enhancement through Unani Techniques) **• M 8U 4 اعلیٰ دماغی افعال اور نیند کی فزیالوجی Higher Brain Functions and Sleep Physiology** 8.4.1 تعلم، یادداشت، اور جذبات کی تنظیم (Learning, Memory and Emotional Regulation) 8.4.2 نفسیاتی۔فعلیاتی اِندماج: ذہن۔جسم کا تعلق (Psychophysiological Integration: Mind-Body Axis) 8.4.3 نفسیاتی۔فعلیاتی اِندماج: ذہن۔جسم کا تعلق (Physiology and Significance of Sleep & Dreams) 8.4.4 یونانی تصورات: قُوّتِ حافظہ، نَوم، اور جذباتی سلامتی					

	(Unani Concepts of *Quwwat-e-Hafiza*, *Nawm*, and Emotional Well-being)					
		4	20	40	60	120
		16	80	160	240	480

Paper No : 2 حیاتی کیمیا،جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics

Semester No : 3

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-9 حیاتیاتی سالمات Biomolecules This module is designed to provide postgraduate learners with a comprehensive understanding of the fundamental biomolecules essential for life processes. It covers the structure, classification, properties, and biological significance of carbohydrates, proteins and lipids. Special emphasis is laid on the biochemical roles of these molecules in human physiology, their metabolic pathways, and their relevance in health and disease. • **M 9U 1 حیاتی کیمیائی ساختوں کے عمومی اصول General principles of biochemical structures** 9.1.1 حیاتیاتی ساخت اور افعال کی بنیاد کے طور پر میکرومالیکیولر تنظیم	2	10	20	30	60

	Macromolecular organization as the basis of biological structure and function 9.1.2 سٹیریو آئسومیرزم کا تصور Concept of stereoisomerism 9.1.3 حیاتی سالمات (کاربوہائیڈریٹ، لیپڈز، پروٹینز، نیوکلک ایسڈز) کی ساخت اور افعال Structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids) 9.1.4 توانائی کے میٹابولزم اور خلیائی عمل میں حیاتی سالمات کا کردار Role of biomolecules in energy metabolism and cellular processes 9.1.5 حیاتی سالمات اور یونانی اصولوں کے درمیان تعلق Relationship between biomolecules and Unani principles **• M 9U 2 پروٹینز Proteins** 9.2.1 فعلیاتی اقسام: ساختانی پروٹینز، انزائمز، ٹرانسپورٹرز، ریگولیٹری پروٹینز Functional types: Structural proteins, enzymes, transporters, regulatory proteins 9.2.2 پروٹین کی ساخت اور ترکیب Protein composition and strucure 9.2.3 پروٹین کے تنوع کی ساختانی بنیاد Structural basis of protein diversity **• M 9U 3 لیپڈز Lipids** 9.3.1 جسم میں لیپڈز کی اقسام Types of lipids in body 9.3.2 جسم میں لیپڈز کے کردار Roles of lipids in the body 9.3.3 لیپڈز کی ساخت اور افعال					

	Structure and functions of lipids • M 9U 4 کاربوہائیڈریٹس Carbohydrates 9.4.1 کاربوہائیڈریٹس کی ساخت اور اقسام Strucure and types of carbohydrates 9.4.2 جسم میں کاربوہائیڈریٹس کا کردار Role of carbohydrates in body					
	M-10 مسارات استقلابیہ اور انکی تنظیم Metabolic Pathways and Regulation This module aims to provide in-depth knowledge of the major metabolic pathways operating in the human body and their regulation. This module covers the biochemical reactions involved in the metabolism of carbohydrates, lipids and proteins, along with their integration and regulation. It highlights the role of hormones and enzymes in maintaining metabolic homeostasis and explains the physiological basis of metabolic disorders. • M 10U 1 عمومی اُصول General principle 10.1.1 انسانی میٹابولزم کی مجموعی حکمت عملی اور منطق The overall strategy and logic of human metabolism 10.1.2 آزاد توانائی، اینٹروپی Free energy, entropy 10.1.3 اے ٹی پی کی ساخت اور اس کا توانائی کا مواد Structure of ATP and its energy content 10.1.4 میٹابو لک کنٹرول کے اصول Principles of metabolic control 10.1.5 قلیل مدتی کنٹرولز: ایلوستیرک اثرات (ملی سیکنڈز)، کوویلنٹ ترمیم (سیکنڈز سے منٹس)	2	10	20	30	60

	Short-term controls: Allosteric effects (milliseconds), covalent modification (seconds to minutes) 10.1.6 طویل مدتی کنٹرولز: انزائم انڈکشن/سپریشن (گھنٹوں سے دنوں تک) Long-term controls: Enzyme induction/suppression (hours to days) **• M 10U 2 اے ٹی پی کی پیداوار اور کنٹرول ATP Production and Control** 10.2.1 مائٹوکونڈریل تنفس کے مسارات Pathways of mitochondrial oxidation 10.2.2 الیکٹران ٹرانسپورٹ سلسلہ The electron transport chain 10.2.3 مائٹوکونڈریل اے ٹی پی سنتھیسس Mitochondrial ATP Synthesis 10.2.4 کیمی اوسموٹک میکانزم The Chemiosmotic Mechanism **• M 10U 3 انزائمز Enzymes** 10.3.1 حیاتی کیمیائی تعاملات اور انزائمز کے مفاہیم Concepts of Biochemical Reactions and Enzymes 10.3.2 حیاتی کیمیائی تعاملات کی اقسام: ہائیڈرولیسس، لیگیشن، کنڈینسیشن، گروپ-ٹرانسفر، ریڈوکس، آئسومیرائزیشن Classes of biochemical reaction: Hydrolysis, ligation, condensation, group-transfer, redox, isomerisation 10.3.3 انزائمز کس طرح کیمیائی تعاملات کو عموماً متحرک کرتے ہیں How enzymes catalyse chemical reactions in general terms 10.3.4 انزائمز کی ساخت اور افعال Structure and Function of Enzymes 10.3.5 تخفیز اور خصوصیت کے لیے فعال مقام کی اہمیت					

	Importance of active site for catalysis and specificity 10.3.6 انزائمز اور افعال (فنکشنز) و مزاج کے یونانی اصولوں کے درمیان تعلق Relationship between enzymes and Unani principles of *Af'al* (functions) and *Mizaj* **• M 10U 4 میٹابولک مسارات Metabolic pathways** 10.4.1 اہم میٹابو لک مسارات Major metabolic pathways 10.4.2 کاربوہائیڈریٹس، فیٹس اور پروٹینز کا میٹابولزم Metabolism of Carbohydrates, Fats and Proteins 10.4.3 میٹابو لک تکیُّف اور عوارض Metabolic adaptations and disorders					
		4	20	40	60	120

Semester No : 4

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-11 جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques	2	10	20	30	60

	This module introduces advanced biochemical methods with a focus on spectroscopic and chromatographic techniques, biomarker analysis, and Unani diagnostic correlations. Students will explore instrumentation principles, clinical applications of advanced testing, and integration of traditional diagnostic elements like *Mizaj* and *Tabiat* with modern biomedical insights. **• M 11U 1 اسپیکٹروسکوپک تکنیکیں Spectroscopic techniques** 11.1.1 "مختلف اسپیکٹروسکوپک تکنیکوں (یووی-وِس، آئی آر، فلوریسینس، این ایم آر، ماس اسپیکٹرومیٹری) کے اصول اور اطلاقات۔ Principles and applications of various spectroscopic techniques (UV-Vis, IR, Fluorescence, NMR, mass spectrometry). 11.1.2 اسپیکٹروسکوپک آلات کا استعمال کرتے ہوئے انزائم کی تخمینہ کاری کی تکنیکیں Enzyme estimation techniques using spectroscopic tools. **• M 11U 2 کرومیٹوگرافک تکنیکیں Chromatographic techniques** 11.2.1 کرومیٹوگرافک تکنیکوں کے اصول اور اطلاقات Principles and applications of chromatographic techniques 11.2.2 ایچ پی ایل سی، جی سی اور ٹی ایل سی HPLC, GC and TLC **• M 11U 3 بائیومارکرز اور یونانی ادغام Biomarkers and Unani Integration** 11.3.1 ائیومارکرز کی شناخت Identification of biomarkers. 11.3.2 بائیومارکرز کے اطلاقات Applications of Biomarkers 11.3.3 جدید بائیومارکرز کو یونانی تشخیص کے ساتھ مربوط کرنا Interfacing modern biomarkers with Unani diagnostics.					
	M-12 طبی حیاتی کیمیا Medical Biochemistry	2	10	20	30	60

	This module focuses on the clinical relevance of biochemistry in patient diagnosis and management. It emphasizes enzyme markers, fluid analysis, organ function tests, and clinical correlations. Special emphasis is placed on validating Unani principles using modern biochemical diagnostics. **• M 12U 1 کلینیکل بائیوکیمسٹری clinical biochemistry** 12.1.1 امراض کی تشخیص میں کلینیکل بائیوکیمسٹری Clinical biochemistry in the diagnosis of diseases. 12.1.2 تشخیص میں گیسیین آئنز، پی ایچ، میٹابولک سبسٹریٹس، ہارمونز، اور انزائم کی سطح Gases, ions, pH, metabolic substrates, hormones, and enzyme levels in diagnosis. 12.1.3۔ تلف الأنسجۃ کے انزائم مارکرز (مثلاً، اے ایس ٹی، اے ایل ٹی، ایل ڈی ایچ، سی کے۔ایم بی، ٹروپونن) Enzyme markers of tissue damage (e.g., AST, ALT, LDH, CK-MB, troponin). 12.1.4۔ انزائم پر مبنی مقایسۃ: گلوکوز، یوریا، کریٹینین Enzyme-based assays: Glucose, urea, creatinine. **• M 12U 2 حیاتی کیمیائی تجزیہ biochemical Analysis** 12.2.1 کلینیکل بائیوکیمسٹری ٹیسٹ (مثلاً، خون کی بائیوکیمسٹری، جگر کے افعال کے ٹیسٹ گردے کے افعال کے ٹیسٹ، لیپڈ پروفائل اور پیشاب کی بائیوکیمسٹری)۔ Clinical biochemistry tests (e.g., blood biochemistry, liver function tests, kidney function tests, lipid profile and urine biochemistry). 12.2.2 حیاتی کیمیائی بے ضابطگیوں اور کلینیکل مظاہر کے درمیان باہمی تعلق Correlation between biochemical abnormalities and clinical manifestations. 12.2.3 یونانی اصولوں کی توثیق میں حیاتی کیمیائی تکنیکوں کا کردار Role of biochemical techniques in validation of Unani principles.					
		4	20	40	60	120

Semester No : 5						
2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-13 اساس جینیات Foundations of Genetics This module introduces the historical evolution of genetics, fundamental concepts of heredity, gene structure and function, and molecular mechanisms of gene expression. Special focus is laid on physiological roles of genes and chromosomes, cellular division, mutations, and gene-environment interactions, with a comparative approach integrating Unani concepts like *Warasat*, *Mizaj*, quwat-i-musawwira,quwwat-i-muallidah and *Tabi'at*. **• M 13U 1 تاریخی اور مالیکیولر بنیادیں Historical and Molecular Foundations** 13.1.1 مینڈل کے تجربات اور وراثت کے قوانین Mendel's experiments and laws of inheritance 13.1.2 طبی جینیات کے ماخذ اور اثرات Origins and impact of medical genetics 13.1.3 ڈی این اے کی موروثی مواد کے طور پر دریافت Discovery of DNA as hereditary material 13.1.4 ڈی این اے کی ساخت، تکرار، اور افعال	2	10	20	30	60

	DNA structure, replication, and function 13.1.5 جین کا اظہار (ٹرانسکرپشن، ٹرانسلیشن) Gene expression (transcription, translation) 13.1.6 میوٹیشنز کی اقسام اور اثرات Types and effects of mutations 13.1.7 "آر این اے (ایم آر این اے، ٹی آر این اے، آر آر این اے) کی ساخت اور اقسام اور جین کے اظہار میں ان کے کردار Structure and types of RNA (mRNA, tRNA, rRNA) and their roles in gene expression 13.1.8 یونانی مفاہیم سے فلسفیانہ مطابقت Philosophical relevance to Unani concepts 13.1.9 "طبی مثالوں کا استعمال کرتے ہوئے یونانی موروثی اصولوں کا جدید وراثتی نمونوں کے ساتھ ادغام Integration of Unani hereditary principles with modern inheritance patterns using clinical examples **• M 13U 2 انسانی کروموسومل ساخت اور جینیاتی تغیر Human Chromosomal Structure and Genetic Variation** 13.2.1 انسانوں میں می اوسس اور گیمیٹوجینسس کے عمل Meiosis and gametogenesis processes in humans 13.2.2 انسانی کروموسوم کی ساخت اور تنظیم Human chromosome structure and organization 13.2.3 انسانی کروموسومل بے ضابطگیوں کی اقسام (این یوپلائیڈی، ٹرانسلوکیشنز) Types of human chromosome abnormalities (aneuploidy, translocations) - 13.2.4 انسانوں میں جینیاتی تغیر کے ماخذ (میوٹیشنز، پولیمارفزمز، سی این ویز) Origins of genetic variation in humans (mutations,					

	polymorphisms, CNVs) - انسانی جینیاتی تغیر کے کھوج کے طریقے (این جی ایس، ارے سی جی ایچ)13.2.5 Detection methods for human genetic variation (NGS, array CGH) - انسانی طِرازٌ مَظْہری ؒاور امراض پر جینیاتی تغیر کا اثر13.2.6 Impact of genetic variation on human phenotypes and disease **• M 13U 3 انسانی آبادی کی جینیات اور وراثتی نمونے Human Population Genetics and Inheritance Patterns** انسانی آبادیوں میں ایلیل اور جینوٹائپ کی فریکوئنسیز13.3.1 Allele and genotype frequencies in human populations انسانی جینیات میں ہارڈی-وائنبرگ توازن کے اصول13.3.2 Hardy-Weinberg equilibrium principles in human genetics انسانوں میں جینیاتی لنکیج، ریکمبینیشن، اور لنکیج عدم توازن13.3.3 Genetic linkage, recombination, and linkage disequilibrium in humans انسانی خصوصیات میں وراثت پذیری کے مفاہیم اور مقداری جینیات13.3.4 Heritability concepts and quantitative genetics in human traits انسانی امراض میں آٹوسومل ڈومیننٹ/ریسیسو وراثت13.3.5 Autosomal dominant/recessive inheritance in human disorders انسانوں میں ایکس-لنکڈ، وائی-لنکڈ، مائٹوکونڈریل وراثت13.3.6 X-linked, Y-linked, mitochondrial inheritance in humans انسانوں میں غیر روایتی وراثت (موزیکزم، امپرنٹنگ، ٹرائی نیوکلیوٹائیڈ ریپیٹس)13.3.7 Nontraditional inheritance in humans (mosaicism, imprinting, trinucleotide repeats) انسانی جینیاتی امراض کے لیے ایمپیرک خطرات اور دوبارہ ہونے کے خطرات 13.3.8					

	Empiric risks and recurrence risks for human genetic disorders انسانی جینیاتی خطرے کے حساب کتاب کے لیے پرو میبلٹی اور بے کا تھیورم 13.3.9 Probability and Bayes' theorem for human genetic risk calculation					
	M-14 Human Genetic Disorders and Diagnostic Approaches This module integrates modern genetics with Unani medicine. It covers chromosomal, biochemical, monogenic, and developmental disorders, exploring their molecular basis and diagnostic methods. The module explains the genetic architecture of complex disorders and pharmacogenetics, while building practical diagnostic skills. Students will learn to apply genetic principles to clinical scenarios from a Unani perspective, design patient-centered genetic testing and counseling, and develop integrated frameworks for understanding genetic conditions within Unani medicine. **• M 14U 1 انسانی کروموسومل اور حیاتی کیمیائی امراض Human Chromosomal and Biochemical Disorders** انسانی تشخیص میں کروموسوم بینڈنگ تکنیکیں 14.1.1 Chromosome banding techniques in human diagnostics انسانی جینیاتی ٹیسٹنگ میں مالیکیولر سائٹو جینیٹکس (فش، ارے سی جی ایچ)14.1.2 Molecular cytogenetics in human genetic testing (FISH, array CGH) انسانی آٹوسومز اور جنسی کروموسومز کے امراض14.1.3 Disorders of human autosomes and sex chromosomes انسانوں میں میٹابولزم کی پیدائشی خرابیاں14.1.4 Inborn errors of metabolism in humans انسانی مائٹوکونڈریل امراض اور ان کی جینیات14.1.5 Human mitochondrial disorders and their genetics	2	10	20	30	60

	انسانی جینیاتی امراض میں انزائم المقایسے اور میٹابولومکس کے اصول 14.1.6 Principles of enzyme assays and metabolomics in human genetic disorders **• M 14U 2 انسانی مونوجینک اور نشوونما کے امراض Human Monogenic and Developmental Disorders** انسانوں میں مرض-جین کی شناخت (پوزیشنل کلوننگ، ڈبلیوای ایس) 14.2.1 Disease-gene identification in humans (positional cloning, WES) انسانی مونوجینک امراض اور ان کی مالیکیولر بنیاد 14.2.2 Human monogenic disorders and their molecular basis انسانی ابتدائی جنینی نشوونما میں جینز 14.2.3 Genes in human early embryonic development انسانی پیٹرننگ جینز اور مورفوجینسس 14.2.4 Human patterning genes and morphogenesis انسانی نشوونما پر ٹیراٹوجنز اور ماحولیاتی اثرات 14.2.5 Teratogens and environmental effects on human development انسانی ڈسمورفک سنڈرومز اور ان کی جینیاتی بنیاد 14.2.6 Human dysmorphic syndromes and their genetic basis **• M 14U 3 انسانی پیچیدہ امراض اور فارماکوجینیٹکس Human Complex Disorders and Pharmacogenetics** انسانی پیچیدہ امراض کی جینیاتی ساخت 14.3.1 Genetic architecture of human complex disorders انسانی امراض میں جینوم-وائیڈ ایسوسی ایشن اسٹڈیز (جی ڈبلیو اے ایس) 14.3.2 Genome-wide association studies (GWAS) in human disease انسانی امراض کی پیش گوئی میں پولی جینک رسک اسکورز 14.3.3 Polygenic risk scores in human disease prediction					

	14.3.4 انسانی صحت اور امراض میں اپی جینیٹک میکانزمز Epigenetic mechanisms in human health and disease 14.3.5 انسانوں میں فارماکو جینیٹکس اور طب شخصی Pharmacogenetics and personalized medicine in humans 14.3.6 انسانی پیچیدہ امراض میں جین-ماحول کے تعاملات Gene-environment interactions in human complex disorders					
		4	20	40	60	120

Semester No : 6

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-15 Medical Genetics, Genomic Applications, and Population Genetics This module integrates principles of human medical genetics, population genetics, and chromosomal disorders to develop diagnostic and interpretative competencies. It also explores the physiological impact of genetic and chromosomal variations and aligns them with Unani principles, especially *Takwin-i-Janin* (embryogenesis) and *Quwa Tanasuliyya* (reproductive capability). Focus is placed on interpreting inheritance patterns, understanding	2	10	20	30	60

	polygenic and mitochondrial inheritance, and recognizing gene-disease associations through the lens of Unani Tibb. • **M 15U 1 آبادی کی جینیات اور وراثتی خطرات Population Genetics and Inheritance Risks** 15.1.1 ہارڈی–وائنبرگ توازن Hardy-Weinberg equilibrium 15.1.2 تَزاوُجِ مُتَلائِق، جینیاتی اِنْجِراف، طَفْرَة، اور انتخاب Assortative mating, genetic drift, mutation, and selection 15.1.3 تَعَدُّدُ الأَشْكَالِ اور ہیٹروزیگوس فائدہ Polymorphism and heterozygote advantage 15.1.4 مراض کی فریکوئنسیز میں نسلی اختلافات Ethnic differences in disease frequencies 15.1.5 انسانی جینوم کا جائزہ Human genome overview 15.1.6 یونانی تناظر: وراثت Unani perspective: *Wirasiyyaat* • **M 15U 2 جینی خلل Gene disorder** 15.2.1 واحد جینی خلل Single gene disorders 15.2.2 آٹوسومل ڈومینینٹ اور ریسیسو وراثت Autosomal dominant and recessive inheritance 15.2.3 پینیٹرنس، ایکسپریسوٹی، اور اولاد کو خطرہ Penetrance, expressivity, and risk to offspring 15.2.4 مائٹوکونڈریل وراثت Mitochondrial inheritance					

	15.2.5 پولی جینک مرض، جڑواں ہم آہنگی، حساسیت کے جینز Polygenic disease, twin concordance, susceptibility genes 15.2.6 خون کے رشتوں میں شادی کے اثرات Impact of consanguinity **• M 15U 3 جینیاتی نقشہ سازی اور امراض کی مالیکیولر بنیاد Genetic Mapping and Molecular Basis of Disorders** 15.3.1 جینیاتی لنکیج اور جینیاتی نقشہ سازی کا اصول Genetic linkage and principle of genetic mapping 15.3.2 طَفَرات: پوائنٹ طَفَرات، ڈیلیشنز، ریپیٹ ایکسپینشنز Mutations: point mutations, deletions, repeat expansions 15.3.3 تشخیصی پروبز کا استعمال کرتے ہوئے ڈی این اے پر مبنی تشخیص DNA-based diagnosis using diagnostic probes 15.3.4 میوٹنٹ فینوٹائپس کی مالیکیولر بنیاد Molecular basis of mutant phenotypes 15.3.5 سیکوینسنگ اور نقلی مالیکیولر تشخیص کا جائزہ (مثلاً، پی سی آر، آر ایف ایل پی) Overview of sequencing and simulated molecular diagnostics (e.g., PCR, RFLP) 15.3.6 یونانی تشخیص اور تَہَّن مرض میں اطلاقات Applications in Unani diagnosis and prognosis **• M 15U 4 مشاورت اور عوامی صحت کے اطلاقات Counseling & Public Health Applications** 15.4.1 ڈی این اے پر مبنی تشخیص اور جینیاتی پروبز کے اصول Principles of DNA-based diagnostics and genetic probes 15.4.2 قبل از پیدائش اور بعد از پیدائش تشخیص (اسکریننگ کے طریقے) Prenatal and postnatal diagnosis (screening methods)					

	15.4.3 جینیاتی مشاورت–بنیادی پروٹوکولز Genetic counseling – basic protocols 15.4.4 جینیات میں اخلاقی/قانونی/معاشرتی مسائل Ethical/legal/social issues in genetics 15.4.5 عوامی صحت اور کمیونٹی اسکریننگ میں اطلاق Application in public health and community screening 15.4.6 یونانی مفاہیم—بالخصوص تکوینِ جنین (ایمبریو جینسس) اور قوتِ تناسلیہ (ری پروڈکٹو فیکلٹی) Unani concepts—particularly *Takwin-i-Janin* (embryogenesis) and *Quwa Tanasuliyya* (reproductive faculty)					
	M-16 طبی معلومیات Bioinformatics This module is designed to introduce Unani postgraduates to the basics of bioinformatics, with a focus on its applications in traditional medical systems. The course offers a blend of theoretical learning, practical training, and experiential learning, providing a holistic approach for using bioinformatics tools and databases in the study and research of Unani medicine. **• M 16U 1 طبی معلومیات کا تعارف Introduction to Bioinformatics** 16.1.1 طبی معلومیات کی تعریف، دائرہ کار، اہمیت (Definition, scope, and significance of bioinformatics) 16.1.2 طب یونانی میں طبی معلومیات کے اطلاقات (Overview of bioinformatics applications in Unani Medicine) 16.1.3 اعشاب طبیہ اور فارماکوجینومکس میں طبی معلومیات کا کردار (Role of bioinformatics in herbal medicine and pharmacogenomics) **• M 16U 2 حیاتیاتی ڈیٹا بیسز اور معلومات کی بازیافت Biological Databases and Information Retrieval**	2	10	20	30	60

	16.2.1 حیاتیاتی ڈیٹابیس کی اقسام: ترتیب ڈیٹابیس (جین بینک، ای ایم بی ایل)، ساخت ڈیٹابیس (پی ڈی بی)، اور خصوصی ڈیٹابیس (مثلاً آیوش سے متعلقہ ڈیٹابیس) (Types of biological databases: Sequence databases (GenBank, EMBL), structure databases (PDB), and specialized databases (e.g., AYUSH-specific databases) 16.2.2 ترتیب، ساخت، اور فعالیاتی ڈیٹا کی بازیافت اور تجزیہ کے طریقے (Methods to retrieve and analyze sequence, structure, and functional data) 16.2.3 طبی معلومیات ٹولز کا تعارف (Introduction to bioinformatics tools like BLAST, FASTA, and PubMed) **• M 16U 3 جینو مکس اور پروٹیو مکس Genomics and Proteomics** 16.3.1 جینو مکس کا جائزہ: جین کی ساخت، فعل، تشریح (Overview of genomics: Gene structure, function, and annotation) 16.3.2 پروٹیو مکس کا تعارف: پروٹین کی ساخت، تہہ بندی، فعل (Introduction to proteomics: Protein structure, folding, and function) 16.3.3 طب شخصی اور اعشاب کی فارماکولوجی میں جینو مکس/پروٹیو مکس کے اطلاقات (Applications of genomics and proteomics in personalized medicine and herbal pharmacology) 16.3.4 دوا کی دریافت میں طبی معلومیات کا کردار (Role of bioinformatics in traditional drug discovery) **• M 16U 4 مالیکیولر ماڈلنگ اور دوا کی دریافت Molecular Modelling and Drug Discovery** 16.4.1 دوا کی دریافت میں مالیکیولر ماڈلنگ کی اہمیت (Molecular modelling and its significance in drug discovery) 16.4.2 ساخت کی پیشین گوئی، ہومولوجی ماڈلنگ، مالیکیولر ڈاکنگ (Structure prediction, homology modelling, and molecular docking)					

	16.4.3 یونانی ادویات کی دریافت و ترقی میں طبی معلومیات کا اطلاق (Bioinformatics application in Unani drug discovery and development)					
		4	20	40	60	120
		16	80	160	240	480
Paper No : 3 معالیجاتی منافع الاعضاء Clinical Physiology						
Semester No : 3						
2A Module Number	**2B Modules & units**	**2C Number of Credits**	**Notional Learning hours**			
			2D Lectures	**2E Practical Training**	**2F Experiential Learning including Modular Assessment**	**2G Total**
	M-17 طبی تغذیہ Clinical Nutrition This module explores foundational and clinical aspects of nutrition, integrating biomedical and Unani perspectives. It covers nutrient classification, dietary planning, nutritional assessment, and energy metabolism in health and disease. Special focus is given to *Mizaj*-based dietary principles and *Ilāj bil Ghizā* (dietary therapy). The module also introduces Unani postgraduates to therapeutic diets, body composition analysis, and energy requirements in	2	10	20	30	60

	clinical and recovery settings, enhancing their ability to apply nutrition science in patient care. **• M 17U 1 Fundamentals of Nutrition – Current and Unani Perspectives غذیہ کے بنیادی اُصول: جدید و یونانی نقطہ نظر** 17.1.1 طب یونانی و جدید سائنس میں تغذیہ کے تصورات (Nutrition Concepts in Unani and Contemporary Sciences) 17.1.2 مِزاج پر مبنی غذائی تفہیم (Mizaj-based Nutritional Understanding in Unani Medicine) 17.1.3 غذائی اجزاء کی درجہ بندی و افعال (Classification and Function of Nutrients) 17.1.4 Nutrition in Health, Growth and Performance 17.1.5 اغذیہ وظیفیہ اور مغذیات (Functional Foods and Nutraceuticals) **• M 17U 2 Clinical Nutrition and Dietary Planning طبی تغذیہ اور غذائی منصوبہ بندی** 17.2.1 طبی تغذیہ اور غذاے ءدوائیہ کے اُصول (Principles of Clinical Nutrition and Therapeutic Diets) 17.2.2 مخصوص آبادیوں کے لیے غذائی ہدایات (بزرگ، حاملہ، کھلاڑی، بچے) (Dietary Guidelines for Specific Populations (Elderly, Pregnant, Athletes, Children) 17.2.3 عام عوارض میں غذائی انتظام: ذیابیطس، سمن، ضغط الدم قوی (Nutritional Management in Common Disorders: Diabetes, Obesity, Hypertension) 17.2.4 ہسپتال کی ترتیب میں تغذیہ: اینٹرل اور پیرنٹرل فیڈ نگ (Nutrition in Hospital Settings: Enteral and Parenteral Feeding)					

	17.2.5 یونانی تجاویز: تعدیلِ غذا، علاج بالغذا (Unani Recommendations for *Tadeel-e-Ghiza*, *Ilaj bil Ghiza)* **• M 17U 3 غذائی جائزہ اور جسمانی ترکیب Nutritional Assessment and Body Composition** 17.3.1 غذائی تجزیہ تکنیکات اور غذائی جائزہ ٹولز (Nutrient Analysis Techniques and Dietary Assessment Tools) 17.3.2 جسمانی ساخت کا تجزیہ: بی ایم آئی، خصر ورک تناسب، جلد کی تہ کی موٹائی (Body Composition Analysis: BMI, Waist-Hip Ratio, Skinfold Thickness) 17.3.3 تغذیاتی حالت کا جائزہ: طبی، حیاتی کیمیائی، انسانی پیمائشی اشاریے (Nutritional Status Assessment: Clinical, Biochemical, Anthropometric Indicators) 17.3.4 غذائی قلت (کم/زیادہ غذائیت): شناخت و انتظام (Malnutrition (Undernutrition & Overnutrition): Detection and Management) **• M 17U 4 توانائی کا استحالہ اور مزاج پر مبنی تدبیر Energy Metabolism and Mizaj-Based Modulation** 17.4.1 توانائی کا خرچ اور کل توانائی کی ضرورت کے اجزاء (Energy Expenditure and Components of Total Energy Requirement) 17.4.2 بنیادی میٹابولک شرح (بی ایم آر): تعین کنندہ عوامل اور حسابات (Basal Metabolic Rate (BMR): Determinants and Calculations) 17.4.3 بنیادی میٹابولک شرح اور مزاج: میٹابولزم و مزاج کی یونانی تشریح (BMR and Mizaj: Unani Interpretation of Metabolism and Temperament) 17.4.4 بیماری و استرداد میں کیلوری کی ضروریات (Caloric Needs in Disease and Recovery States)					
	M-18 معدہ۔کبدی و صفراوی نظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System	2	10	20	30	60

	This module focuses on the clinical physiological assessment of the gastrointestinal and hepatobiliary systems, integrating diagnostic techniques with functional insights. It covers abdominal examination methods, interpretation of gastric and liver function tests, and the clinical relevance of signs and symptoms in GI and liver disorders. Emphasis is placed on conditions such as hepatitis, functional dyspepsia, and malabsorption syndromes. The module also incorporates Unani perspectives, including concepts of *Quwwat-e-Tabi'yah*, *Amrāz-e-Kabid*, and dietary recommendations for GI health. **• M 18U 1 نظامِ ہضم کی کلینیکل تشخیص Clinical Assessment of Gastrointestinal System** 18.1.1 معائنہ بطن کے اُصول وتکنیکات (Principles and Techniques of Abdominal Examination) 18.1.2 امتحان بالنظر، امتحان بالمس، امتحان بالید، امتحان بالسمع (Inspection, Palpation, Percussion & Auscultation) 18.1.3 مَعدَہ واَمعاء کے ریفلیکسز اور پیتھالوجیکل آصوات (GI Reflexes and Bowel Sounds in Pathological States) 18.1.4 معدہ وآنتوں کے جسمانی علامات کا طبی اطلاق (مثلاً، ایلام، اِستسقاء (Clinical Application of GI Physical Signs (e.g., tenderness, ascites) **• M 18U 2 اختبار وظائف الکبد اور کبدی صفراوی اضطرابات Liver Function Tests and Hepatobiliary Disorders** 18.2.1 جگر وصَفراوی نِظام کی فزیالوجی Physiology of Liver and Biliary System 18.2.2 اختبار وظائف الکبد (ایل ایف ٹیز) اور ان کی تشریح (Liver Function Tests (LFTs) and Interpretation)					

	18.2.3 عام کبدی وصفراوی امراض: (ورم کبد، ورم مرارہ، تلیئف کبد) (Common Hepatobiliary Disorders (Hepatitis, Cholestasis, Cirrhosis) 18.2.4 طب یونانی میں جگر کی صحت وعوارض (اَمراضِ کَبِد) (Unani Concepts of Liver Health and Disorders (*Amrāz-e-Kabid)* **• M 18U 3 اختبار وظائف مَعدَہ اور اِمعائی فعلی عوارض Gastric Function Tests and Functional GI Disorders** 18.3.1 مَعدَہ کے اِفراز وحَرَکات کی فزیالوجی (Physiology of Gastric Secretion and Motility) 18.3.2 اختبار وظائف مَعدَہ: ذروۃ الحمض، پی ایچ نگرانی، پیپسن کی مقدار Gastric Function Tests: Acid Output, pH Monitoring, Pepsin Levels 18.3.3 عسر الہضم وظیفی اور ورم معدہ (Functional Dyspepsia and Gastritis) 18.3.4 طب یونانی میں قُوّتِ طَبِیعَیّہ اور معوی امراض Unani Perspective on *Quwate Tabiyah* and Gastrointestinal Dysfunction **• M 18U 4 غذائی انجذاب کی خرابیاں اور طبی ربط Malabsorption Syndromes and Clinical Correlations** 18.4.1 غذائی انجذاب کی خرابی کے میکانیزم واقسام Mechanisms and Types of Malabsorption 18.4.2 مرض سلیاک، لیکٹوز عدم برداشت، اور لیبلے کی ناکافی فعالیات Celiac Disease, Lactose Intolerance, and Pancreatic Insufficiency 18.4.3 تشخیصی طریقہ کار، اختبار برازبایوپسی، بریتھ ٹیسٹ Diagnostic Approaches (Stool Tests, Biopsy, Breath Tests)					
		4	20	40	60	120

Semester No : 4						
2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-19 نظامِ قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System This module provides an understanding of cardiovascular clinical physiology with emphasis on examination techniques, diagnostic tools, and pathophysiological mechanisms. It includes hands-on training in pulse and blood pressure assessment, ECG interpretation, and the use of advanced diagnostic technologies such as echocardiography and cardiac imaging. It also covers the topics like cardiovascular disorders such as hypertension, myocardial infarction, and congenital heart defects, alongside Unani concepts of *Quwat-e-Haiwaniyah* and Unani cardiology. The module bridges modern diagnostics with classical insights for comprehensive cardiovascular evaluation. **• M 19U 1 کلینیکل معائنہ اور بلڈ پریشر کی تشخیص Clinical Examination and Blood Pressure Assessment** 19.1.1 قلبی نظام کا کلینکل معائنہ Clinical Examination of the Cardiovascular System (CVS)	2	10	20	30	60

	ضغط الدم کی پیائش کی تکنیکات وغلطیاں19.1.2 Blood Pressure Measurement Techniques & Errors نبض کا معائنہ اور پیریفرل علامات19.1.3 Pulse Examination and Peripheral Signs کیس مباحث: ضغط الدم قوی اور صدمہ 19.1.4 Case Discussions: Hypertension and Shock **• M 19U 2 قلبی برق نگاری اور تشخیصی آلات Electrocardiography and Diagnostic Tools** قلبی برق نگاری: اُصول، لہریں، وقفے، تشریح19.2.1 (ECG: Principles, Waves, Intervals, and Interpretation) بلڈ پریشر مانیٹر، پلس آکسی میٹر، ہولٹر مانیٹر کا استعمال19.2.2 Use of Blood Pressure Monitor, Pulse Oximeter, Holter Monitor اختبار جھد ریاضت، ایکو کارڈیوگرافی19.2.3 Exercise Stress Test and Echocardiography کارڈیک ایم آر آئی اور سی ٹی سکین19.2.4 Cardiac MRI, CT Scan کارڈیاک کیتھیٹرائزیشن و اینجیو گرافی19.2.5 Cardiac Catheterization and Angiography سباتی ڈاپلر و دماغیّ وعائی خطرے کا جائزہ19.2.6 Carotid Doppler and Cerebrovascular Risk Assessment **• M 19U 3 امراض قلب کی پیتھوفزیالوجی اور یونانی ربط Cardiovascular Pathophysiology and Unani Correlations** طب یونانی میں امراضِ قلب: تصوّرات، تشخیص اور قوتِ حیوانی سے اس کا تعلق19.3.1 Unani Cardiology: Concepts, diagnosis and its relation to *Quwat-e-Haiwaniyah* عضلۂ قلب کا اِفتُقار، احتشاء، اور قلبی درد (ذبحۂ صدر)19.3.2					

	Myocardial Ischemia, Infarction, and Cardiac Pain (Angina) 19.3.3 قصور قلب احتقانی: اقسام، اسباب، ظاہری علامات Congestive Cardiac Failure: Types, Causes, Clinical Presentation 19.3.4 جنینی دورانِ خون: انحرافات (شنٹس) اور نشوونما کی تبدیلیاں Foetal Circulation: Shunts and Developmental Changes 19.3.5 اذینی حجاب کا نقص، پیٹنٹ ڈکٹس آرٹیریوسس، ٹیٹرالوجی آف فالوٹ Atrial Septal Defect, Patent Ductus Arteriosus, Tetralogy of Fallot					
	M-20 نظامِ تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System This module offers an in-depth exploration of respiratory system physiology in clinical contexts, emphasizing examination techniques, diagnostic procedures, and interpretation of respiratory function tests. It will also provide hands-on experience with tools like spirometry, pulse oximeters, and ABG analysis, and apply clinical reasoning to cases such as asthma, COPD, and pneumonia. Pathophysiological mechanisms like hypoxia and ARDS are discussed alongside management strategies including ventilation support. The module also integrates Unani approaches to respiratory care, with focus on *Munaffis* drugs and traditional perspectives. **• M 20U 1 طبی معائنہ اور تشخیصی آلات/وسائل Clinical Examination and Diagnostic Tools** 20.1.1 طبی معائنہ: امتحان بالنظر، امتحان بالمس، امتحان بالید، امتحان بالسمع Clinical Examination: Inspection, Palpation, Percussion, Auscultation 20.1.2 طبی علامات: ضِیقُ التَّنَفُّس، زُرقَت، صدری تشوہات Clinical Signs: Dyspnoea, Cyanosis, Chest Deformities 20.1.3 بالینی آلات: پلس آکسی میٹر، پیک فلومیٹر، شرحِ تنفس کے اسالیب Bedside Tools: Pulse Oximeter, Peak Flow Meter, Respiratory Rate Patterns	2	10	20	30	60

	20.1.4 کیس ڈسکشن: سی او پی ڈی، نمونیہ، دمہ Case Discussions: COPD, Pneumonia, Asthma **• M 20U 2 اختبارِ وظائف الرئۃ اور خون میں گیسوں کا تجزیہ Pulmonary Function Test and Blood Gas Analysis** 20.2.1 جائزہ اختبارِ وظائف الرئۃ: قیاس النفس، فلو-والیوم لوپس، موسع قصبی کا ردِ عمل PFT Overview: Spirometry, Flow-Volume Loops, Bronchodilator Response 20.2.2 حجمِ رئۃ اور سعۃ الرئۃ: طبی تشریح Lung Volumes & Capacities: Clinical Interpretation 20.2.3 غاز الدم الشریانی (ABG): نمونہ کشی، تاؤیل، حِ ضی قاعدی توازن Arterial Blood Gas (ABG): Sampling, Interpretation, Acid-Base Balance 20.2.4 آکسیجن کی کمی (ہائپوکسیا) اور کاربن ڈائی آکسائیڈ کی زیادتی (ہائپر کیپنیہ): اقسام اور تلافی Hypoxia & Hypercapnia: Types and Compensation 20.2.5 علاج کی نگرانی اور مرض کی پیشگوئی میں اختبارِ وظائف الرئۃ کا کردار Role of PFTs in Monitoring Therapy and Prognosis **• M 20U 3 نظامِ تنفس کی فعلیاتی امراضیات اور طبی ربط Respiratory Pathophysiology and Clinical Correlation** 20.3.1 فَشَل تنفّسی کی فعلیاتی امراضیات: قسم اول و دوم، حاد اور مزمن Pathophysiology of Respiratory Failure: Type I & II, Acute & Chronic 20.3.2 تہویۃ-تروِیۃ کا عدمِ توازن اور تحویلۃ کی فعلیات Ventilation-Perfusion mismatch & Shunt Physiology 20.3.3 کووڈ کے بعد کے اثرات، او راے آر ڈی ایس، تپ دِق کے لیے مربوط طریقہ کار Integrated Approach to ARDS, COVID Sequelae, and TB 20.3.4 یونانی تعلق: نظامِ تنفس کے امراض میں منفث اور دیگر یونانی ادویات کا کردار اور طریقہ کار					

	Unani Correlation: Role and mechanism of *Munaffis* and other Unani drugs in Respiratory disorders **• M 20U 4 وینٹیلیشن سپورٹ Ventilation Support** 20.4.1 میکانیکی تہویہ Mechanical ventilation 20.4.2 آکسیجن سے علاج Oxygen therapy 20.4.3 سی پیپ CPAP 20.4.4 قلبی روی احیاء (سی پی آر) Cardio Pulmonary Resuscitation (C.P.R)					
		4	20	40	60	120

Semester No : 5

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-21 نظامِ کلیہ وتولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems	2	10	20	30	60

	This module covers the clinical physiology of the reproductive and renal systems, emphasizing diagnostic and therapeutic techniques. The module covers infertility assessments, hormonal profiling, and menstrual irregularities, with a special focus on Unani perspectives on reproductive health. It also explores renal function tests, electrolyte balance, and common renal disorders such as AKI and CKD, alongside modern therapeutic interventions including dialysis. The module bridges Unani and modern approaches to renal care, particularly through Unani diuretics and fluid regulation during renal compromise. **• M 21U 1 نظامِ تولید کی طبی فعلیات Clinical Physiology of Reproductive System** 21.1.1 عقمِ ذکور واِناث کا جائزہ Assessment of Male and Female Infertility 21.1.2 "رسیلاتی شاکلہ اور تشخیصی تاُویل Hormonal Profiles and Diagnostic Interpretation (FSH, LH, Prolactin, etc.) 21.1.3 "حیض کی بے قاعدگیوں کا جائزہ (اِحتباسِ حیض، عُسرِ طمث، متلازمۂ متعدد الکیسات المبایض) Evaluation of Menstrual Irregularities (Amenorrhea, Dysmenorrhea, PCOS) 21.1.4 موج نگاری (الٹراساؤنڈ) اور منی کا تجزیہ Ultrasonographic and Semen Analysis 21.1.5 عقم پر یونانی نقطہ نظر Unani Perspectives on Infertility **• M 21U 2 اختبارِ وظائف الکلیہ اور کہارل توازن Renal Function Evaluation and Electrolyte Homeostasis** 21.2.1 اختباراتِ وظائفِ الکلیہ: یوریا، کریٹینین، یورک ایسڈ Renal Function Tests (RFTs): Urea, Creatinine, Uric Acid					

	بول کی مقدار، مخصوص کثافت، اور خُردبینی کا جائزہ 21.2.2 Evaluation of Urine Output, Specific Gravity, and Microscopy کہارل توازن: صودیم، پوٹاشیم، کیلشیم، میگنیشیم 21.2.3 Electrolyte Homeostasis: Sodium, Potassium, Calcium, Magnesium حِ ضی قاعدی امراض اور استحالاتی شاکلہ کی تاوِیل 21.2.4 Acid-Base Disorders and Interpretation of Metabolic Profiles جی ایف آر: پیمائش اور طبی اہمیت 21.2.5 GFR: Measurement and Clinical Relevance **• M 21U 3 امراضِ کُلوی کا طبی ربط Clinical Correlation of Renal Disorders** مزمن اور حاد کُلوی مرض 21.3.1 Acute Kidney Injury (AKI) and Chronic Kidney Disease (CKD) پروٹین یوریا اور بَول میں خون: طبی اور تجربہ گاہی ربط 21.3.2 Proteinuria and Hematuria: Clinical and Laboratory Correlation متلازمۂ نفروٹک: فعلیاتی امراضیات اور ظاہری علامات 21.3.3 Nephrotic Syndrome: Pathophysiology and Clinical Presentation فَشَلِ کُلوی: سبب، پیش رفت، اور کثیر نظامی اثر 21.3.4 Renal Failure: Etiology, Progression, and Multisystem Impact یونانی ربط: احتباس البول 21.3.5 Unani Correlation: *Ihtibās al-Bawl* **• M 21U 4 علاج، غسلِ کُلیہ، اور مربوط طریقہ کار Therapeutics, Dialysis, and Integrated Approach** مُدرّاتِ بول: اقسام، طریقہ کار، اور طبی اِطلاق 21.4.1 Diuretics: Types, Mechanisms, and Clinical Application ادرارِ بول اور کُلوی اعانت میں یونانی مُدرّاتِ بول ادویہ کا کردار 21.4.2					

	Role of Unani Diuretics (*Mudirr-e-Baul Advia*) in *Idraar-e-Baul* and Renal Support 21.4.3 غسلِ کُلیہ: دَواعی، اقسام (دموی غسل، صفاقی غسل) Dialysis: Indications, Types (Hemodialysis, Peritoneal Dialysis) 21.4.4 کُلوی پیوند کاری: دَواعی، فعلیات، مناعتی اساس Renal Transplantation: Indications, Physiology, Immunological Basis 21.4.5 کُلوی تعطل کے دوران ہرمونی اور سیالاتی ضَبط و نظم Hormonal and Fluid Regulation during Renal Compromise					
	M-22 دموی سریریہ، مناعت، شیخوخہ اور التہاب Clinical Haematology, Immunology, Aging, and Inflammation This module provides a comprehensive understanding of haematological and immunological functions, pathological alterations, and their clinical evaluation, along with insights into inflammation and aging. It explores blood cell lineages, anemias, malignancies, and coagulation disorders, with emphasis on modern diagnostic tools and Unani perspectives. It covers immune mechanisms, hypersensitivity, immune-endocrine interactions, and Unani immunomodulation. The module also investigates acute and chronic inflammation, repair processes, and anti-inflammatory strategies. Finally, it addresses the biological basis of aging, immunosenescence, and traditional Unani concepts of longevity and resilience. **• M 22U 1 طبی علمُ الدم اور تشخیصی اَسالیب Clinical Haematology and Diagnostic Approaches** 22.1.1 تخلیقِ دم اور خون کے خلیات کے سلسلۂ نسب Hematopoiesis and Blood Cell Lineages 22.1.2 ہیموگلوبینوپیتھیاں، فقر الدم اور خون جمنے کے اِضطرابات	2	10	20	30	60

	Hemoglobinopathies, Anemias & Coagulation Disorders 22.1.3 خون کے خبیث اورام: لیوکیمیا، لیمفوما، اور مایلوما Blood Malignancies: Leukemia, Lymphoma, and Myeloma 22.1.4 تشخیصی آلات/وسائل: سی بی سی، اسمیر، نُخاعِ عظم، اِختباراتِ تخثر Diagnostic Tools: CBC, Smear, Bone Marrow, Coagulation Tests 22.1.5 دم اور دموی امراض پر یونانی نقطہ نظر Unani Perspective on Blood and Blood Disorders (*Damwī Amrāz*) **• M 22U 2 طبی علمُ المناعت Clinical Immunology** 22.2.1 فطری اور اِکتسابی مدافعتی نظام Innate and Adaptive Immune Systems 22.2.2 مدافعتی۔غدودی ربط: الإجہاد، ہرمونات، اور مناعت Immune-Endocrine Crosstalk: Stress, Hormones, and Immunity 22.2.3 خود مدافعت اور قوتِ مناعت کی کمی کے امراض Autoimmune and Immunodeficiency Disorders 22.2.4 یونانی مداخلتوں سے قوتِ مناعت کی تعدیل Immune Modulation through Unani Interventions (*Quwat-e-Mana'at*) 22.2.5 حساسیت کے اقسام اول تا چہارم کے ردِ عمل اور طبی مظاہ Types I-IV Hypersensitivity Reactions and Clinical manifestations **• M 22U 3 اُلتِہاب، اِصلاح، اور مُضادِّ اِلتِہاب تدابیر Inflammation, Repair, and Anti-inflammatory Strategies** 22.3.1 اُلتِہاب کے طریقہ کار: حاد اور مزمن Mechanisms of Inflammation: Acute & Chronic 22.3.2 اُلتِہاب کے حیاتیاتی علامات اور واسطے Biomarkers and Mediators of Inflammation (CRP, IL-6, ESR, Ferritin)					

	22.3.3 نسیجی اِصلاح، تَلیُّف، اور تحلیل Tissue Repair, Fibrosis and Resolution 22.3.4 مُضادِّ التِہاب اَسالیب: جدید علمِ ادویات اور یونانی تدابیر Anti-inflammatory Approaches: Modern Pharmacology & Unani *Tadabīr* **• M 22U 4 عمر رسیدگی، طولِ عمر، اور شیخوخت سے تحفظ Aging, Longevity, and Geroprotection** 22.4.1 عمر رسیدگی کے خُلوی اور سالماتی طریقہ کار Cellular and Molecular Mechanisms of Aging 22.4.2 مناعتی شیخوخت اور التِہابی عمر رسیدگی Immunosenescence and Inflammaging 22.4.3 طولِ عمر اور فعلیاتی مرونت Longevity and Physiological Resilience					
		4	20	40	60	120

Semester No : 6

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-23 نظامِ غدد کی کلینکل فزیالوجی Clinical Physiology of the Endocrine System	2	10	20	30	60

	This module provides a clinical and physiological exploration of the endocrine system, focusing on disease presentation, hormonal dysregulation, diagnostic testing, and integrative perspectives. The module also covers the structured clinical evaluation of endocrine disorders including goiter, menstrual irregularities, diabetes, obesity, and pituitary/adrenal dysfunctions. A syndromic approach is adopted to assess conditions like Cushing's, Addison's, PCOS, and endocrine-related systemic manifestations. Emphasis is placed on the interpretation of hormonal assays and dynamic testing, supported by endocrine imaging techniques. Unani medical concepts such as *Saman-e-Mufrit* (obesity) and *Ziabetus* (diabetes) are incorporated to provide a comparative and complementary diagnostic framework. • **M 23U 1 غدودی اِضطرابات کا طبی جائزہ Clinical Evaluation of Endocrine Disorders** 23.1.1 غدودی نقص کے لیے طبی معائنہ Clinical Examination for Endocrine Dysfunction 23.1.2 عام ظاہری علامات: دُرَاق، سمنِ مفرط، حیض کی بے قاعدگیاں، نشوونما کے اِضطرابات Common Presentations: Goiter, Obesity, Menstrual Irregularities, Growth Disorders 23.1.3 درقیہ، فَوقَ کُلوی، غدۂ نخامیہ، اور لبلبہ کے اِضطرابات Thyroid, Adrenal, Pituitary, and Pancreatic Disorders 23.1.4 ذیابیطس ملیٹس اور انسولین مزاحمت کی طبی فعلیات Clinical Physiology of Diabetes Mellitus and Insulin Resistance 23.1.5 سمنِ مفرط، ذیابیطس کی یونانی طبی تاوِیل Unani Clinical Interpretation of *Saman-e-Mufrit*, *Ziabetus*					

	• M 23U 2 غدودی اضطرابات کے لیے متلازماتی طریقہ Syndromic Approach to Endocrine Disorders 23.2.1 ثانوی ارتفاعِ خون، سمنِ مفرط، عقم کے غدودی اسباب Syndromic Recognition of Endocrine Disorders (e.g., Cushing's, Addison's, PCOS) 23.2.2 ثانوی ارتفاعِ خون، سمنِ مفرط، عقم کے غدودی اسباب Endocrine Causes of Secondary Hypertension, Obesity, Infertility 23.2.3 کوتاہ قدی، کثرتِ شعر، ثَدی رَشح پر طریقہ کار Approach to Short Stature, Hirsutism, Galactorrhea 23.2.4 نظامی امراض میں ہرمونی عدمِ توازن (مثلاً: مزمن کبدی/کُلوی مرض، خبیث ورم) Hormonal Imbalances in Systemic Diseases (e.g., chronic liver/kidney disease, malignancy) • M 23U 3 ہرمونی اندازہ جات اور تاوِیل Hormonal Assays and Interpretation 23.3.1 ہرمونی شاکلہ کا تجزیہ: ٹی ایس ایچ، ٹی تھری، ٹی فور، کورٹیسول، ایل ایچ، ایف ایس ایچ، جی ایچ، انسولین Hormonal Profile Analysis: TSH, T3, T4, Cortisol, LH, FSH, GH, Insulin 23.3.2 فعال غدودی اختبارات (تحریض اور ابطال کے اختبارات) Dynamic Endocrine Testing (Stimulation and Suppression Tests) 23.3.3 تجربہ گاہی رپورٹوں اور ہرمونی عدمِ توازن کی تاوِیل Interpretation of Lab Reports and Hormonal Imbalance 23.3.4 غدودی تَصویر کشی: نخامیہ، فَوق کُلوی، درقیہ کے لیے الٹراساؤنڈ، ایم آر آئی، سی ٹی Endocrine Imaging: Ultrasound, MRI, CT for Pituitary, Adrenals, Thyroid					
	M-24 کلینیکل نیوروفزیالوجی Clinical Neurophysiology This module offers an integrative and applied approach to the clinical physiology of the nervous system, combining modern diagnostic tools with	2	10	20	30	60

	traditional Unani perspectives. It covers detailed methods for clinical examination of the central and peripheral nervous systems, including reflex and cranial nerve assessments, and standardized neurological status evaluations such as the Glasgow Coma Scale. It also explores nerve injuries, regeneration, and pain physiology alongside Unani concepts like *Tafarruq-e-Ittisāl* and *Su' Mizāj*. The module also emphasizes neurogenesis, peripheral neuropathies, sleep physiology, emotional and behavioral assessment, and neuroimaging techniques. Special attention is given to clinical correlations through case studies on epilepsy, paralysis (*Fālij*), facial palsy (*Laqwa*), and behavioral syndromes, fostering an integrated understanding of neurophysiological processes in health and disease. **• M 24U 1 نظامِ اعصاب کا طبی معائنہ اور تشخیصی اختبار Clinical Examination and Diagnostic Testing of Nervous System** 24.1.1 مرکزی اور طرفی اعصابی نظام کا طبی معائنہ Clinical Examination of CNS and PNS 24.1.2 اِنعکاسی اختبار اور دِماغی اعصاب کا معائنہ Reflex Testing & Cranial Nerve Examination 24.1.3 طرفی عصب کی فعلیت کا جائزہ Assessment of Peripheral Nerve Function 24.1.4 گلاسگو کوما اسکیل اور اعصابی حیثیت Glasgow Coma Scale (GCS) and Neurological Status 24.1.5 تشخیصی آلات/وسائل: ای ای جی، ای ایم جی، عصب کی توصیلی مطالعات Diagnostic Tools: EEG, EMG, Nerve Conduction Studies					

	• **M 24U 2 اِصابۃ الأعصاب، اعصابی بحالی، اور درد کی فعلیات Nerve Injuries, Neuro-regeneration and Pain Physiology** 24.2.1 اِصابۃ الأعصاب اور تنزل کی اقسام Types of Nerve Injuries & Degeneration 24.2.2 اعصابی بحالی کا طریقہ کار اور جائزہ Mechanism and Assessment of Nerve Regeneration 24.2.3 درد کی درجہ بندی اور فعلیات Classification and Physiology of Pain 24.2.4 درد کی فعلیاتی امراضیات اور یونانی نقطہ نظر (تفَرُّقِ اِتّصال، سُوءِ مزاج) Pathophysiology of Pain and Unani View (*Tafarruke Itesaal*, *Sue Mizaj*) • **M 24U 3 Neurogenesis and Neuropathies** 24.3.1 "مرکزی اعصابی نظام میں نیوروجینسس اور پلاسٹسٹی Neurogenesis and Plasticity in CNS 24.3.2 اطرافی نیوروپیتھی: جانچ اور کلینیکل مطابقت Peripheral Neuropathy: Assessment and Clinical Relevance 24.3.3 ہیمی پلجیا اور اسپائنل ضعیفات: جدید بمقابلہ گیلینک نقطہ نظ Hemiplegia and Spinal Lesions: Modern vs Galenic Views 24.3.4 کلینیکل کیس ڈسکشنز کے ساتھ کرینیئل نروز کا معائنہ Examination of Cranial Nerves with Clinical Case Discussions 24.3.5 لقوہ، فالج (پیرالیسس) کے لیے یونانی نقطہ نظر Unani Approach to *Laqwa*, *Fālij* (Paralysis) • **M 24U 4 نوم کی فعلیات، جذبات، طرزِ عمل، اور اعصابی تصویر کشی Sleep Physiology, Emotion, Behavior and Neuroimaging** 24.4.1 نوم کی فعلیات اور نوم کے اِضطرابات					

	Sleep Physiology and Sleep Disorders 24.4.2 نوم پر یونانی نقطہ نظر Unani Perspectives on Sleep (*Naum)* 24.4.3 طرزِ عمل اور جذباتی اِضطرابات کا جائزہ Assessment of Behavior and Emotional Disturbances 24.4.4 اعصابی تصویر کشی کے طریقہ کار: سی ٹی، ایم آر آئی، پی ای ٹی اسکین Neuroimaging Techniques: CT, MRI, PET Scan 24.4.5 طبی مطالعہ ہائے واقعات: مرگی، اکتئاب، طرزِ عمل کے متلازمے Clinical Case Studies: Epilepsy, Depression, Behavioral Syndromes					
		4	20	40	60	120
		16	80	160	240	480

Paper No : 4 تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances

Semester No : 3

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-25 طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology	2	10	20	30	60

	This module covers physiological concepts described in classical Unani literature: its evolution and relevance. The literature is divided in the periods before Al Qanoon and after Al Qanoon. **• M 25U 1 منافع الاعضاء کا کلاسیکی تصور Classical concept of Manafeul Aza** 25.1.1 یونانی فعلیات کا ایک جائزہ An overview of Unani Physiology 25.1.2 کلاسیکی ادب میں منافع الاعضاء کا بیان Description of *Manafeul Aza* in classical literature 25.1.3 منافع الاعضاء کے بنیادی ماخذ Primary Sources of *Manafeul Aza* **• M 25U 2 کلاسیکی ادب کا تقابلی تجزی Comparative analysis of classical Literature** 25.2.1 القانون میں منافع الاعضاء *Manfeul Aza* in *Al Qanoon* 25.2.2 ابن سینا سے قبل اور ابن سینا کے بعد منافع الاعضاء کا بیان Pre Ibn Sina and Post Ibn Sina description of *Manafeul aza* 25.2.3 ادبی تجزیہ: کامل الصناعۃ، مائۃ مسیحی، القانون فی الطب، فردوس الحکمت، کتاب الکلیات (ابن رشد) اور دیگر کلاسیکی ادب Literature analysis: *Kamilus Sana, Miat Masihi, Al Qanoon fit Tib, Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd) and other classical literature*					
	M-26 یونانی تصور ریاضت اور اس کا سپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology This module aims to provide a deep understanding of exercise and sports physiology, focusing on its applications within the Unani system.The module includes the Sports and Exercise Physiology and its relevance to Unani	2	10	20	30	60

	Concept of Riyazat. It incorporates understanding changes in the physiological capacities during exercise reflecting the dynamic state of body. **• M 26U 1 لیاقتِ بدَنیہ کا جائزہ Assessment of Physical Fitness** 26.1.1 ایک فَرد کی لیاقتِ بدَنیہ کا تعیُّن Determination of Physical Fitness of a subject 26.1.2 لیاقتِ بدَنیہ کے سرٹیفکیٹ کا خاکہ/فارمیٹ Format for Physical Fitness Certificate 26.1.3 لیاقتِ بدَنیہ کے سرٹیفکیٹ جاری کرنے سے متعلق قانونی مسائل Legal issues pertaining to issuing Physical Fitness Certificate **• M 26U 2 ریاضت کے فزیولوجیکل تکیُّفات Physiological adaptations to Exercise** 26.2.1 ریاضت کا فعلیاتی تکیُّف Physiological adaptations to exercise 26.2.2 وہ فزیالوجی عوامل جو ریاضت کی کارکردگی کو محدود کرتے ہیں Physiological factors that limit exercise performance **• M 26U 3 ریاضت کی فعلیات Exercise Physiology** 26.3.1 ریاضت کے دوران قلبی وعائی اور تنفّسی فعلیات Cardiovascular and Respiratory Physiology during Exercise 26.3.2 ریاضت کا یونانی تصور اور اس کا کھیلوں پر اِطلاق Unani Conceprt of Riyazat and its application to Sports					
		4	20	40	60	120
Semester No : 4						
2A	**2B**	**2C**	**Notional Learning hours**			

Module Number	Modules & units	Number of Credits	2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
	M-27 موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change This module is aimed at providing an understanding of the physiological impact of climate change on human health and well-being. It explores how environmental changes like extreme temperatures, altered humidity, air pollution, and changing ecosystems affect various physiological systems. The module also covers the adaptation and maladaptation responses of the human body to environmental stressors induced by climate change. **• M 27U 1 موسمیاتی تبدیلی کا تعارف Introduction to Climate Change** 27.1.1 موسمیاتی تبدیلی کے بنیادی اصول Basics of climate change 27.1.2 تاریخی موسمیاتی انداز اور مستقبل کی پیش گوئیاں Historical climate patterns and future projections 27.1.3 سافٹ ویئر آلات (ایکسل، آر) کا استعمال کرتے ہوئے موسمیاتی ڈیٹا کے رُجحانات کا تجزیہ Analyzing climate data trends using software tools (Excel, R) **• M 27U 2 انسانی فزیالوجی اور موسمیاتی تبدیلی Human Physiology and Climate Change** 27.2.1 موسمیاتی تبدیلی کا تولید اور نشوونما پر اثر Impact of climate change on reproduction and development 27.2.2 حرارتی دباؤ اور اس کے انسانی جسم پر فعلیاتی اثرات	2	10	20	30	60

	Heat stress and its physiological effects on the human body موسمیاتی تبدیلی سے متعلق تنفّسی اور قلبی وعائی امراض 27.2.3 Climate change-related respiratory and cardiovascular diseases اسبابِ ستّہ ضروریہ کا انسانی صحت پر اثر 27.2.4 Effect of Asbabe Sitta Zarooriya on Human health **• M 27U 3 تحقیق اور مستقبل کے اِتّجاہات Research and Future Directions** موسمیاتی اقدامات میں پالیسی اور کمیونٹی کی شمولیت کا کردار 27.3.1 Role of policy and community engagement in climate action موسمیاتی فعلیات میں موجودہ تحقیقی رُجحانات اور طریقہ ہائے کار 27.3.2 Current research trends and methodologies in climate physiology موسمیاتی سائنس میں مستقبل کی تحقیقی ضروریات اور پیشہ ورانہ راستے 27.3.3 Future research needs and career paths in climate science					
	M-28 ارتقائی فزیالوجی Evolutionary Physiology This module incorporates fundamental concepts of evolution and how physiological triats evolve in response to environmental pressure. It also encompasses the influence of evolutionary process on physiological systems. **• M 28U 1 ارتقائی اصولوں کا تعارف Introduction to Evolutionary Principles** ارتقاء کے کلیدی مفاہیم: قدرتی انتخاب، جینیاتی اِنجراف، جین کا بہاؤ 28.1.1 Key concepts in evolution: natural selection, genetic drift, gene flow ارتقاء میں تغیر (میوٹیشن) کا کردار 28.1.2 The role of mutation in evolution سافٹ ویئر کا استعمال کرتے ہوئے ارتقاء کا تجزیہ 28.1.3 Analyzing evolutionary trees using software **• M 28U 2 تقابلی فعلیات Comparative Physiology**	2	10	20	30	60

	28.2.1 فقاریہ اور غیر فقاریہ حیوانات کے درمیان فعلیاتی نظاموں کا تقابل Comparing physiological systems among vertebrates and invertebrates 28.2.2 فعلیاتی اختلافات کی ارتقائی اہمیت The evolutionary significance of physiological differences 28.2.3 ماحولیاتی تبدیلیوں کے جواب میں سلوکی اور فعلیاتی تکیُفات Behavioral and physiological adaptations in response to environmental changes • **M 28U 3 انسانی صحت میں ارتقائی فعلیات Evolutionary Physiology in Human Health** 28.3.1 انسانی فعلیات اور امراض پر ارتقائی نقطہ ہائے نظر Evolutionary perspectives on human physiology and diseases 28.3.2 صحت کے مسائل کو سمجھنے میں ارتقائی طب کا کردار The role of evolutionary medicine in understanding health issues 28.3.3 ارتقائی فعلیاتی تحقیق میں موجودہ رُجحانات اور طریقہ ہائے کار Current trends and methodologies in evolutionary physiology research					
		4	20	40	60	120

Semester No : 5

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including	2G Total

					Modular Assessment	
	M-29 طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Physiological Tools for Validation of Unani Medicine This module provides a thorough exploration of recent diagnostic tools that can be utilised for Validation of Unani Medicine- its theories and basic principles. It covers topics like knowledge validation and knowledge addition. Emphasis is given to Validation process, Integration of health systems and effective models of integration. **• M 29U 1 طبِ یونانی کے بنیادی تصوّرات کی تصدیق Validation of Core Concepts of Unani** 29.1.1 بنیادی تصوّرات اور ان کی سائنسی تاوِیل Core Concepts and their scientific interpretation 29.1.2 طبِ یونانی کی تصدیق میں فعلیاتی آلات/وسائل Physiological Tools in Validation of Unani Medicine 29.1.3 علم کی تصدیق اور علم کا اضافہ Knowledge validation and Knowledge addition 29.1.4 طبِ یونانی میں مستقبل کی تحقیق Future research in Unani Medicine **• M 29U 2 نظامِ صحت کا ادغام Integration of Health Systems** 29.2.1 نظامِ صحت کا ادغام Integration of Health systems 29.2.2 اِدغام کے ماڈل Models for Integration 29.2.3 اِدغام میں حدود اور چیلنجز	2	10	20	30	60

	Limitations and Challenges in Integration • M 29U 3 توثیق کا عمل Validation Process 29.3.1 توثیق کی ضرورت Need for Validation 29.3.2 تحقیق کے ترجیحی شعبے Priority areas of Research 29.3.3 توثیق کا عمل Validation Process 29.3.4 تحقیقی اخلاقیات-یونانی اور جدید نقطہ نظر Research Ethics- Unani and Modern View					
	M-30 طبی تعلیمی ٹیکنالوجی Medical Education Technology This module includes various aspects of Medical Education Technology like, Teaching learning Methods, Tools of Education Technology, Benefits and limitations of Medical education Technology. • M 30U 1 تعلیمی ٹیکنالوجی کے بنیادی اصول Basics of Education Technology 30.1.1 تعلیمی ٹیکنالوجی کی تعریف اور دائرہ کار Definition and scope of Education Technology 30.1.2 تاریخی ارتقاء اور اہمیت Historical evolution and significance 30.1.3 کلیدی مفاہیم: ڈیجیٹل خواندگی، ای-لرننگ، بلینڈڈ لرننگ Key concepts: Digital Literacy, e-Learning, Blended Learning 30.1.4 بنیادی تعلیمی آلات (ایل ایم ایس، ویڈیو کانفرنسنگ) ترتیب دینا Setting up basic educational tools (LMS, video conferencing) 30.1.5 مقبول تعلیمی پلیٹ فارمز پر اکاؤنٹس بنانا	2	10	20	30	60

	Creating accounts on popular educational platforms ڈیجیٹل تعلیمی ماحول میں نیویگیٹ کرنا 30.1.6 Navigating digital learning environments • M 30U 2 تدریس وتعلّم کے طریقے اور تکنیکیں Teaching/Learning Methods & Techniques روایتی بمقابلہ ٹیکنالوجی سے مزین تدریسی طریقوں کا جائزہ 30.2.1 Overview of traditional vs. technology-enhanced teaching methods باہمی تعاونی تعلّم، فلپڈ کلاس روم، گیمیفیکیشن 30.2.2 Collaborative Learning, Flipped Classroom, Gamification ٹیکنالوجی میں ترقی یافتہ ماحول میں تفریقی ہدایات 30.2.3 Differentiated Instruction in a tech-rich environment ٹیکنالوجی کو شامل کرتے ہوئے سبق کا منصوبہ ڈیزائن کرنا 30.2.4 Designing a lesson plan incorporating technology باہمی تعاونی منصوبوں کے لیے آلات (گوگل ڈاکس، پیڈلیٹ) کا استعمال 30.2.5 Using tools for collaborative projects (Google Docs, Padlet) کثیر الوسائط پریزنٹیشنز تیار کرنا 30.2.6 Creating multimedia presentations • M 30U 3 تعلیمی ٹیکنالوجی کے جدید ترین ٹولز Latest Tools of Education Technology ابھرتی ہوئی ٹیکنالوجیز (اے آر/وی آر، تعلیم میں مصنوعی ذہانت) کا جائزہ 30.3.1 Overview of emerging technologies (AR/VR, AI in Education) جانچ اور فیڈبیک کے آلات (کوئیزز، کاہوٹ) 30.3.2 Tools for assessment and feedback (Quizziz, Kahoot!) تعلیم میں ڈیٹا اینالیٹکس کی اہمیت 30.3.3 Importance of data analytics in education مختلف تعلیمی ایپس کے ساتھ عملی تجربہ 30.3.4					

	Hands-on experience with various educational apps 30.3.5 آن لائن آلات کا استعمال کرتے ہوئے تقیمات اتیار کرنا Creating assessments using online tools 30.3.6 تعلیمی سیاق و سباق میں اے آر/وی آر ایپلیکیشنز کی کھوج Exploring AR/VR applications in educational contexts **• M 30U 4 تعلیمی ٹیکنالوجی کی حدود Limitations of Education Technology** 30.4.1 ڈیجیٹل تقسیم The digital divide 30.4.2 تعلیمی ٹیکنالوجی میں رازداری اور تحفظ کے مسائل Privacy and security issues in educational technology 30.4.3 اساتذہ کے درمیان ٹیکنالوجی کے خلاف مزاحمت کا چیلنج The challenge of technology resistance among educators 30.4.4 ٹیکنالوجی سے متعلق مسائل کو کم کرنا Mitigating tech-related issues 30.4.5 مؤثر تدریس و تعلّم کے لیے ابلاغی مہارتیں Communication Skills for effective teaching/Learning					
		4	20	40	60	120

Semester No : 6

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning	2G Total

					including Modular Assessment	
	M-31 برملی وفقاری فزیالوجی Vertebrate and Amphibian Physiology The module is designed to introduce to Unani Medicine Post Graduates the physiology of commonly used Lab animals in experimentation for providing better understanding of animal experimental studies and comparative physiology. Besides Ethical and Regulatory Frameworks in Animal Research,this module also emphasises alternates to animal experimentation. **• M 31U 1 فقاریہ حیوانات کی فعلیات کے عمومی اصول General Principles of Vertebrate Physiology** 31.1.1 فقاریہ اور دوزیست فعلیات کا تعارف Introduction to Vertebrate and AmphibianPhysiology 31.1.2 علیحدہ اعضائی ماڈلز میں فعلیاتی ردِعمل Physiological Responses in Isolated Organ Models 31.1.3 بڑے اعضائی نظاموں کی تقابلی فعلیات Comparative Physiology of Major Organ Systems **• M 31U 2 عام تجرباتی جانوروں کی فعلیات Physiology of Common Lab Animals** 31.2.1 مینڈک کی فعلیات Physiology of Frog 31.2.2 چوہے اور گنی پگ کی فعلیات Physiology of Mouse and Guinea Pig **• M 31U 3 حیوانی تجربات کا تبادل Alternate to Animal Experimentation** 31.3.1 حیوانی تحقیق میں اخلاقی اور انضباطی ڈھانچے Ethical and Regulatory Frameworks in Animal Research	2	10	20	30	60

	31.3.2 غیر حیوانی جانچ کے ماڈلز میں پیش رفت 31.3. 3 فعلیاتی مطالعات کے لیے اِن سلیکو ماڈلنگ Advances in Non-Animal Testing Models In Silico Modeling for Physiological Studies 31.3.4 لیاتی کلچر پر مبنی فعلیاتی پرکھ Cell Culture-Based Physiological Assays					
	M-32 جدید اضافات Recent Advances This module encapsulates Recent Advances in Science and Technology like Genomics, AI, 3D printing, VR which can be used to leverage research in Unani Medicine. Topics like Targeted Therapies, Bioprinting Tissues, and Use of Predictive analysis in Unani Medicine are included. **• M 32U 1 جینومکس اور شخصی طب Genomics and Personalized Medicine** 32.1.1 جین ایڈیٹنگ کے آلات- کرسپر Gene editing tools - CRISPR 32.1.2 کینسر کے علاج میں ہدف شدہ تھراپیز اور حسب ضرورت علاج Targeted Therapies and tailored treatments in cancer care 32.1.3 بیماری کی پیش گوئی اور علاج میں جینومکس کا کردار Role of Genomics in Disease Prediction and Treatment 32.1.4 مزاج اور شخصی طب اور اس کا جینومکس کے ساتھ ادغام Mizaj and Personalized Medicine and its integration with genomics **• M 32U 2 مصنوعی ذہانت (اے آئی) اور مشین لرننگ Artificial Intelligence (AI) and Machine Learning** 32.2.1 مصنوعی ذہانت اور مشین لرننگ کے بنیادی اصول Basics of Artificial Intelligence and Machine Learning 32.2.2 طب یونانی اور طبی تشخیص میں اے آئی کے اطلاقات	2	10	20	30	60

	Applications of AI in Unani Medicine and Healthcare Diagnostics طبِ یونانی میں پیش قیاسی تجزیہ کا استعمال 32.2.3 Use of Predictive analysis in Unani Medicine اے آئی پر مبنی فیصلہ سازی میں اخلاقی تقاضے اور تعصب 32.2.4 Ethical Considerations and Bias in AI-based Decision Making • **M 32U 3 3 3D Printing and Virtual Reality (VR) and Augmented Reality (AR) تھری ڈی پرنٹنگ اور ورچوئل رئیلٹی (وی آر) اور آگمینٹڈ رئیلٹی (اے آر)** نظام صحت اور مصنوعی اعضاء میں تھری ڈی پرنٹنگ کے بنیادی اصول 32.3.1 Basics of 3D Printing in Healthcare and Prosthetics بائیو پرنٹنگ ٹشوز: پیوند کاری کے لیے ٹشوز اور اعضاء کی تشکیل 32.3.2 Bioprinting Tissues: for creating tissues and organs for transplantation طبی تعلیم میں ورچوئل رئیلٹی (وی آر) اور آگمینٹڈ رئیلٹی (اے آر) 32.3.3 Virtual Reality (VR) and Augmented Reality (AR) in Medical Education مریضوں کی بحالی میں اے آر اور وی آر کے آیوش پر مبنی اِطلاقات 32.3.4 Applications of AR/VR in AYUSH-based Patient Rehabilitation					
		4	20	40	60	120
		16	80	160	240	480
		64	320	640	960	1920

Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods

Paper No : 1 (عمومی واطلاقی منافع الاعضاء General and Applied Physiology)

Semester No : 3

Module 1 : سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe cellular signaling, transport, and adaptation mechanisms.
2. Describe muscle contraction physiology and its clinical implications.
3. Apply basic tools for assessing muscle function.
4. Describe neuromuscular junction structure, transmission, and drug interactions.
5. Interpret homeostatic regulation through modern and Unani frameworks.
6. Correlate Unani concepts like *Aza, Laham*, and *Tabiyat* with modern physiology.

Unit 1 خلیہ کی فزیالوجی اور تکیّف Cell Physiology and Adaptation

1.1.1 سگنل ٹرانسڈکشن کے مسارات اور ریسیپٹر میکانیہ جات

(Signal transduction pathways and receptor mechanisms)

1.1.2 غشاء الخلیہ پر نقل وحمل کا میکانزم

(Cell membrane transport mechanisms)

1.1.3 اجہاد میں خلوی مطابقت

(Cellular adaptation to Stress

References: 26,29,33,35,36,38,39,40,41

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experiential Learning	3E Domain / Sub Domain	3F Level (Does/Shows how/Knows how/Know)	3G Teaching Learning Methods
CO2,CO3	Describe structure and functional dynamics of cell membrane & transport mechanisms	1	Lecture	CC	Knows-how	TUT,L&PPT
CO2,CO3, CO4	Demonstrate models of membrane transport (diffusion, osmosis, active transport)	2	Practical1.1	PSY-SET	Shows-how	DL,DIS,PT,D,LS
CO2,CO3, CO4	Demonstrate histological features of normal and adaptive cell changes	2	Practical1.2	PSY-GUD	Shows-how	D,DIS,PT,C_L,DL
CO2,CO3	Discuss cellular adaptation to stress (hypertrophy, hyperplasia, atrophy, metaplasia)	1	Lecture	CC	Knows-how	TUT,BL,L&GD,C_L,FC
CO2,CO3	Discuss cellular signaling pathways, receptor mechanisms, and second messengers	1	Lecture	CC	Knows-how	DIS,L&GD,TUT
CO2,CO3, CO4	Evaluate altered cell morphology in stress conditions	3	Practical1.3	CE	Shows-how	DIS,SDL,CBL,Mnt,PT

CO2,CO3, CO4	Identify case scenarios of stress adaptation in different diseases	6	Experiential-Learning1.1	CAN	Does	TBL,PBL,PL,C_L,DIS

Unit 2 عضلاتی فزیالوجی Muscle Physiology

1.2.1 انقباض عضلات کی سالماتی بنیاد

(Molecular basis of muscle contraction)

1.2.2 تدریب اور بیماری میں عضلاتی موافقت

(Muscle adaptation in training and disease)

1.2.3 عضلات کی طاقت، لچک اور برداشت کی پیمائش کے لیے لیبارٹری آلہ جات

(Laboratory equipment for measuring muscle strength, flexibility and endurance)

1.2.4 برقی عضلات نگاری

(Electromyography (EMG)

1.2.5 عضلاتی فزیالوجی درج ذیل حالات میں: عضلاتی امراض (مایوپیتھیز)، تھکاوٹ، کریمپس، رِگار مورٹس

(Muscle physiology in: myopathies, fatigue, cramps, Rigor Mortis)

1.2.6 طب یونانی کے تصورات: اعضاء، لحم، اور قُوّتِ مُحرِّکہ کا عضلاتی فزیالوجی سے ربط

(Concept of *Aza, Laham* and *Quwate Muharik*a and its correlation with Muscle physiology)

References: 1,7,11,15,19,26,27,28,29,30,31,33,34,46,48

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Demonstrate EMG (Electromyography) and interpretation of muscle activity	2	Practical1.4	PSY-SET	Shows-how	D,TUT,DIS,LRI,IBL
CO2	Analyze muscle fatigue, strength, spasm, and pharmacological modulation	1	Lecture	CAN	Knows-how	L&GD,PER,TUT

CO2,CO4	Analyze and interpret clinical case scenarios related to muscle dysfunction	1	Practical1.5	PSY-GUD	Shows-how	CBL,SDL,TUT,C_L,DIS
CO1,CO2, CO3	Describe the role of Quwwate *Muharika* in functioning of muscles. Correlate the concept of *Lahm* and *Aza* with present physiological concept.	1	Lecture	CE	Knows-how	TUT,DIS,L&GD
CO1,CO2, CO3	Integrate *Quwa* with current physiology	2	Experiential-Learning1.2	PSY-ORG	Does	TBL,DIS,C_L,D,LS
CO2,CO4	Analyze patient narratives on muscle fatigue and weakness	2	Experiential-Learning1.3	CAN	Does	CBL,RLE,PER,DIS
CO2,CO4	Measure muscle strength, tone, and endurance	2	Practical1.6	PSY-MEC	Shows-how	DIS,D,DL,Mnt,PT
CO2,CO3	Discuss excitation-contraction coupling and calcium signaling	1	Lecture	CC	Knows-how	DIS,TUT,L&PPT

Unit 3 وصل العصبی عضلی Neuromuscular Junction

1.3.1 عصبی عضلاتی اتصال کی ساخت

(Structure of neuromuscular junction)

1.3.2 عصبی عضلاتی ترسیل

(Neuromuscular transmission)

1.3.3 عصبی عضلاتی انسداد

(Neuromuscular block)

1.3.4 عصبی عضلاتی اتصال محرکات

(Drugs stimulating neuromuscular junction)

References: 26,27,28,29,30,31,32,33,34,35,36

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the structure of neuromuscular junction	1	Lecture	CC	Knows-how	EDU,L_VC,BL
CO2,CO3	Discuss the neuromuscular transmission	1	Lecture	CC	Knows-how	C_L,L_VC,DIS,TUT,FC
CO2,CO3	Describe drugs acting on neuromuscular junction- Blockers and Stimulators	1	Lecture	CC	Knows-how	L&PPT ,DIS,PER
CO2,CO3, CO4	Identify myopathies and neuromuscular junction disorders	2	Practical1.7	PSY-SET	Shows-how	CBL,BL,PBL,IBL,BS
CO2,CO3, CO4	Demonstrate understanding of Neuromuscular transmission	4	Experiential-Learning1.4	PSY-SET	Does	DIS,Mnt,TUT,D,SIM
CO2,CO3, CO4	Demostrate how Neuromuscular drugs are used in anesthesia, surgery, spasticity management	4	Experiential-Learning1.5	PSY-SET	Does	CBL,BS,DIS,PBL

Unit 4 استتباب اور طبیعت Homeostasis and Tabiyat

1.4.1 استتباب میکانیہ: یونانی و جدید تصورات

(Homeostatic Mechanism- Unani and Modern Concept)

1.4.2 طبیعت کا خلوی و نظامی تنظیم میں کردار

(Role of *Tabiyat* in cellular and systemic regulation)

1.4.3 استتباب میں خلل اور بایومارکرز

(Homeostasis Disruption & Biomarkers)

References: 1,8,14,15,18,19,20,24,26,27,28,29,30,31,32,33,34,35,36,192,193

3A	3B	3C	3D	3E	3F	3G
CO2,CO3, CO4	Demonstrate assessment of stress and metabolic biomarkers (CRP, HbA1c, Oxidative markers)	3	Practical1.8	PSY-SET	Shows-how	PT,DIS,DL,D,BL
CO2,CO3, CO4	Recognize clinical cases of disrupted homeostasis (e.g., metabolic syndrome, stress disorders)	4	Experiential-Learning1.6	CC	Does	PL,CBL,SDL,DIS,PAL
CO2	Describe disruption of homeostasis in disease conditions	1	Lecture	CC	Knows-how	TUT,JC,DIS,L&GD
CO2,CO4	Assess physiological parameters of homeostasis (BP, Temp, HRV)	3	Practical1.9	PSY-MEC	Shows-how	D,PT,DL
CO1,CO2, CO3,CO4	Create Unani-based homeostasis maintenance plans integrating Ilaj bit Tadbeer and dietary modification	4	Experiential-Learning1.7	PSY-ORG	Does	Mnt,BS,SDL,W,CBL

Practical Training Activity

Practical Training 1.1 Demonstrate models of membrane transport (diffusion, osmosis, active transport)

Total Duration: 2 hours

Materials Required:

- Dialysis tubing (for diffusion and osmosis models)
- Glucose solution, starch solution, iodine, distilled water
- Beakers, measuring cylinders, droppers, test tubes
- Hot plate (optional, for active transport simulation)

- Simulated cell membrane models (commercial or DIY)
- Color indicators for glucose and starch (Benedict's solution, iodine)
- Charts illustrating molecular movement in each transport type

1. Introductory Briefing by Facilitator (15 minutes):

Concept of membrane transport. Define diffusion, osmosis, and active transport. Use visual aids or simple animations to demonstrate the difference in molecular movement and energy requirements.

2. Demonstration of Diffusion (20 minutes):

Setup:

Fill a beaker with water and place a dialysis tubing containing starch solution inside. Add iodine to the beaker water and observe colour change over time.

Observation Goal:

Iodine (small molecules) diffuses into the tubing; starch (large molecules) does not leave—illustrates selective permeability and simple diffusion.

Discussion Points:

- Direction of movement from high to low concentration.
- No energy required.
- Relevance to nutrient absorption in the gut.

3. Demonstration of Osmosis (20 minutes):

Setup:

Prepare two setups: one with pure water inside dialysis tubing and sucrose solution outside, and one vice versa. Place both in beakers and observe water movement over 15–20 minutes.

Observation Goal:

Visualize swelling/shrinkage of tubing, indicating osmotic flow based on solute gradient.

Discussion Points:

- Solvent (water) moves from low solute to high solute concentration.
- Osmotic balance and cell volume regulation.

4. Demonstration of Active Transport (30 minutes):

Setup:

Using a model system (or animation if lab resources are limited), demonstrate how energy (ATP or heat) is required to move ions against a gradient.

Alternative method (if no ATP model available):

- Prepare a heat-assisted dye movement experiment, showing enhanced transport across membrane model due to energy input.

Observation Goal:

Movement occurs against concentration gradient only when energy is provided.

Discussion Points:

- Active transport requires metabolic energy (ATP).
- Examples: Na^+/K^+ ATPase pump, H^+ pumps in stomach lining.

5. Group Interpretation and Application (20 minutes):

Divide students into small groups and assign one model (diffusion, osmosis, or active transport) to each group. Ask them to summarize:

- What happened in the demonstration
- Physiological example where the mechanism applies
- Each group presents a 2-minute summary.

6. Conclusion and Recap (15 minutes):

Recap the key mechanisms with comparative emphasis on energy requirement, direction of flow, and biological relevance. Encourage students to reflect on how these basic processes underpin all systemic functions.

Practical Training 1.2 Histological features of normal and adaptive cell changes

Total Duration: 2 hours

Materials Required:

- Light microscopes (one per student or pair)
- Prepared histology slides:

    - Normal tissues (epithelial, muscle, liver, kidney)
    - Adaptive changes:
        - Skeletal muscle hypertrophy
        - Prostatic hyperplasia
        - Endometrial atrophy
        - Squamous metaplasia (e.g., bronchial epithelium)
        - Cervical dysplasia (optional)
- Slide reference charts/laminated placards
- Histology atlases or digital screens for comparison
- Worksheets for observation and notes

1. Introduction and Orientation by Facilitator (15 minutes):

- The types of adaptive changes cells undergo in response to physiological stress or pathology.
- Definitions and distinguishing features of hypertrophy, hyperplasia, atrophy, metaplasia, and dysplasia.
- The importance of recognizing these changes in the context of disease progression.

2. Observation of Normal Cell Histology (30 minutes):

Students observe and identify structural features of normal tissues:

- **Epithelial tissue** (skin or intestinal lining)
- **Skeletal muscle** (with multinucleated fibres)
- **Liver and kidney tissues** (organization of parenchyma)

Guided Observation Tasks:

- Identify nuclei, cytoplasm, tissue arrangement
- Note features like polarity, stratification, and specialized functions

3. Observation of Adaptive Cell Changes (45 minutes):

Rotate through prepared slides showing:

- **Hypertrophy:** Enlarged cardiac or skeletal muscle fibres
- **Hyperplasia:** Prostatic gland proliferation
- **Atrophy:** Reduced cell size in muscle or glands (e.g., endometrium)
- **Metaplasia:** Bronchial pseudostratified columnar epithelium to squamous
- **(Optional) Dysplasia:** Disordered epithelial growth (e.g., cervical epithelium)

Tasks for Each Slide:

- Sketch a few representative cells
- Note differences from normal (cell size, number, layering, organization)
- Identify likely causes or stimuli for the adaptive change (e.g., increased load, hormonal influence, chronic irritation)

4. Correlation with Clinical Scenarios (30 minutes):

Interactive Segment: Provide short cases e.g.:

- A bodybuilder with muscle hypertrophy
- A post-menopausal woman with uterine atrophy
- A smoker with metaplastic bronchial epithelium

Students identify the type of adaptation seen, corresponding slide, and physiological or pathological trigger.

Practical Training 1.3 Altered cell morphology in stress conditions

Duration: 3 hours

1. Introduction to Stress and Cellular Morphology (30 minutes):

- Facilitator introduces the concept of stress at the cellular level, emphasizing types of stress:
    - **Oxidative stress:** Damage due to free radicals.
    - **Inflammatory stress:** Immune response leading to cellular changes.
    - **Metabolic stress:** Altered metabolic states (e.g., obesity, diabetes).
- Discuss key stress-induced morphological changes:

- **Cellular size changes** (atrophy or hypertrophy).
- **Nuclear alterations** (pyknosis, karyolysis, karyorrhexis).
- **Signs of apoptosis and necrosis** (blebbing, fragmented nuclei).
- **Mitochondrial and cytoskeletal changes**.

2. Hands-On Slide Examination and Morphological Interpretation (2 hours):

Step 1: Slide Review and Group Work

- Students are divided into small groups. Each group is given a set of slides representing different types of cellular stress (oxidative stress, inflammation, metabolic syndrome, etc.).
- Groups are tasked with:
  - Observing the cellular changes under the microscope (identifying atrophy, hypertrophy, necrosis, apoptosis, etc.).
  - Recording their observations, such as changes in size, shape, and structural integrity of the cells.
  - Noting the type of stress associated with each sample (e.g., oxidative, metabolic, inflammatory).

Step 2: Microscopic Examination

- Each group will rotate between different slides, discussing the identified stress-related changes in morphology, including:
  - **Liver cells**: Evidence of fatty change or hepatocyte ballooning (in metabolic stress).
  - **Muscle fibers**: Atrophic fibers with mitochondrial damage (due to prolonged physical stress).
  - **Fat cells**: Increased size or evidence of stress-induced inflammation (in obesity).
  - **Endothelial cells**: Nuclear pleomorphism or irregularities (in oxidative stress).
- The facilitator will guide students in understanding how to differentiate between reversible and irreversible cell changes.

3. Case Discussions (30 minutes):

- After completing the practical slide analysis, groups come together for a facilitated discussion:
  - **Modern Perspective**: How do these cellular changes link to specific health conditions?
  - Discuss potential Unani treatments:
    - **Herbal formulations**: Use of detoxifiers for oxidative stress.

- **Regimens**: Diet and exercise recommendations based on restoring *Mizāj*.
- **Therapies**: Incorporating Unani practices like *Hijāma* (cupping) or *Riyāzat* (exercise) to restore balance.

Practical Training 1.4 EMG (Electromyography) and interpretation of muscle activity

Total Duration: 2 hours

Surface EMG system (or EMG simulation software if the device is unavailable)

1. Introduction by Facilitator (10 minutes):

Brief explanation of EMG, its purpose in clinical settings, and the types of EMG (surface vs needle). Highlight its relevance in diagnosing neuromuscular disorders.

2. Conceptual Integration with Unani Medicine (10 minutes):

Facilitator will Introduce the Unani physiological view of motor function, particularly focusing on *Quwā-e-Muharrika* (motor faculty) and the significance of *Aʿṣāb* (nerves) in initiating and sustaining movement. Discuss how weakness of nerves (*Ẓuʿf-e-Aʿṣāb*) in Unani texts can be explored with the help of EMG.

3. Demonstration and Hands-on Experience (40 minutes):

Demonstrate the EMG procedure using a volunteer. Select a superficial muscle such as the brachioradialis or thenar group. Show how to clean the skin, apply the electrodes, and record resting and contracting muscle activity. Students are invited (in small groups) to practice placing electrodes and recording data under supervision, reinforcing correct technique and interpretation of visual feedback.

4. EMG Interpretation and Group Analysis (30 minutes):

Present printed or digital EMG tracings showing different patterns—normal, neuropathic, and myopathic. Encourage students to observe differences in amplitude, duration, and recruitment patterns. Discuss the possible clinical conditions associated with each pattern and ask students to share their interpretations in small groups.

5. Case-Based Application (20 minutes):

Share 2 to 3 short clinical scenarios (e.g., diabetic neuropathy, myasthenia gravis, radial nerve injury) and ask students to hypothesize what EMG findings they would expect in each case. Encourage discussion on how these findings align with Unani descriptions of *Asabī* conditions such as *Khaddar*, *Fālij*, and *Waj'-al-ʿAṣab*.

6. Reflection and Conclusion (10 minutes):

Summarize the session by reiterating the role of EMG in modern diagnostics and how its findings may be interpreted in light of Unani principles. Emphasize the importance of integrated thinking in clinical Unani practice. Conclude by taking feedback and answering queries.

Practical Training 1.5 Muscle dysfunction

Total Duration: 1 hour

Materials Required:

- Pre-prepared clinical case vignettes (paper-based or slides)
- Patient simulation (standardized patient or peer role-play)
- Reflex hammer, tuning fork, cotton, pin for sensory testing
- Muscle strength grading chart
- Summary handout of Unani correlates for neuro-muscular conditions

1. Brief Orientation by facilitator (5 minutes):

Clinical examination and interpretation of muscle dysfunction. Revisit the key signs—weakness, atrophy, fasciculations, tone changes, reflex alterations—and how these relate to different pathologies (myopathic vs neuropathic).

2. Case Scenario Presentation (15 minutes):

Present two structured clinical case scenarios involving muscle dysfunction. Example scenarios may include:

- A middle-aged man with progressive proximal muscle weakness, difficulty in climbing stairs (suggesting myopathy).
- A young adult with acute onset foot drop, reduced ankle reflexes (suggesting peripheral nerve involvement).

For each case, provide a brief history and ask students to identify key signs to examine during a physical evaluation.

3. Supervised Examination Practice or Demonstration (20 minutes):

Use a volunteer or standardized patient to demonstrate the examination of muscle tone, power, deep tendon reflexes, and coordination.

Students can take turns performing parts of the examination under guidance, focusing on:

- Inspection for muscle atrophy or fasciculations

- Palpation for muscle tone
- Power testing (MRC grading)
- Reflexes (biceps, triceps, patellar, ankle)
- Functional tests (gait, rising from a chair, arm abduction)

4. Correlation with Unani Concepts (10 minutes):

Discuss how observed clinical signs can be explained within the Unani framework:

- *Ẕu'f-e-Aʿṣāb* for nerve weakness
- *Tafarruq-e-Ittisāl* (disruption in nerve-muscle link)
- *Falij* and *Laqwa* as advanced clinical manifestations

Highlight the role of temperament (*Mizāj*) and imbalance (*Sū' Mizāj*) in muscle diseases.

5. Interactive Discussion and Wrap-up (10 minutes):

Open the floor for questions and discussion. Encourage students to share similar cases from their clinical postings or OPDs. Summarize key clinical signs and their diagnostic relevance in both modern and Unani systems. Reinforce the importance of physical examination as a foundational clinical tool.

Practical Training 1.6 Muscle endurance test

Duration: 2 hours

Materials Required:

- Hand-held dynamometers for muscle strength testing
- Goniometer for joint range of motion (ROM)
- Reflex hammers
- Visual Analog Scale (VAS) for pain perception
- Stopwatch for endurance testing (e.g., timed planks or chair stands)
- Patient charts for recording test results
- Instruction handouts on standardized strength and endurance tests (e.g., MRC scale for muscle strength)

1. Introduction and Purpose (15 minutes):

- Facilitator introduces the importance of muscle strength, tone, and endurance as key indicators of neurological and musculoskeletal health.
- Brief overview of standard clinical tests (e.g., MRC scale, modified Ashworth scale, timed endurance tests).
- Unani perspective on muscle dysfunction: *Ẕu'f al-A'ḍā'*, *Nuqsān-e-Quwwat*, and the role of Unani interventions in restoring muscle tone and strength.

2. Practical Demonstration and Hands-On Testing (90 minutes):

Step 1: Measurement of Muscle Strength (30 minutes):

- **Procedure:**
  - Students will be divided into pairs. One student will be the examiner, and the other will be the patient.
  - Using hand-held dynamometers, students will test muscle strength in key muscle groups (e.g., elbow flexion, knee extension, grip strength).
  - The strength will be measured on the MRC scale (0-5) for each muscle group tested.
  - Record results on patient charts.

Step 2: Measurement of Muscle Tone (30 minutes):

- **Procedure:**
  - Test muscle tone in both relaxed and contracted states using the modified Ashworth scale.
  - Students will palpate major muscle groups (e.g., quadriceps, hamstrings, biceps) while the patient is at rest and during passive movement to assess spasticity or rigidity.
  - Record findings in the chart (tone from 0 to 4 on the Ashworth scale).

Step 3: Measurement of Muscle Endurance (30 minutes):

- **Procedure:**
  - Students will assess muscle endurance by performing timed exercises such as a plank hold, chair stands, or timed push-ups.
  - Record the time each student holds the position (plank, wall sit, etc.) or completes the endurance task.
  - Discuss how endurance testing correlates with muscle stamina and general health.

3. Group Discussion and Interpretation (45 minutes):

- **Guided Discussion:**

- Review the results from the strength, tone, and endurance tests.
- Discuss what abnormal results may indicate (e.g., signs of myopathy, peripheral nerve damage, or central neurological involvement).
- Integrate the findings with Unani concepts.
- Encourage students to consider holistic therapeutic strategies, including diet, herbs, and physical therapy interventions from the Unani perspective.

Practical Training 1.7 Myopathies and neuromuscular junction disorders

Duration: 2 hours

Materials Required:

- Clinical case vignettes (4–5): polymyositis, muscular dystrophy, myasthenia gravis, Lambert-Eaton syndrome
- Muscle strength grading charts (MRC scale)
- EMG/NCV trace samples (printed or digital)
- Short videos or animations of clinical signs (e.g., Gower's sign, ptosis fatigue test)
- Reference posters comparing myopathies vs NMJ disorders
- Diagnostic summary sheets (CK levels, autoantibodies, EMG changes)
- Unani reference material on *Ẕu'f al-A'ḍā'*, *Sū' Mizāj-e-'Asab*, *Imtilā'*
- Group worksheets and facilitator scoring rubrics

1. Introductory Briefing (15 minutes):

Facilitator explains:

- Overview of myopathies (inflammatory, dystrophic, metabolic)
- Key NMJ disorders (e.g., Myasthenia Gravis, Lambert-Eaton Syndrome)
- Differences in fatigue pattern, reflexes, weakness distribution
- Unani views: *Ẕu'f al-A'ḍā'*, *Sū' Mizāj-e-'Asabī*, *Fasād-e-Tarkīb*

2. Case-Based Group Activity (75 minutes):

Task: Rotate through **4 practical stations** (15 minutes each + 15 min buffer), each with a different clinical scenario.

Station Examples:

- **Station 1: Duchenne Muscular Dystrophy**
    - Child with Gower's sign, pseudohypertrophy
    - Elevated CK, EMG myopathic pattern
    - Unani focus: *Fasād-e-Tarkīb*, *Huzaal*, genetic factors
- **Station 2: Polymyositis**
    - Proximal muscle weakness, autoimmune features
    - Raised muscle enzymes, EMG shows irritability
    - Unani view: *Waram*, *Sū' Mizāj-e-Hār*
- **Station 3: Myasthenia Gravis**
    - Ptosis, fatigability, improvement with rest
    - Decremental EMG response
    - Unani concept: *Sū' Mizāj-e-Barid Yābiss*
- **Station 4: Lambert-Eaton Syndrome**
    - Weakness improves with effort, autonomic signs
    - Incremental EMG response
    - Correlate with Unani

Students perform:

- Symptom identification
- EMG/NCS data interpretation
- Summary of diagnosis and differential
- Mapping of clinical state to Unani equivalents
- Suggestion of Unani drugs

3. Discussion and Debrief (20 minutes):

- Group presentations on each case
- Cross-discussion of patterns (e.g., proximal vs distal weakness, fatigability)
- Clarify diagnostic markers
- Summarize Unani correlations and therapeutic logic
- Discuss overlap with neurological and muscular *Sū' Mizāj*

4. Conclusion and Reflection (10 minutes):

- Recap of clinical signs and EMG patterns for muscle vs NMJ disorders
- Emphasize clinical application of Unani concepts in diagnosis and management
- Encourage integration with modern neuromuscular tools for holistic patient care

Practical Training 1.8 Stress and metabolic biomarkers (CRP, HbA1c, Oxidative markers)

Duration: 3 hours

Materials Required:

- Lab demonstration kits or multimedia (if actual kits are unavailable):
  - **CRP detection**: Latex agglutination or ELISA-based demonstration
  - **HbA1c testing**: Point-of-care device, HPLC demo or simulation
  - **Oxidative stress**: Colorimetric kits for Malondialdehyde (MDA), Superoxide Dismutase (SOD), Catalase activity
- Sample tubes with simulated or actual blood/serum/plasma
- Centrifuge (for separation demo)
- Pipettes, reagents, cuvettes, colorimeter or spectrophotometer
- Clinical data sheets with mock patient profiles
- Charts/posters showing reference values and clinical interpretation

1. Introductory Briefing and Theoretical Background by facilitator (30 minutes)

- **CRP** as a marker of systemic inflammation (acute phase protein)
- **HbA1c** as a long-term glycaemic index
- **MDA, SOD, Catalase** as markers of oxidative damage and antioxidant defence

Unani Correlation Discussion:

- *CRP* ↔ *Waram*, *Sū' Mizāj-e-Saffrāwī*
- *HbA1c* ↔ *Diabetes (Ziabetus Shakari)*, *Ghalba-e-Balgham Ghair Tabi'ī*
- *MDA/SOD/Catalase* ↔ *Fasād-e-Akhlaṭ*, *Ḥarārat Ghair Ṭabī'īyah*, *Tafāwut-e-Tarkīb*

2. Demonstration of CRP Estimation (30 minutes):

Method: Latex agglutination or ELISA-based simulated kit demo

Steps Covered:

- Sample handling and preparation
- Addition of reagent and observation of agglutination
- Interpretation based on turbidity or ELISA color change

Clinical Relevance Discussion:

- Conditions with elevated CRP: *Waram*, infections, autoimmune conditions
- Interpretation with reference range
- Discuss Unani approach to inflammation control

3. Demonstration of HbA1c Measurement (30 minutes):

Method: POCT or simulation of HPLC

Steps Covered:

- Finger-prick or venous sample simulation
- HbA1c value reading and correlation with glycaemic status
- Discussion on chronic vs. acute glucose assessment

Clinical Relevance Discussion:

- Use in diagnosing and monitoring diabetes
- Interpretation: Normal (<5.7%), Prediabetes (5.7–6.4%), Diabetes (≥6.5%)
- Unani correlation with *Ziabetus*, *Khilt-e-Ghair Tabi'ī*

4. Demonstration of Oxidative Stress Biomarkers (60 minutes):

Method: Colorimetric demonstration (MDA, SOD, Catalase)

Steps Covered:

- Preparation of serum samples
- Reagent mixing and incubation
- Colour change observation via spectrophotometer
- Calculation of oxidative index

Discussion Points:

- MDA indicates lipid peroxidation (cell membrane damage)
- SOD and catalase represent antioxidant enzyme defence
- Role in neurodegenerative, cardiac, and metabolic diseases
- Unani equivalents: *Fasād-e-Khilṭ*, *Ḥarārat Ghair Ṭabī'īyah*, aging changes

5. Correlation with Clinical Cases and Interpretation (20 minutes):

Provide brief case vignettes (e.g., a diabetic patient, a patient with joint pain and elevated CRP, a case of oxidative stress in aging)

Students interpret biomarker levels and propose possible physiological conditions. They also identify potential Unani diagnoses and suggest preliminary *Tadbīrāt*.

6. Wrap-up, Recap, and Q&A (10 minutes):

- Recap key biomarkers and interpretation logic
- Reinforce connections with Unani concepts and diagnostic frameworks
- Invite student reflections on how biochemical and Unani diagnostic perspectives can be integrated for better clinical understanding

Practical Training 1.9 Physiological parameters of homeostasis (BP, Temp, HRV)

Duration: 3 hours

1. Introduction to Homeostasis and Physiological Parameters (30 minutes):

- **Facilitator Introduction**: Discuss the concept of homeostasis and the physiological parameters involved in maintaining balance:
    - **Blood Pressure (BP)**: How BP reflects cardiovascular homeostasis, its role in regulating tissue perfusion, and how it is influenced by stress and environmental factors.
    - **Body Temperature**: The role of temperature regulation in maintaining metabolic function, and how external and internal factors (like fever) affect it.
    - **Heart Rate Variability (HRV)**: Understanding HRV as a measure of autonomic nervous system balance and its role in assessing stress adaptation and recovery.
- **Unani Perspective**: Introduce how these parameters relate to Unani concepts of balance (*Tawāzun*).

2. Hands-On Measurement of Physiological Parameters (2 hours):

Step 1: Blood Pressure Measurement (45 minutes)

1. Demonstrate the use of a manual sphygmomanometer and stethoscope, explaining how to take BP measurements and properly listen for Korotkoff sounds.
2. Students take turns measuring BP in pairs (sitting and standing positions).
3. Discuss common issues in BP measurement, such as cuff size and patient position.
4. Compare measurements with digital BP monitors and discuss potential variations between manual and digital methods.

Step 2: Temperature Measurement (30 minutes)

1. Demonstrate the use of digital thermometers for measuring oral and infrared temperatures.
2. Students take turns measuring body temperature in different settings (resting, post-exercise, and after environmental exposure).
3. Discuss normal and abnormal temperature readings (fever, hypothermia, etc.).

Step 3: Heart Rate Variability (HRV) Measurement (45 minutes)

1. Demonstrate how to measure HRV using ECG equipment or smartphone apps.
2. Students measure HRV at rest and after stress (e.g., following physical exertion or mental stress exercises).
3. Discuss the importance of HRV in assessing the autonomic nervous system's capacity to adapt to stress and its relationship to overall health.

3. Integration and Discussion on Clinical Relevance (45 minutes):

- **Group Discussion**: Discuss the clinical relevance of each parameter in the context of homeostasis and disease management.
    - **BP**: How does it relate to cardiovascular and metabolic diseases?
    - **Temperature**: What can alter body temperature tell us about infection, inflammation, and systemic dysfunction?
    - **HRV**: How does it help in understanding stress, mental health, and autonomic regulation?

Experiential Learning Activity

Experiential-Learning Learning 1.1: Stress adaptation in different diseases

Duration: 6 hours

1. Introduction to Stress Adaptation (45 minutes):

- Facilitator introduces the concept of stress and its physiological and psychological effects on the body.
    - **Acute vs Chronic Stress**: Short-term vs long-term adaptive mechanisms.
    - **Hormonal and Immune Responses**: Role of cortisol, catecholamines, cytokines, and other hormones in stress adaptation.
    - **Metabolic Responses**: How stress influences glucose metabolism, fat storage, and muscle function.

2. Case Scenario Analysis (4 hours):

Students will be divided into small groups, each receiving one detailed clinical case scenario. They will analyze the cases in-depth, assess stress responses, and propose a diagnosis and management plan based on both modern and Unani perspectives.

Step 1: Case Scenario Distribution (15 minutes)

- Distribute the case scenarios among the groups. The cases will include diseases that involve stress adaptation mechanisms such as:
    1. **Metabolic Syndrome**: Chronic stress leading to insulin resistance, dyslipidemia, and hypertension.
    2. **Hypertension and Cardiovascular Disease**: Long-term stress response causing sustained sympathetic activation and vascular changes.
    3. **Type 2 Diabetes**: Stress-induced insulin resistance and metabolic dysregulation.
    4. **Chronic Fatigue Syndrome**: Prolonged stress and its effect on energy production, muscle function, and immune system.
    5. **Anxiety/Depression**: The impact of chronic psychological stress on the HPA axis and its effects on physical health.

6. **Obesity**: Stress-induced overproduction of cortisol and its role in fat accumulation.

Step 2: Group Work - Analysis and Diagnosis (90 minutes)

- Each group will work on their case scenario, focusing on the following:
    1. **Stress Mechanism Identification**: Determine the types of stress (physical, psychological, metabolic) involved.
    2. **Adaptive Response Analysis**: Identify how the body is adapting to the stress and whether the adaptation is healthy or maladaptive.
    3. **Clinical Symptoms**: Evaluate how stress adaptation impacts clinical symptoms, e.g., weight gain, blood pressure changes, fatigue, or altered blood sugar levels.
    4. **Pathophysiological Correlation**: Relate the disease mechanisms to cellular and systemic stress adaptation, considering the role of cortisol, inflammatory markers, and metabolic changes.
    5. **Unani Interpretation**: Correlate the findings with Unani concepts.

Step 3: Case Presentation and Discussion (90 minutes)

- Each group will present their case scenario analysis to the class. The presentation should include:
    1. An overview of the stress mechanisms at play.
    2. A discussion of the adaptive physiological responses.
    3. A synthesis of how the body's response to stress has contributed to the disease process.
    4. Unani perspectives on the diagnosis and disease progression.
    5. Therapeutic strategies based on both modern biomedical knowledge and Unani principles, including lifestyle interventions, herbal formulations, and treatment regimens.

3. Integrating Modern and Unani Approaches (30 minutes):

- Facilitator leads a class-wide discussion on the integration of modern and Unani approaches to stress management in chronic diseases.
    - Discuss commonalities and differences in how stress is managed and treated.
    - Explore potential synergies in Unani and modern practices for treating stress-related diseases, such as *Tafāwut-e-Tarkīb* (restoring balance) and *Muqawwī* (tonics for the body).

- Example: In the case of metabolic syndrome, combine modern pharmacological interventions with Unani dietary recommendations and exercise regimens aimed at balancing the humors.

4. Conclusion and Reflection (45 minutes):

- Review the key points from each case scenario and discuss how stress adaptation mechanisms influence disease outcomes.
- Students will reflect on how understanding stress responses can lead to better patient care and intervention strategies.
- A final discussion on the importance of integrating Unani diagnostic and therapeutic principles with modern clinical approaches in managing stress-related diseases.

Experiential-Learning Learning 1.2: *Taqwiyat-e-Aza* and Unani interventions in muscle weakness

Duration: 2 hours

Preparation Required:

- Pre-selected case vignettes (3–4), each with clinical history, symptoms, examination findings, and investigation summary
- Reference sheets summarizing key Unani terms, therapeutic principles, and drugs for muscle strength
- Whiteboard or flipcharts for group summaries
- Copies of select Unani texts (e.g., *Al-Qānūn*, *Kulliyāt-e-Nafisi*) on *Taqwiyat* and *Ẕu'f al-A'ḍā'*
- Case discussion worksheet for group reflections

1. Introduction and Framing (15 minutes):

Facilitator introduces:

- The relevance of muscle weakness in clinical practice (e.g., sarcopenia, neurogenic atrophy, post-illness weakness, chronic fatigue states)
- Unani pathophysiological understanding:
  - *Ẕu'f al-A'ḍā'* (organ weakness)
  - *Sū' Mizāj* (deranged temperament of muscles)
  - *Imtilā'*, *Tafāwut-e-Tarkīb*, *Ḥarārat-e-Ghair Tabi'īyah*
  - Principle of *Taqwiyat* through drugs, *Ghazā*, and *Tadbīrāt*

2. Group-Based Case Discussions (75 minutes):

Case Format (3 cases × 25 minutes each):

Each case includes:

- Brief history and symptoms (e.g., fatigue, proximal muscle weakness, post-viral debility, age-related wasting)
- Physical findings (muscle tone, strength grading, reflexes)
- Basic lab/EMG/imaging summaries

Tasks for Each Case:

- Identify the possible cause of muscle weakness (nutritional, metabolic, neurological, age-related, post-infectious, etc.)
- Correlate with Unani interpretation of *Ẓu'f*, *Sū' Mizāj*
- Propose a *Taqwiyat* plan using:
    - **Unani drugs:** e.g., *Majoon Jograj Gugal*, *Habbe Muqawwi*, *Itrifal Mulayyin* if indicated
    - **Dietary guidance:** strengthening *Ghazā* (e.g., egg yolk, dates, mutton broth, *Halwāyat*)
    - **Regimen:** massage (*Dalak*), exercise (*Riyāzat*), *Hammām*, *Taleeq*
- Consider differential diagnosis and plan for integration with modern evaluation

Facilitator Role: Guide students to balance traditional and contemporary perspectives and ensure case depth.

3. Group Presentations and Reflections (20 minutes):

Each group shares:

- Key interpretation from Unani lens
- Chosen *Taqwiyat* strategy
- Insights into how Unani intervention addresses the underlying cause

Facilitator summarizes and comments on the therapeutic logic and clinical integration.

4. Wrap-up and Open Discussion (10 minutes):

- Reinforce that *Taqwiyat* is not generic but personalized based on *Mizāj*, age, cause, and chronicity
- Discuss Unani strengths in chronic muscle weakness and post-illness recovery

- Reflect on opportunities for future research and interdisciplinary care

Experiential-Learning Learning 1.3: Muscle fatigue and weakness

Duration: 2 hours

Preparatory Materials:

- 3–4 anonymized patient narratives (audio recordings, video clips, or transcripts) depicting various causes of muscle fatigue (e.g., post-viral, autoimmune, nutritional, neurogenic, psychosomatic).
- Structured analysis worksheet for narrative mapping.
- Unani concept chart for common musculoskeletal complaints.

1. Introduction and Thematic Framing (15 minutes):

Facilitator introduces:

- Importance of narrative-based diagnosis in clinical medicine.
- Emphasis on patient-cantered care and deep listening.

2. Narrative Exploration and Analysis (90 minutes):

Step 1: Listen or Read (15 minutes per narrative × 3)

- Students, in groups, listen to or read through each narrative.
- Each story includes physical symptoms, progression, lifestyle context, emotions, and treatment-seeking behaviour.

Step 2: Structured Analysis (15 minutes per narrative)

- Students complete the worksheet for each narrative, addressing:
    - Primary complaints and their chronology
    - Emotional and functional impact on the patient
    - Possible biomedical diagnosis (e.g., myasthenia, chronic fatigue, post-viral syndrome)
    - Unani perspective
    - Likely *Amrāz*, *Mizāj*, and *Maddah* involved

- Suggested Unani intervention: drugs, *Tadbīrāt*, nutrition, counselling

3. Group Sharing and Synthesis (30 minutes):

- Each group presents one patient case, focusing on how the Unani understanding evolved from the narrative.
- Discussion is encouraged around subtleties in symptom expression and what may be overlooked in purely biomedical interpretation.

4. Wrap-Up and Reflective Dialogue (15 minutes):

Facilitator concludes by:

- Emphasizing the diagnostic value of attentive narrative listening.
- Connecting narrative insights with Unani diagnostic arts like pulse, temperament analysis, and *Mizāj* correction.
- Inviting personal reflections: “What did you hear beyond the symptoms?”

Experiential-Learning Learning 1.4: Neuromuscular transmission

Duration: 4 hours

1. Introduction to Neuromuscular Transmission (30 minutes):

- **Facilitator Introduction**:
  - Provide a brief overview of neuromuscular physiology, including the role of the neuromuscular junction in muscle contraction.
  - Explain the key components involved: motor neuron, synaptic vesicles, acetylcholine, and muscle receptors.
  - Discuss the importance of neurotransmitter release in the communication between the neuron and the muscle fibre.

2. Chart and Diagram Demonstration (45 minutes):

- **Activity 1: Use of Diagrams and Charts**
  - Present detailed charts/diagrams illustrating the sequence of events in neuromuscular transmission.
- Students will work in pairs or small groups to recreate the sequence of events on a blank diagram, labelling key structures and processes.
- Encourage students to ask questions as you go through the diagrams, ensuring understanding of the mechanisms at each stage.

3. 3D Model Exploration (1 hour):

- **Activity 2: Use of 3D Models**

- Present 3D models (physical or digital) that show the structure of the motor neuron and muscle fibers.
- Walk students through the motor end plate, synaptic cleft, acetylcholine receptors, and how the action potential propagates through the muscle fibre.
- Allow students to handle the physical 3D models or interact with digital simulations to manipulate and view the transmission process from different angles.
- Students will work in pairs to use the models to demonstrate the sequence of neuromuscular transmission to their peers.

4. Digital Simulation of Neuromuscular Transmission (1 hour):

- **Activity 3: Digital Simulation**
  - Introduce a digital simulation (e.g., PhET or similar) that shows the neuromuscular transmission process.
  - Have students use the digital tool to run different scenarios, such as decreasing acetylcholine levels or blocking receptor activity, and observe the effects on muscle contraction.
- **Group Activity**:
  - Divide students into groups, each tasked with experimenting with different variables in the simulation.
  - They should document their observations and analyze how changes to neuromuscular transmission affect muscle function. For example, they may examine what happens when acetylcholine is blocked or in cases of excessive acetylcholine release.

5. Linking Unani Medicine with Modern Physiology (45 minutes):

- Guide students to reflect on how Unani concepts of balance (Tawāzun) could be applied to the understanding of neuromuscular function.
- Discuss how conditions like muscle weakness or neuromuscular dysfunction could be linked to imbalances in the humors.
- Talk about the Unani interventions for supporting muscle function, including Ilaj bit Tadbeer (e.g., *Hijāma*, *Dalk*), and dietary recommendations for restoring muscle strength and nerve health.

Experiential-Learning Learning 1.5: Use of Neuromuscular Junction drugs

Duration: 4 hours

1. Introduction to Neuromuscular Drugs (30 minutes):

- **Facilitator Introduction**:
    - Provide an overview of the neuromuscular junction and how neuromuscular blockers and muscle relaxants influence the transmission of nerve impulses to muscles.
    - Discuss depolarizing agents (e.g., succinylcholine) and non-depolarizing agents (e.g., rocuronium, vecuronium).
    - Introduce muscle relaxants used in the management of spasticity (e.g., baclofen, dantrolene).
    - Explain the mechanism of action for each drug type, emphasizing their role in blocking or modifying neuromuscular transmission.

2. Case Discussion 1: Anesthesia and Surgery (1 hour):

- **Case Scenario 1: General Anesthesia with Neuromuscular Blockers**
    - Present a clinical scenario involving a patient undergoing surgery requiring general anesthesia. Discuss the use of succinylcholine for rapid sequence induction and rocuronium for muscle relaxation during surgery.
    - Analyze the benefits (e.g., rapid onset, short duration) and risks (e.g., malignant hyperthermia, bradycardia, apnea) associated with these drugs.
    - Discuss the importance of monitoring neuromuscular function during surgery (e.g., using a train-of-four (TOF) monitor).

3. Case Discussion 2: Spasticity Management (1 hour):

- **Case Scenario 2: Management of Spasticity in Stroke Patient**
    - Present a clinical case of a post-stroke patient with spasticity. Discuss the use of baclofen or dantrolene for muscle relaxation in this patient.
    - Explore the mechanism of these muscle relaxants in reducing muscle tone by acting on spinal cord reflexes (baclofen) or muscle contractile proteins (dantrolene).

4. Case Discussion 3: Use of Neuromuscular Drugs in Special Populations (1 hour):

- **Case Scenario 3: Neuromuscular Blockers in Patients with Myasthenia Gravis**
    - Present a case of a patient with Myasthenia Gravis undergoing surgery. Discuss the challenges in using neuromuscular blockers in these patients.
    - Focus on the use of non-depolarizing agents (e.g., rocuronium) and their potential complications in patients with reduced neuromuscular transmission.

5. Interactive Discussion: Integrating Unani and Modern Medicine (45 minutes):

- Engage students in a discussion about how Unani concepts of balance, temperament, and humoral theory could complement modern pharmacological approaches to neuromuscular dysfunction.
- For example, how would excessive heat or coldness (characteristic of *Sa'fra* or *Balgham* imbalance) manifest in muscle function, and how might Unani treatments such as pharmacological herbs, dietary modifications, or detox therapies be used to enhance recovery or reduce adverse drug effects?

Experiential-Learning Learning 1.6: Disrupted homeostasis

Duration: 4 hours

Materials Required:

- 3–4 detailed clinical case files (real or anonymized):
  1. Metabolic syndrome (with lab results, symptoms, lifestyle context)
  2. Chronic stress with adrenal dysregulation
  3. Hypothyroid or PCOS with fatigue and weight gain
  4. Subclinical inflammation with fatigue and metabolic biomarkers
- Whiteboard/flipcharts and case analysis forms
- Reference charts of biomarkers (e.g., CRP, HbA1c, cortisol, insulin, thyroid profile)
- Summary handouts of Unani pathophysiological concepts and relevant formulations
- Assessment rubric for presentation and analysis

1. Thematic Introduction (30 minutes):

Facilitator introduces:

- Homeostasis and its systemic regulation (neuroendocrine, metabolic, immune)
- Modern concepts: metabolic syndrome, chronic low-grade inflammation, stress axis dysfunction
- Unani perspectives of Homeostasis

2. Clinical Case Analysis (2 hours):

Group Division and Case Allocation (10 minutes):

- Students are divided into small groups; each group receives a unique case file.

Case Work (60 minutes per case × 2):

For each case, students analyze:

- Patient symptoms and relevant history
- Laboratory data and abnormal parameters
- Pathophysiological interpretation (homeostatic disruption mechanisms)
- Unani diagnosis (*Sū' Mizāj*, *Fasād-e-Tarkīb*, *Khilt predominance*, *Amrāḍ-e-Mufrada* vs *Murakkaba*)
- Role of *Tabi'at*, *Quwā*, and *A'ḍā* involved
- Suggested Unani interventions:
    - Drugs
    - Regimens
    - Dietary and lifestyle advice

Groups document their findings and prepare for presentation.

3. Group Presentations and Peer Review (60 minutes):

Each group presents one clinical case:

- Diagnostic process and justification
- Unani reasoning and differentiation of *Mizāj/Tadbīr*
- Proposed treatment plan and expected outcomes
- Challenges or areas of uncertainty

Other students ask questions, compare perspectives, and offer additions or refinements.

4. Summary, Integration & Reflection (30 minutes):

Facilitator summarizes key takeaways:

- Common patterns of disrupted homeostasis across different systems

- Integration of biomarkers and Unani diagnostic cues
- Emphasizes preventive and promotive aspects of Unani medicine
- Invites students to reflect on:
    - *"What did this session teach you about complexity in chronic conditions?"*
    - *"How can Unani principles be more systematically applied in such cases?"*

Experiential-Learning Learning 1.7: Unani-based homeostasis maintenance plans

Duration: 4 hours

1. Introduction to Homeostasis and Unani Principles (30 minutes):

- Facilitator Introduction: Discuss the concept of homeostasis and its importance in maintaining physiological balance.
- Unani Perspectives:
    - Introduce the concept of *Tabiyat* in Unani medicine.
    - Discuss the role of *Ilaj bit Tadbeer* (regimen-based therapies) in maintaining homeostasis and equilibrium.
    - Briefly review dietary modifications and their role in correcting imbalances.
    - Explain how Unani's holistic approach integrates lifestyle, diet, and physical regimens to maintain balance in the body.

2. Overview of *Ilaj bit Tadbeer* and Dietary Modifications (45 minutes):

- Ilaj bit Tadbeer Techniques:
    - *Hijāma* (Cupping): Uses and benefits in promoting circulation and removing stagnation of blood to restore balance.
    - *Dalk* (Massage): Role in improving tissue circulation and reducing stress-induced imbalances.
    - Sauna and Hot/Cold Baths: Discuss how temperature therapies can influence fluid balance and metabolic function.
- Dietary Modifications:
    - Dietary Modification Principles: Integrating Unani dietary concepts.
    - Condition-Specific Dietary Recommendations: For hypertension, stress, and metabolic disorders.

3. Case Scenario Discussion and Plan Development (2 hours):

- **Case Scenario 1**: A 45-year-old male with hypertension and stress disorder.
    - Ask students to analyze the case based on physiological imbalances (e.g., altered BP, elevated cortisol).
    - Task: Develop a homeostasis maintenance plan that integrates *Ilaj bit Tadbeer* (e.g., *Hijāma*, *Sauna*) and dietary modifications.
    - Encourage students to propose a holistic approach, addressing both physical and mental stressors.
    - Discuss each group's approach, ensuring integration of both Unani regimens and dietary recommendations.
- **Case Scenario 2**: A 55-year-old female with metabolic syndrome (high blood sugar, cholesterol, and triglycerides).
    - Ask students to assess the case, considering disrupted homeostasis related to metabolism.
    - Design a plan incorporating *Ilaj bit Tadbeer* (e.g., *Dalk*) and dietary recommendations.
    - Students present their plans, with a focus on lifestyle modifications and proper dietary interventions.
- **Case Scenario 3**: A 40-year-old male experiencing chronic fatigue syndrome (disrupted circadian rhythm, cortisol dysregulation).
    - Develop a maintenance plan using both *Ilaj bit Tadbeer* (e.g., regular *Sauna* for relaxation and *Hijāma* for circulation) and dietary modifications
    - Discussion: Encourage students to focus on restoring balance in the autonomic nervous system through regimen-based therapy and stress-relieving foods.

4. Integration of Modern Concepts and Unani Philosophy (30 minutes):

- Guide students to integrate modern physiological concepts (e.g., stress adaptation, metabolic balance) with Unani philosophy of balance and healing.
- Discuss how the *Ilaj bit Tadbeer* methods complement the body's natural healing processes and promote equilibrium.
- Emphasize the importance of individualized treatment plans, considering both physiological and psychological factors.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.	4

LAQ (10 Marks): On the role of Quwwate Muharika in functioning of muscles. LAQ (10 Marks): On the structure of neuromuscular junction. Compilation (15 marks): on the topic "Identify case scenarios of stress adaptation in different diseases". DOPS (15 marks): Demonstrate models of membrane transport (diffusion, osmosis, active transport). Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Module 2 : معدی امعائی، کبدی وصفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the regulation of gastrointestinal functions through the gut-brain axis and hormones.
2. Describe digestion and absorption processes and assess digestive faculties in Unani terms.
3. Analyze the role of the gut microbiome and mucosal immunity in health and disease.
4. Analyse Unani perspectives on GI health, lifestyle, and dietary modulation with modern concepts.
5. Discuss hepatic roles in metabolism, detoxification, bile secretion, and immune function.
6. Interpret Unani views on liver physiology and pathology.
7. Apply knowledge of GI and liver disorders to clinical assessment and dietary management.
8. Identify and correlate clinical biomarkers with GI and hepatobiliary dysfunction.

Unit 1 مَعدَہ وَ اَمعاء کی فزیالوجی Gastrointestinal Physiology

2.1.1 گٹ-برین ایکسس: معدہ و امعاء کے افعال کا عصبی و ہارمونی ضبط

(Gut-Brain Axis: Neural & Hormonal Regulation of GI Functions)

2.1.2 بنیادی غذائی اجزاء کا ہضم و اِجتذاب

(Digestion & Absorption of Major Nutrients)

2.1.3 طب یونانی میں ہضم کے تصورات

Unani Concepts of *Hazm* (Digestion)

2.1.4 قُوّتِ ہاضمہ کا تجزیہ

(Assessment of *Quwāte-Hāzima* (Digestive Faculty)

References: 3,4,5,6,7,9,10,11,26,27,28,29,30,31,32,33,34,43,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the physiology of Digestion & Absorption of Major Nutrients Describe Gut-Brain Axis, Neural & Hormonal Regulation of GI Functions	2	Lecture	CC	Knows-how	L&GD,DIS,TUT,SDL,FC
CO1,CO4	Measure Quwāte-Hāzima using Unani Parameters	4	Practical2.1	PSY-MEC	Shows-how	D-BED,BL,PER,PT,D
CO1,CO4, CO5	Prepare assessment tools/Questionnaire for Quwāte-Hāzima using Unani Parameters and statistical tools	6	Experiential-Learning2.1	PSY-SET	Does	LS,DIS,TBL,IBL,BS
CO1,CO3	Discuss Unani Concepts of Hazm, Factors affecting It, and Assessment of Quwāte-Hāzima (Digestive Faculty)	1	Lecture	CC	Knows-how	L&GD
CO1,CO2, CO3	Describe Unani Concepts of Amraz-e-Maida, Gut Health Maintenance & Lifestyle Measures	1	Lecture	CC	Knows-how	TUT,L&PPT ,DIS,IBL

Unit 2 گٹ مائیکروبائیوم، اِمتیازی مدافعت اور گٹ کی صحت کے یونانی اُصول Gut Microbiome, GI Immunity & Unani Approaches to Gut Health

2.2.1 صحت و بیماری میں گٹ مائیکروبائیوم کا کردار: ترکیب، افعال، میکانیزم

(Gut Microbiome in Health and Disease- Composition, Role & Mechanisms)

2.2.2 مراضِ معدہ، گٹ صحت اور طرزِ زندگی کا یونانی تصور

(Unani Perspective of *Amraz-e-Maida* (GI Disorders), Gut Health, and Lifestyle)

2.2.3 مخاطی مدافعت و اِمعائی حِصار کی سالمیت

(Mucosal Immunity & GI Barrier Integrity)

2.2.4 گٹ مائیکروبائٹا کی تدبیر :غذائی تداخلات،یونانی غِذااور نِظام

Modulation of Gut Microbiota: Dietary Interventions, Unani *Ghiza*, and Regimens)

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,17,19,26,27,28,29,30,31,32,33,34,188,189,190,191

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe Gut Microbiome: Composition, Role in Health & Disease, Mechanisms Explain Mucosal Immunity & GI Barrier Integrity	2	Lecture	CC	Knows-how	FC,TUT,SY,L_VC
CO1,CO2, CO3	Prepare Unani Diet Plans for Modulating Gut Microbiota	4	Experiential-Learning2.2	PSY-SET	Does	SDL,C_L,DIS,LS,Mnt
CO2,CO3, CO4	Demonstrate Microbiome Analysis Techniques, Gut Barrier Markers, and Identification of Unani Ghiza & Regimens for Gut Health	4	Practical2.2	PSY-SET	Shows-how	PER,Mnt,PT,D,DL

Unit 3 جگر وصفراوی نظام کی فزیالوجی Hepatobiliary Physiology

2.3.1 کاربوہائیڈریٹس،لپڈز، پروٹینز کے اِستحالہ اور زہریلے مادوں کے اِخراج میں جگر کا کردار

(Hepatic Functions in Metabolism of Carbohydrates, Lipids, Proteins & Detoxification)

2.3.2 مناعی تحویر میں جگر کا کردار،حیاتیاتی تبدیلی (بایوٹرانسفارمیشن)اور صفرا کا افراز

(Liver in Immune Modulation, Biotransformation & Bile Secretion)

2.3.3 طب یونانی میں کَبِد (جگر) کے افعال: صحت وبیماری کے تناظر میں

(Unani Perspective of *Kabid* (Liver) Functions in Health & Diseases)]

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,15,16,17,24,26,27,28,29,30,31,32,33,34,58,189

3A	3B	3C	3D	3E	3F	3G

CO2,CO3	Discuss Hepatobiliary Structure & Functions: Bile Secretion, Detoxification and Biotransformation Describe the role of Liver in Metabolic Regulation	2	Lecture	CC	Knows-how	L&PPT
CO2,CO3, CO4	Perform Liver Function Tests and Analyze LFT Parameters	4	Practical2.3	PSY-MEC	Shows-how	DL,DIS,D,LRI,Mnt
CO1,CO3, CO4	Revise and discuss Hepatoprotective Unani Drugs	6	Experiential-Learning2.3	CE	Knows-how	PER,DIS,TBL,LS

Unit 4 Applied aspects of Gut-Liver Health گٹ۔جگر صحت کے اطلاقی پہلو

2.4.1 معدے اور آنتوں کی حرکت کے امراض: میکانزم اور طبی اہمیت

(Gastrointestinal Motility Disorders: Mechanisms & Clinical Relevance)

2.4.2 معدہ و جگر کی صحت کے لیے طرزِ زندگی اور غذائیات (علاج بالغذا)

(Applied Lifestyle, Dietetics *(Ilaj-bil-Ghiza)* for GI & Liver Health)

2.4.3 گر کے عوارض: یونانی اور دیگر طریقہ ہائے علاج کا تقابلی جائزہ

(Liver disorders (Unani medicine and other systems approach)

2.4.4 معدہ و جگر کی خرابی کے بایومارکرز: طبی ربط

(Biomarkers of GI & Liver Dysfunction — Clinical Correlation)

References: 1,3,7,8,9,10,11,12,15,16,17,19,20,23,24,189,192,193,194,195

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Measure how psychological stress affects GIT function and motility	4	Practical2.4	PSY-MEC	Shows-how	DIS,D,PrBL,SDL,C_L
CO1,CO2, CO3,CO4	Describe Mechanisms & Clinical Relevance of GI Motility Disorders, Liver Disorders, and their Management from Modern & Unani Systems	2	Lecture	CC	Knows-how	L&PPT ,TUT,JC

CO1,CO2, CO3	Prepare Unani Functional Foods & Detox Recipes	4	Practical2.5	PSY-SET	Shows-how	PT,RLE,DL,DIS,SDL
CO1,CO2, CO3,CO4	Analyze real-world clinical problems related to gastrointestinal and liver disorders to plan diagnostic and management approaches.	4	Experiential-Learning2.4	PSY-SET	Does	PSM,C_L,TUT,PL,DIS
CO1,CO2, CO3,CO4	Design and conduct a community interaction to assess dietary practices and liver health awareness, and document the findings systematically	6	Experiential-Learning2.5	PSY-SET	Does	Mnt,C_L,RLE,D,DIS

Practical Training Activity

Practical Training 2.1 Assessment of Quwāte-Hāzima

Total Duration: 4 hours

1. Introduction and Orientation by Instructor (30 minutes)
   - Brief overview of *Quwāte-Hāzima* concept in Unani medicine.
   - Importance of assessing digestive faculty in clinical practice.
   - Introduction to Unani parameters for assessment:
     - Appetite evaluation (*Ishtihā*)
     - Digestion time (*Muddate-Hazm*)
     - Stool characteristics (*Kaifiyate-Bawl wa Barāz*)
     - Tongue examination
     - Pulse and temperament analysis.
2. Demonstration by Instructor (30 minutes)
   - Live demonstration or video demonstration of:
     - History taking focusing on digestion-related symptoms.
     - Inspection of tongue, abdomen, and observation of physical signs.

- Discussion on linking signs to *Mizāj* and digestive strength.

3. Hands-On Activity: Student Practice in Small Groups (2 hours)

- Each group will perform digestion assessment on one another using Unani parameters.
- Fill a structured assessment sheet (history, signs, and Unani interpretation).

- **Focus Points for Students**:
  - Appetite description (type, variations, disturbances).
  - Digestion time (subjective questioning after meals).
  - Observation of stool pattern (consistency, frequency, ease).
  - Examination of tongue (color, coating, moistness).
  - Pulse reading with digestion focus (softness, strength, warmth).

4. Group Discussion and Interpretation (30 minutes)

- Each group presents their findings briefly (2-3 minutes per group).
- Discussion on variations observed.
- Interpretation of digestive health based on Unani assessment.

5. Summary and Feedback (30 minutes)

- Faculty summarizes key observations.
- Comparative discussion on normal vs. deranged *Quwā te-Hāzima*.
- Feedback session: Students reflect on challenges faced during assessment.
- Final tips for clinical application of Unani digestive evaluation.

Materials Required:

- Structured assessment sheet.

Basic examination tools (tongue depressor, gloves).

Practical Training 2.2 Microbiome Analysis Techniques, Gut Barrier Markers, and Identification of Unani Ghiza & Regimens for Gut Health

Total Duration: 4 hours

1. **Introduction and Overview (30 minutes)**
    - Importance of gut microbiota and gut barrier integrity in health and disease.
    - Basic concepts:
        - Gut microbiome and dysbiosis.
        - Gut barrier function: Tight junctions, permeability.
        - Unani perspective
    - Unani foods (*Ghizā*) and regimens (*Tadābīr*) traditionally used for maintaining gut health.

2. **Demonstration of Microbiome and Gut Barrier Analysis (1.5 hours)**
    - **Microbiome Analysis Techniques**:
        - Overview of sampling techniques (stool sample collection and preservation).
        - DNA extraction basics and 16S rRNA sequencing concept (demonstration via videos/slides or lab setup if available).
        - PCR and microbial profiling (introduction).
        - Use of microbiome analysis reports (example interpretation if real-time analysis not possible).
    - **Gut Barrier Marker Demonstration**:
        - Introduction to clinical markers:
            - Zonulin (marker of intestinal permeability).
            - Calprotectin (inflammatory marker).
            - Lactulose-mannitol test (for permeability; theoretical explanation).
        - Sample test kits or mock demonstration (if available).

3. **Unani Ghizā and Regimens for Gut Health (1 hour)**
    - Presentation/demonstration of Unani dietary agents and regimens:
        - **Foods**:
            - *Shahtoot* (Mulberries), *Satar* (Thyme), *Asl* (Honey), *Anjeer* (Figs), *Rummān* (Pomegranate).

- **Regimens**:
    - *Tanqiya-e-Mi'da* (gut detox procedures).
    - Specific *Tadābīr* like moderate warm water drinking, medicated vinegars (*Sikanjabeen*), and seasonal diet shifts.
- Match these Unani foods and regimens to modern gut health concepts (prebiotics, anti-inflammatory foods, mucosal protectors).

4. **Hands-on Activity: Mapping & Reflection (1 hour)**
    - Students map examples of Unani foods and regimens to gut health benefits based on modern evidence (small group task).
    - Each group creates a quick "Gut Health Enhancement Chart":
- **Group presentations**:
    - 2–3 minutes each to share key findings.

5. **Conclusion (15 minutes)**
    - How microbiome science supports ancient Unani gut health approaches.
    - Importance of combining traditional dietetics with modern diagnostic tools.

Materials Needed:

- Lab or demonstration videos (for DNA extraction and gut barrier tests).
- Sample microbiome reports.

Practical Training 2.3 Liver Function Tests

Total Duration: 4 hours

1. Introduction and Orientation by Instructor (30 minutes)
    - Importance of Liver Function Tests (LFTs).
    - Overview of LFT parameters:
        - Serum Bilirubin (Total, Direct, Indirect)
        - Liver Enzymes (ALT, AST, ALP, GGT)
        - Serum Proteins (Albumin, Globulin, A/G Ratio)

        - Prothrombin Time (PT) (optional mention)
    - Clinical relevance: hepatocellular vs. cholestatic patterns, liver synthetic function.
    - Unani perspective on liver health (*Amal-e-Kabid*, *Istifragh*, *Taqwiyat-e-Kabid*).

2. Demonstration: Performing Liver Function Tests (30 minutes)
    - Laboratory demonstration of sample collection and testing process:
        - Venous blood sampling (already collected or demonstrated).
        - Use of automated analyzer or manual colorimetric methods (depending on facility).
    - Safety and ethical considerations in blood handling.

3. Hands-On Activity: Analyzing LFT Reports (2 hours)
        - Each group/Student is given real or simulated LFT reports (5–6 reports with different patterns: normal, hepatocellular injury, cholestasis, liver failure).
        - Analyze each report to identify:
            - Normal vs. abnormal parameters.
            - Possible causes (e.g., viral hepatitis, alcoholic liver disease, obstructive jaundice).
            - Clinical interpretation of patterns (e.g., predominant ALT/AST rise vs. ALP rise).
        - Link findings with Unani clinical

4. Group Discussion and Interpretation (30 minutes)
        - Key findings from reports.
        - Possible diagnoses or conditions.
        - Unani correlations and classical understanding of liver dysfunction.

5. Conclusion and Takeaways (30 minutes)
        - Importance of early LFT interpretation in clinical settings.
        - Integrating modern LFTs with Unani clinical judgment.
        - Emphasis on holistic liver care and preventive strategies.

Practical Training 2.4 Impact of psychological stress on digestion and motility.

Total Duration: 4 hours

1. Introduction and Orientation (30 minutes)
    - Physiological basis of stress responses (Sympathetic-Adrenal-Medullary and HPA axis).
    - How stress affects gastrointestinal motility, secretion, and blood flow.
    - Unani perspective: effect of emotional states (*Aḥwāl-e-Nafsāniyya*) on *Quwā te-Hāzima*.
    - Link between stress and conditions like indigestion (*Su-e-Hazm*), irritable bowel syndrome, etc.

2. Demonstration: Stress Assessment and Digestive Symptom Survey (30 minutes)
    - A simple **psychological stress questionnaire** (e.g., perceived stress scale).
    - A **GI symptom assessment form** (self-reported symptoms like bloating, motility changes, appetite loss).
    - How to correlate stress scores with digestive complaints.

3. Hands-On Activity: Group Exercise (2 hours)
    - **Student grouping**: Groups of 2–3.
        - Each group member fills out a short stress questionnaire and a GI symptoms survey.
        - Collect and compile data anonymously.
        - Analyze simple correlations:
            - Higher stress scores → higher GI symptoms?
            - Low stress scores → fewer symptoms?
        - Discuss immediate effects if any (e.g., students feeling nervous during exam periods noticing digestion issues).

4. Group Discussion and Interpretation (30 minutes)
    - Each group presents basic findings:
        - Did stress levels seem related to digestive complaints?
        - Any common patterns?
    - Unani interpretation:

- How *Aḥwāl-e-Nafsāniyya* imbalance disrupts *Tabi'at* and digestive faculties.
- Classical references on mind-body connection in digestion.

5. Conclusion and Takeaways (30 minutes)

- Faculty summarizes:
  - Key physiological mechanisms linking stress and digestion.
  - Unani understanding vs. modern understanding.
- Emphasis on stress management techniques to support digestion.

Practical Training 2.5 Unani Functional Foods & Detox Recipes

Total Duration: 4 hours

1. Introduction and Orientation by Instructor (30 minutes)
   - Concept of **functional foods** in Unani Medicine (*Ghidhā-e-Dāwā'ī* — food as medicine).
   - Traditional detoxification (*Tanqiya*, *Istifrāgh*) approaches using diet.
   - Examples of Unani functional foods: *Anjeer*, *Shahtoot*, *Asl (Honey)*, *Kishmish*, *Tukhme-e-Karafs*, *Sikanjabeen*, *Sharbat-e-Deenar*.
   - Relevance to modern understanding: foods that support gut-liver axis, anti-inflammatory and antioxidant functions.

2. Demonstration of Recipes (1.5 hours)

- **Examples of recipes**:
  - **Sharbat-e-Deenar** (figs and raisins-based liver detox drink).
  - **Sikanjabeen** (Unani vinegar-honey based digestive and cooling detox drink).
  - **Tukhme-e-Karafs decoction** (digestive and mild detoxifier).
  - **Shahtoot Sharbat** (mulberry-based cooling, antioxidant drink).
  - **Anjeer-Tukhme-e-Badiyan Mix** (mild laxative and gut cleanser).
- **Demonstration Focus**:
  - Ingredients, *Mizāj* (temperament), therapeutic uses, and ideal seasonal/time use.

- Safety tips (e.g., dosage, contraindications).

3. Hands-On Preparation (1 hour)

- **Student activity**: (Note: This activity can be done in collaboration with *Saidla* sepeciality)
  - In small groups, students prepare selected recipes.
  - Record ingredients, preparation steps, storage, and recommended uses.
  - Taste testing and sensory evaluation: assessing qualities like taste, smell, consistency based on Unani parameters.

4. Group Reflection and Discussion (30 minutes)

  - How these functional foods align with Unani detoxification principles.
  - How modern functional food concepts (probiotic, anti-inflammatory, detoxification) validate Unani practices.
  - Practicality of integrating such recipes into modern clinical practice.

5. Conclusion and Documentation (30 minutes)

- Each group submits a simple **Recipe Sheet** with:
  - Name of recipe.
  - Ingredients with *Mizāj*.
  - Preparation method.
  - Therapeutic indications.
  - Modern equivalent benefits (optional).

Experiential Learning Activity

Experiential-Learning Learning 2.1: Assessment tools/Questionnaire for Quwāte-Hāzima

Total Duration: 6 hours

1. Introduction and Orientation by facilitator on (45 minutes)

  - Concept of *Quwāte-Hāzima* in Unani Medicine.
  - Importance of standardized assessment tools in clinical and research settings.

- Overview of questionnaire design: item formulation, domains, scaling (Likert scale, binary, multiple choice, etc.).
- Basics of statistical validation (face validity, content validity, pilot testing).

2. Literature and Classical Text Review (45 minutes)

- Students review Unani texts (e.g., *Canon of Medicine*, *Kulliyāt-e-Nafisi*, *Ikhtiyārāt-e-Badīʿī*) to extract parameters related to *Quwā te-Hāzima*.
- Identify traditional markers: appetite, digestion time, bowel regularity, abdominal comfort, tongue signs, pulse changes, temperament correlation.

3. Brainstorming and Domain Identification (45 minutes)

- Group discussion: classify the extracted parameters into domains such as:
  - Appetite and Food Intake
  - Digestive Symptoms
  - Excretory Features
  - Physical Signs (e.g., tongue, pulse)
  - General Well-being (energy post meals, comfort).
- Finalize 4–5 major domains for the questionnaire.

4. Drafting Items and Scoring System (1.5 hours)

- Students formulate 3–5 questions for each domain.
- Questions will be close-ended (yes/no, 5-point scale, frequency-based).
- Develop preliminary scoring rules for interpreting strong, moderate, or weak *Quwā te-Hāzima*.
  - Example: Higher score indicates better digestive faculty.

5. Designing Pilot Questionnaire (1 hour)

- Prepare a clean draft questionnaire (15–20 items maximum).
- Assign codes for easy statistical analysis later (e.g., Strong Appetite = 5, Poor Appetite = 1).
- Ensure clarity, simplicity, and cultural relevance to Unani practice.

6. Statistical Planning for Validation (45 minutes)

- Orientation on how to validate the tool:

- Face Validity: Expert review.
- Content Validity: Relevance of each item to the domain.
- Pilot Testing: Sample collection.
- Reliability Testing: Cronbach's Alpha for internal consistency.
- Item Analysis: Mean, SD, item-total correlation.

- Plan small pilot sample (10–20 individuals) for preliminary testing.

7. Wrap-Up and Reflection (30 minutes)

- Group presentations of draft questionnaires.
- Peer review among groups.
- Faculty feedback for improvement.
- Discussion on how tool development helps bridge traditional concepts and modern research methodologies.

Experiential-Learning Learning 2.2: Unani Diet Plans for Modulating Gut Microbiota

Total Duration: 4 hours

1. Introduction and Orientation (30 minutes)

- Importance of gut microbiota in health and disease.
- Unani concepts of diet and gut health (*Tadbīr-e-Ghidhā* and *Islāḥ-e-Mi'da*).
- Modern understanding: Prebiotics, probiotics, fiber-rich foods.
- Classical Unani foods supporting digestion and microbial balance (e.g., *Anjīr*, *Asl*, *Kishmish*, *Shahtoot*, *Mā' al-Lahm*, *Sharbat-e-Anār*).

2. Group Work: Review of Unani Foods Beneficial for Gut Health (45 minutes)

- Students review Unani texts (like *Kulliyāt-e-Nafisi*, *Al-Qānūn fī al-Ṭibb*) to list foods described as:
  - *Mushil* (mild laxatives)
  - *Muallif* (harmonizing)
  - *Muqawwi-e-Mi'da* (strengtheners of digestion)

- *Muṣaḥḥiḥ-e-Mi'da* (correctives for digestive disorders).
- Identify foods with modern known prebiotic or probiotic effects.

3. Activity: Designing Unani-Based Gut Health Diet Plans (2 hours)
    - Prepare 2 diet plans per group:
        - **Diet Plan 1**: For a healthy adult to maintain gut health.
        - **Diet Plan 2**: For a patient with minor gut dysbiosis (e.g., bloating, constipation).
- **Guidelines for Plans**:
    - Include Unani recommended foods and drinks.
    - Suggest meal timings based on Unani principles (e.g., lighter evening meal).
    - Consider *Mizāj* (temperament) when suggesting foods (e.g., avoid cold foods in *Bārid Mizāj*).
    - Ensure diversity of fibres, natural prebiotics (like dates, figs), and digestive correctives.

4. Group Presentations and Peer Review (30 minutes)
- Each group presents their two diet plans.
- Peer groups provide feedback: Are the diets logical? Balanced? Rooted in Unani philosophy and supportive of gut microbiota?
- Faculty consolidates key points and best practices.

Experiential-Learning Learning 2.3: Hepatoprotective Unani Drugs

Total Duration: 6 hours

1. Introduction and Orientation (30 minutes)
    - Concept of *Muqawwī-e-Kabid* (Hepatoprotective agents) in Unani medicine.
    - Classical texts and descriptions (e.g., *Al-Qānūn*, *Kulliyāt-e-Nafisi*, *Kitāb al-Hāwī*).
    - Modern concept of hepatoprotection: anti-inflammatory, antioxidant, anti-fibrotic properties.
    - Overview of common Unani hepatoprotective drugs (e.g., *Kasni*, *Sharbat-e-Deenar*)

2. Literature Review (2 hours)

- Each student/group selects **3–5 Unani drugs** commonly used for liver health.
- Conduct a **structured literature review**:
    - Unani classical references: identify traditional indications, formulations, and *Mizāj*.
    - Modern scientific evidence: PubMed, Google Scholar, AYUSH portals.
    - Summarize pharmacological actions relevant to hepatoprotection (antioxidant, anti-inflammatory, hepatocyte regeneration, bile flow stimulation).

3. Preparation of Review Summaries (1.5 hours)

- A summary sheet for each drug:
    - Name (Unani & Botanical), Part Used, *Mizāj*, Classical References.
    - Experimental or clinical evidence (brief description of studies).
    - Mechanisms of hepatoprotection (modern view).
- Highlight gaps where modern validation is weak or missing.

4. Group Presentations and Evidence-Based Discussion (1.5 hours)

- **Each group presentation**: (10–12 minutes per student/group)
    - Share findings for their selected drugs.
    - Discuss strengths and limitations of available scientific evidence.
    - Relate findings to Unani concepts of liver care.
- **Faculty-led discussion**:
    - Critically appraise methodologies of modern studies.
    - Discuss importance of evidence-based validation for Unani drugs.
    - Encourage ideas for future research directions.

5. Conclusion and Takeaways (30 minutes)

- Importance of linking classical knowledge with modern evidence.
- How to advocate for Unani hepatoprotective drugs through rigorous scientific documentation.

- Ethical considerations in promoting traditional therapies.

Experiential-Learning Learning 2.4: GI & Liver Disorders: Diagnostic Workup & Integrated Management Approaches

Total Duration: 4 hours

1. Introduction and Orientation by facilitator (30 minutes)
    - Importance of case-based learning for clinical skill development.
    - Overview of GI and Liver Disorders commonly encountered:
        - Acute/Chronic Gastritis, GERD, IBS, Hepatitis, NAFLD, Cirrhosis.
    - Integrated Diagnostic Approach: Modern investigations + Unani clinical examination.
    - Integrated Management: Pharmacological (modern & Unani), Dietary, Lifestyle, and Detox measures (*Tadābīr*).
2. Case Distribution and Review (30 minutes)
    - **Activity**:
        - Each student/group is assigned **one detailed clinical case** (realistic/simulated case histories).
        - Case includes: history, presenting complaints, lab findings (CBC, LFTs, USG report, endoscopy findings, if needed).
        - Students review and identify key clinical issues.
3. Diagnostic Workup & Management Planning (2 hours)
    - Analyze the case: identify probable diagnosis/differential diagnosis.
    - **Plan diagnostic workup**:
        - Modern Investigations (e.g., endoscopy, liver enzymes, imaging)
        - Unani assessment tools.
    - Develop an **Integrated Management Plan**:
        - Modern medical interventions (where applicable).
        - Unani therapeutic plan (medications, *Tadābīr*, dietotherapy, detoxification).
        - Preventive and lifestyle strategies.

- **Preparation of a case summary sheet** including:
    - Diagnosis
    - Investigation Plan
    - Unani and Modern Treatment Strategies
    - Prognosis and Follow-up Plan

4. Group Presentations and Faculty Discussion (45 minutes)

- Each group/student presents their case in ~8 minutes, covering:
    - Diagnostic reasoning.
    - Investigations planned.
    - Integrated management strategies.
- Faculty provides critical feedback, emphasizing:
    - Rational diagnostic reasoning.
    - Safe and evidence-based integration of Unani and modern medicine.
    - Clinical pragmatism and patient-centered approaches.

5. Conclusion and Reflection (15 minutes)

    - How to strengthen diagnostic reasoning and integrated practice.
    - Role of Unani system in GI and liver disorders' holistic management.
    - Encouragement to explore case-based clinical research projects.

Experiential-Learning Learning 2.5: Community-based Survey/Interaction on Dietary Practices, Liver Health Awareness

Total Duration: 6 hours

1. **Introduction and Orientation (30 minutes)**

    - Introduction to the **importance of dietary practices** for liver health.
    - Discuss community-based research as a tool for public health awareness and data collection.

- Overview of liver health concerns: Common liver disorders (NAFLD, hepatitis, cirrhosis) and the role of diet and lifestyle.
- Importance of **liver health awareness** in different communities.
- Explanation of survey methodology and ethical considerations.

2. **Survey Preparation (30 minutes)**
    - **Survey content**:
        - **Demographics**: Age, gender, occupation, etc.
        - **Dietary Practices**: Common foods consumed (fatty, fried, fibre-rich, etc.), frequency of consumption, use of traditional or Unani remedies, alcohol consumption.
        - **Liver Health Awareness**: Knowledge about liver diseases, preventive measures, and risk factors.
        - **Unani Practices**: Knowledge of Unani dietary habits that support liver health.
    - **Survey Design**: Group discussion on the format of questions (Likert scale, multiple-choice, open-ended).
    - **Ethics**: Informed consent, confidentiality, and voluntary participation.
- **Preparation for Community Interaction**:
    - Assign roles (surveyors, note-takers, data entry).
    - Discuss strategies for building rapport with participants and maintaining professional ethics.

3. **Community Interaction and Survey Conduct (2.5 hours)**
- **Survey Distribution**:
    - Visit community areas such as local markets, residential areas, or healthcare centres.
    - Students interact with community members using the prepared survey forms (paper or digital).

4. **Data Collection, Entry, and Preliminary Analysis (1.5 hours)**
- **Data Entry**:
    - Students will **collect data** from the surveys and input them into an organized format (Excel, Google Sheets, or specialized survey software).
    - If digital tools are used, ensure data is compiled immediately.
    - Encourage students to **double-check data for completeness and accuracy**.

- **Preliminary Data Analysis**:
    - Group discussion on trends observed:
        - Common dietary habits related to liver health.
        - General awareness levels about liver diseases and preventive measures.
        - The prevalence of traditional remedies used for liver health.
    - Generate preliminary findings to be shared later in the session.

5. **Group Discussion, Reflection, and Reporting (30 minutes)**

- **Group Presentations**:
    - Each group presents a summary of their findings, including:
        - **Dietary habits** and their potential impact on liver health.
        - **Liver health awareness** levels within the community.
        - **Unani remedies** used by the community for liver health.

6. **Conclusion and Documentation (30 minutes)**

- Faculty Feedback:
    - Provide feedback on the quality of data collected, the effectiveness of survey methods, and the group presentations.
    - Discuss the implications of findings:
        - Gaps in liver health knowledge and dietary habits that need addressing.
        - Suggestions for future community health initiatives focused on liver health.
- **Documenting Results**:
    - Summarize key findings in a report format:
        - Data analysis (charts, graphs).
        - Recommendations for dietary interventions.
        - Community education strategies based on survey results.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (10 Marks): A viva Voce on Gut-Brain Axis, Neural & Hormonal Regulation of GI Functions. Class Presentation (10 Marks): Students may be given the topic Unani Concepts of Amraz-e-Maida, Gut Health Maintenance & Lifestyle Measures for class presentation. The presentation shall be graded on content, presentation skills and coherence. Trainers report (15 Marks): The compiled report on " Unani Diet Plans for Modulating Gut Microbiota" may be evaluated based on the trainers report. Compilation (15 Marks): The compilation on the topic " Hepatoprotective Unani Drugs" shall be evaluated. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ refelections / presentations can be taken as an assessment (25 marks).	4

Semester No : 4

Module 3 : قلبی نظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe autonomic and reflex regulation of cardiac function and heart rate variability.
2. Describe the mechanisms of blood pressure regulation and evaluate vascular health parameters.
3. Analyze neurohormonal influences on cardiovascular function, including Unani views on blood flow and *Imtila'*.
4. Interpret pulse characteristics using modern and Unani assessment techniques.
5. Discuss the pathophysiology of vascular dysfunction and hemodynamic disorders.
6. Relate Unani concepts of *Sauda* and *Su'-e-Mizaj* with vascular pathologies.

Unit 1 نظامِ قلب وعروق کی تنظیم Cardiovascular Regulation

3.1.1 افعالِ قلب کا آٹونومک ریگولیشن

(Autonomic regulation of cardiac function)

3.1.2 ریفلیکس آرکس: بیرو ریسیپٹر، کیمو ریسیپٹر، بین برج ریفلیکس

(Reflex arcs: baroreceptor, chemoreceptor, and Bainbridge reflex)

3.1.3 ضرباتِ قلب کا تقلب

(Heart Rate Variability (HRV)

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the mechanisms of autonomic regulation of cardiovascular function	2	Lecture	CC	Knows-how	FC,TUT,L&PPT
CO2,CO4	Perform assessment of autonomic function using HRV, deep breathing test, and Valsalva manoeuvre	6	Practical3.1	PSY-MEC	Shows-how	DL,D,Mnt,PT,LRI
CO2,CO4	Interpret clinical presentations of dysautonomia, including POTS and orthostatic hypotension, to understand underlying mechanisms	6	Experiential-Learning3.1	PSY-SET	Does	DIS,PrBL,CBL,LRI,SDL

Unit 2 ضغط الدم اور عروقی صحت Blood Pressure and Vascular Health

3.2.1 تنظیمِ ضغط الدم (قلیل المدت وطویل المدت)

(Regulation of blood pressure (short and long-term)

3.2.2 عروقی امتثال، شریانی سختی اور موجِ نبض کی رفتار

(Vascular compliance, arterial stiffness, and pulse wave velocity)

3.2.3 نیوروہارمونل میکانیزم، ویسوپریسن، نیٹریورٹک پیپٹائیڈز

(Neurohormonal mechanisms (RAAS, vasopressin, natriuretic peptides)

3.2.4 طب یونانی کے اُصول: خُون کے بہاؤ اور اِمتِلاء سے متعلق

(Unani principles related to blood flow and Imtila')

References: 1,15,26,27,28,29,30,31,32,33,34,47,189

3A	3B	3C	3D	3E	3F	3G
CO1,CO2, CO3	Analyze the mechanisms of blood pressure regulation and their derangement in disease states with parallels in Unani physiology	3	Lecture	CAN	Knows-how	L&GD,FC,DIS,BL,PBL
CO2,CO4	Demonstrate advanced BP measurement techniques (ambulatory, central aortic pressure)	4	Practical3.2	PSY-SET	Shows-how	DL,D-BED,CBL,W,PT
CO1,CO2, CO4	Engage in outreach-based evaluation of cardiovascular parameters and explore their relationship with Unani Mizaj types	8	Experiential-Learning3.2	PSY-SET	Does	C_L,DIS,IBL,FV,CBL

Unit 3 نبض کا تقیم اور تفسیر Pulse (Nabz) Assessment and Interpretation

3.3.1 نبض کی لہر کی تخلیق اور ترسیل کے اُصول

(Principles of pulse wave generation and propagation)

3.3.2 نبض کی شرح، نظم، ساخت، تغیر

(Pulse rate, rhythm, contour, variability)

3.3.3 طب یونانی میں نَبض کے معیارات: اَدِلَّہ نَبض

(Unani parameters of *Nabz*: *Adilla Nabz)*

3.3.4 نبض کا جدید آلات کے ساتھ اِندماج

(Integration of modern tools with Nabz assessment)

References: 1,7,9,19,26,196,197

3A	3B	3C	3D	3E	3F	3G

CO1,CO2, CO3,CO4	Analyze the physiological basis of pulse wave and contrast it with Unani *Nabz* parameters	2	Lecture	CAN	Knows-how	L&PPT ,TUT,SDL,SY,JC
CO1,CO2, CO4	Demonstrate palpation of different *Nabz* types and correlate with clinical scenarios	4	Practical3.3	PSY-SET	Shows-how	DIS,C_L,CBL,PT,SDL
CO1,CO2, CO3,CO4	Demonstrate and discuss different techniques of recording pulse wave signals e.g. PPG, Doppler and Piezo-electric sensors and adapt these techniques to measure *Adilla Nabz*	6	Experiential-Learning3.3	PSY-ADT	Does	Mnt,BL,DIS,DL,SDL

Unit 4 عروقی خرابی اور ہیموڈینامک عوارض Vascular Dysfunction and Hemodynamic Disorders Vascular Dysfunction and Hemodynamic Disorders

3.4.1 اینڈوتھیلیل ڈسفنکشن: نائٹرک آکسائیڈ، التہاب، آکسیڈیٹیو تناؤ

(Endothelial dysfunction: nitric oxide, inflammation, oxidative stress)

3.4.2 تصلب شرائین: آغاز، ارتقاء، طبی مضمرات

(Atherosclerosis: initiation, progression, clinical implications)

3.4.3 ہیموڈینامک عوارض

(Hemodynamic disorders)

3.4.4 سَودا اور سُوءِ مزاج کا عروقی امراض میں کردار

Role of *Sauda*, and *Su'-e-Mizaj* in vascular pathology

References: 1,8,19,26,27,29,32,198,199,200,201

3A	3B	3C	3D	3E	3F	3G
CO1,CO2	Describe the pathophysiology of endothelial dysfunction and atherosclerosis, and their understanding in Unani medicine	3	Lecture	CC	Knows-how	TUT,L_VC,SDL

CO2,CO3, CO4	Demonstrate clinical indicators of vascular dysfunction (ankle-brachial index, endothelial function tests) and Interpret basic laboratory and imaging data related to vascular health	6	Practical3.4	PSY-SET	Shows-how	W,SIM,Mnt,DIS,DL
CO1,CO2, CO3,CO4	Prepare clinical case discussions focused on hemodynamic compromise (shock, edema), integrating Unani concepts like *Imtilla'* and *Tahabuj*	6	Experiential-Learning3.4	PSY-SET	Does	CBL,D,DIS,SDL,BL

Practical Training Activity

Practical Training 3.1 Assessment of autonomic function

Total Duration: 6 hours

1. Introduction and Orientation by instructor (45 minutes)

- Overview of Autonomic Nervous System (ANS): Sympathetic and Parasympathetic divisions.
- Clinical importance of autonomic function tests in conditions like syncope, diabetic neuropathy, and chronic stress.
- Introduction to three core tests:
    - **Heart Rate Variability (HRV)**
    - **Deep Breathing Test**
    - **Valsalva Manoeuvre**
- Physiological principles behind each test.
- Safety protocols and contraindications.

2. Demonstration: Performing Autonomic Function Tests (45 minutes)

- **Deep Breathing Test**: E:I ratio measurement using ECG or pulse monitor.
- **Valsalva Manoeuvre**: Step-by-step demonstration using mouth pressure gauge or standardised protocol.
- **HRV Analysis**: 5-minute resting ECG recording; intro to software tools.
- Use of safety measures: resting periods, supervision, and monitoring adverse symptoms.

- Explanation of test endpoints and result documentation.

3. Hands-On Activity: Performing and Recording Tests (2 hours)

Each student performs or observes the three tests in rotation:

- **Deep Breathing Test**: Record respiratory sinus arrhythmia and calculate E:I ratio.
- **Valsalva Manoeuvre**: Record heart rate changes through the four phases; calculate Valsalva ratio.
- **HRV Measurement**: Use software or manual interpretation for:
    - Time-domain measures: SDNN, RMSSD
    - Frequency-domain measures: LF, HF, LF/HF ratio

4. Group Interpretation and Clinical Correlation (1 hour)

Each group is given anonymized case profiles and sample data sets or reports (simulated or real) showing:

- Normal autonomic function
- Sympathetic dominance
- Parasympathetic withdrawal
- Autonomic failure (e.g., diabetic autonomic neuropathy)

Activities:

- Interpret patterns based on HRV, Valsalva ratio, and E:I ratio.
- Discuss possible underlying pathologies.
- **Integrate Unani reasoning**: How imbalances in *Hararat* or *Rutoobat* may align with findings.

Faculty Role: Guide discussion, correct misinterpretations, and introduce clinical applications.

5. Integration and Reflective Discussion (1 hour)

Activities:

- Each group shares key findings and clinical correlations.
- Reflections on the utility of autonomic tests in Unani clinical practice.
- Explore lifestyle, dietary, and temperament-based management of dysautonomia.

- Discuss applicability of these tests in preventive care and chronic disease management.

Practical Training 3.2 Advanced BP measurement techniques (ambulatory, central aortic pressure)

Total Duration: **4 hours**

1. Introduction and Orientation (30 minutes)

- Limitations of conventional office BP readings.
- Importance of advanced BP measurement in modern clinical decision-making.
- Overview of:
  - **Ambulatory Blood Pressure Monitoring (ABPM)**: 24-hour monitoring, diurnal variation, nocturnal dipping.
  - **Central Aortic Pressure (CAP)**: Difference from brachial pressure, relevance in arterial stiffness, target organ damage.
- Clinical implications: resistant hypertension, white coat and masked hypertension, cardiovascular risk stratification.
- Introduction to emerging trends and tools in BP assessment.
- Ethical considerations and patient preparation for long-term monitoring.

2. Demonstration: Ambulatory Blood Pressure Monitoring (45 minutes)

Faculty-led demonstration covering:

- Components of ABPM device: cuff, recorder, software.
- Correct positioning and calibration of the device.
- Patient instructions:
  - Maintaining a diary of activities.
  - Avoiding movement during measurements.
  - Device care during sleep and activity.
- Downloading and interpreting 24-hour readings:
  - Day vs. night averages.
  - Dipping status (normal, non-dipping, reverse dipping).

- Variability patterns and clinical interpretation.

3. Demonstration: Central Aortic Pressure Estimation (45 minutes)

Live demo using a non-invasive tonometry-based or oscillometric system:

- Brief explanation of pulse wave analysis (PWA).
- Recording radial artery waveform using applanation tonometry or automated devices.
- Software-based conversion to central aortic pressure via mathematical modelling.
- Parameters obtained:
  - Central systolic and diastolic pressures.
  - Augmentation Index (AIx), Pulse Wave Velocity (PWV).
- Clinical interpretation: vascular age, arterial stiffness, implications for high-risk patients.

4. Hands-On Practice: Device Handling and Data Interpretation (1 hour)

Small group rotation (2–3 students/group):

- Practice setting up ABPM on a peer or mannequin.
- Practice performing CAP measurements using available equipment or simulators.
- Review anonymized printouts or digital data sets:
  - Identify abnormal patterns (e.g., masked hypertension, elevated central pressure).
  - Compare central vs. peripheral BP readings.
  - Discuss implications for medication selection (e.g., effect of vasodilators on central vs. brachial pressure).

5. Wrap-up and Clinical Integration (1 hour)

Group discussion and Q&A session:

- Summary of how advanced BP techniques improve diagnostic precision.
- Case examples:
  - Resistant hypertension where ABPM reveals white coat effect.
  - Elevated central pressure in older adults with normal brachial BP.

- Role of these techniques in monitoring therapy effectiveness and cardiovascular risk.
- **Unani integration**:
    - Relevance of *Imtela*, *Baroodat*, and *salabate Urooqj* in understanding vascular resistance and stiffness.
    - Preventive Unani regimens for early hypertension (e.g., *Tadeel-e-Mizaj*, *Hammam*, *Tanqiya-e-Dam*).

Practical Training 3.3 Palpation of different *Nabz* types

Total Duration: **4 hours**

1. Introduction and Conceptual Overview by Instructor (30 minutes)

- Importance of *Nabz* (pulse) examination in Unani diagnosis and prognosis.
- Classical parameters of Nabz:
    - *Adila Nabz*
- Unani classification of *Nabz*:
    - *Mutashabiha*, *Ghayr Mutashabiha*, *qawi*, *Za'eef*, *Saree'*, *Batee*, etc.
- Modern pulse characteristics:
    - Rate, rhythm, volume, character, and symmetry.
- Clinical relevance: How pulse changes in fever, dehydration, cardiac failure, etc.
- Ethical and practical aspects of pulse palpation.

2. Faculty Demonstration of *Nabz* Palpation (30 minutes)

Hands-on demonstration by faculty using volunteers or simulation:

- Proper technique of radial pulse palpation:
    - Positioning of hand and fingers.
    - Identifying rate, rhythm, force, and specific quality.
- Demonstration of selected *Nabz* types:
    - *Mutashabiha* (uniform pulse): seen in healthy individuals.

- *Saree'* (rapid pulse): e.g., in fever, Safravi Mizaj.
- *Za'eef* (weak pulse): e.g., chronic illness, Saudawi individuals.
- *Qawi* (strong pulse): e.g., in Damwi temperament, during inflammation.

- Corresponding modern examples: bounding pulse in aortic regurgitation, thready pulse in hypovolemia.

3. Hands-On Practice (1.5 hours)

- Practice palpating each other's pulse under supervision.
- Identify and document:
  - Rate (beats per minute)
  - Rhythm (regular, irregular)
  - Volume and force
  - Character (slow-rising, collapsing, etc.)
  - Presence of symmetry (both radial arteries)
- Attempt categorization into Unani *Nabz* types based on tactile findings.
- Rotate with simulated patients (if available) representing specific clinical scenarios.

4. Case-Based Correlation Activity (1.5 hour)

Structured clinical scenarios are provided (real or simulated):

- Each group/student is given 3–4 cases, such as:
  - A febrile child (expect *Saree' Nabz*).
  - A cachectic elderly patient (expect *Za'eef Nabz*).
  - A hypertensive middle-aged man with *Qawii Nabz*.
  - A dehydrated patient with *Bateeq* (interrupted/weak pulse).
- Students palpate, analyze the pulse, and classify *Nabz* type.
- Correlate with Mizaj (e.g., *Damwi* with full, strong pulse; *Balghami* with slow, soft pulse).
- Prepare a short verbal summary: *Nabz* findings, likely Mizaj, possible diagnosis, and Unani implications.

Practical Training 3.4 Laboratory and imaging data related to vascular health

Total Duration: **6 hours**

1. Introduction and Conceptual Briefing by Instructor(1 hour)

- Importance of vascular health in systemic physiology.
- Pathophysiological basis of **vascular dysfunction**: endothelial injury, atherosclerosis, arterial stiffness.
- Clinical relevance of:
  - Ankle-Brachial Index (ABI) in detecting peripheral artery disease (PAD).
  - Endothelial Function Tests (e.g., flow-mediated dilation, reactive hyperemia).
- Overview of relevant lab and imaging investigations:
  - Lipid profile, CRP, homocysteine, serum nitric oxide.
  - Carotid intima-media thickness (CIMT), arterial Doppler studies.
- Unani perspective on *Sudud-e-ʻUrūq*.

2. Demonstration of ABI Measurement (1 hour)

- Use of Doppler probe or automatic ABI device.
- Steps:
  - Measure systolic BP at brachial and ankle arteries (posterior tibial or dorsalis pedis).
  - Calculate ABI = Ankle SBP / Brachial SBP.
- Interpretation:
  - 1.30: Non-compressible arteries (e.g., diabetes)
  - 1.0–1.3: Normal
  - 0.9–1.0: Borderline
  - <0.9: PAD suspicion

3. Demonstration of Endothelial Function Tests (1 hour)

Depending on available facility:

Option A: Flow-Mediated Dilation (FMD) – if ultrasound access is available

- Brief occlusion of brachial artery followed by release.
- Observe post-occlusion diameter change on Doppler.
- Correlate with endothelial nitric oxide (NO) release.

Option B: Digital Pulse Amplitude Tonometry (PAT) or Reactive Hyperemia test

- Use of peripheral sensors to record pulse wave changes during ischemia-reperfusion.

Faculty explains:

- Clinical importance in early atherosclerosis detection.
- Relation to inflammatory and oxidative stress markers.
- Unani interpretation: *Taqallub-e-Mizaj*, *Daf-e-Fuzlāt dysfunction*.

4. Laboratory and Imaging Data Interpretation (1.5 hours)

- 4–5 simulated patient profiles with lab results and imaging summaries:
    - Lipid panel (HDL, LDL, triglycerides)
    - CRP, ESR, NO levels
    - ABI values, CIMT reports, arterial Doppler notes

Tasks:

- Interpret lab values for vascular risk (e.g., high LDL, low NO).
- Analyze imaging data: identifying signs of arterial wall thickening or occlusion.
- Predict clinical implications: risk of stroke, PAD, or coronary artery disease.
- Correlate with possible Unani diagnosis.

5. Presentation and Faculty Feedback (1 hour)

- Key findings and risk interpretation from their case sets.
- Possible Unani conceptual explanations.
- Suggested interventions from both modern and Unani perspectives.

Experiential Learning Activity

Experiential-Learning Learning 3.1: Dysautonomia (e.g., POTS, orthostatic hypotension)

Total Duration: 6 hours

1. Introduction to Dysautonomia and Case-Based Learning Method (30 minutes)

Brief session led by faculty covering:

- Overview of dysautonomia: definition, classification, and prevalence.
- Common clinical forms:
    - **Postural Orthostatic Tachycardia Syndrome (POTS)**
    - **Neurogenic Orthostatic Hypotension**
    - **Autonomic neuropathy in diabetes and autoimmune diseases**
- Symptoms and patient experiences: fatigue, dizziness, palpitations, GI issues, cognitive fog.
- Role of **case-based learning** in deepening diagnostic and interpretive skills.

2. Small Group Case Discussions – Part 1 (2 hours)

Format: 2–3 students per group

Materials Provided:

- 3 detailed case scenarios with history, vitals, symptom profiles, test results (HRV, tilt-table, BP, ECG).
- Mix of POTS, orthostatic hypotension, and diabetic autonomic dysfunction.

Tasks:

- Analyze each case step-by-step:
    - Identify the form of dysautonomia
    - Interpret test results (E:I ratio, HRV, BP changes on standing)
    - Discuss underlying causes and risk factors
    - Determine appropriate interventions (conservative, pharmacological)

- Correlate with **Unani reasoning**:
    - Consider *Su Mizaj* or *Hararat wa Baroodat* derangements
    - Possible involvement of *Asbab Sitta Zarooriya* (six essential factors)
    - Suggest Unani management strategies (e.g., *Taqwiyat-e-Qalb, Tanqiya-e-Madda*)

3. Faculty-Led Consolidation and Reflection – Part 1 (1 hour)

Activities:

- Each group presents key takeaways from one assigned case.
- Faculty facilitates clinical reasoning:
    - Differential diagnosis pathways
    - Red flags
    - Limitations of autonomic testing
- Highlights integrative approach between modern diagnostics and Unani framework.

4. Small Group Case Discussions – Part 2 (1.5 hours)

New set of 2 cases, each with:

- Complex presentation involving multiple systems (e.g., overlapping anxiety or fibromyalgia with dysautonomia).
- Emphasis on chronicity, treatment resistance, and lifestyle interaction.

Tasks:

- Map the autonomic dysfunction to systemic complaints.
- Consider multidisciplinary inputs: neurology, cardiology, psychology.
- Develop a blended management plan including:
    - **Modern interventions**: hydration, salt loading, beta blockers, fludrocortisone
    - **Unani care**: lifestyle adjustment, temperament-specific diet, decoctions (*Joshanda*, *Sharbat-e-Unnab*), and regimens (e.g., *Dalak*, *Hammam*)

5. Conclusion and Takeaways (1 hour)

Faculty-led group discussion covering:

- Clinical signs to suspect dysautonomia in primary settings.
- Interpretation of autonomic tests and holistic correlation.
- Importance of integrated care in functional disorders.
- Preventive strategies and role of patient education.
- Encouraging use of Unani principles in contemporary autonomic disorders.
- Formulate integrative management plans blending evidence-based medicine and traditional knowledge.

Experiential-Learning Learning 3.2: Community-based screening of BP

Total Duration: **8 hours**

1. Pre-Field Orientation and Training by Faculty (1.5 hours)

- Objectives of the community screening:
  - Identifying undiagnosed hypertension and early vascular changes.
  - Promoting awareness on cardiovascular health.
  - Exploring correlation between *Mizaj* and vascular status.
- **Measurement protocols**:
  - Standardized BP measurement technique (resting, seated, cuff size).
  - Use of validated digital BP monitors or sphygmomanometers.
  - Peripheral arterial health assessment (e.g., pulse quality, ankle-brachial index if available).
- **Temperament (*Mizaj*) assessment**:
  - Administering a validated Mizaj questionnaire.
  - Identifying categories: *Damwi* (sanguine), *Balghami* (phlegmatic), Safravi (choleric), *Saudawi* (melancholic).
  - Ethical considerations and consent for screening.

2. Community Field Activity (4 hours)

Location: Local community health centre, school, or residential colony (pre-arranged by faculty)

Activities:

- **Set up screening stations**: BP measurement, *Mizaj* assessment, lifestyle survey.
- **Tasks per group/student**:
    - Measure and record systolic/diastolic BP of at least 20 individuals per team.
    - Assess pulse character and rhythm (radial pulse exam).
    - Conduct *Mizaj* evaluation using short questionnaire or checklist.
    - Record age, gender, lifestyle factors (diet, activity, sleep), stress levels, and family history.

Faculty supervision at each station to ensure consistency and address clinical queries.

3. On-Site Observation and Interaction (30 minutes)

Real-time experiential learning:

- Interact with participants: discuss BP readings, risk factors, and lifestyle habits.
- Observe community response and barriers to preventive care.
- Identify patterns (e.g., higher BP in sedentary, high-salt consumers or those with *Balghami* temperament).
- Note any cultural or health belief factors influencing cardiovascular health.

4. Data Consolidation and Analysis (1 hour)

Back at the institution:

- Groups compile and tabulate:
    - BP categories (normal, elevated, Stage 1 & 2 hypertension).
    - Distribution of Mizaj types.
    - Correlation trends (e.g., higher systolic pressure in Safravi Mizaj, sluggish pulse in *Balghami*).
- Analyze:
    - Which Mizaj types are more prone to vascular issues?
    - Lifestyle or demographic associations?
    - Frequency of unawareness regarding BP status.

Basic statistical methods may be introduced (mean, correlation, frequency distribution).

5. Presentation and Group Discussion (1 hour)

Each group/student presents:

- Key findings and insights from their community interactions.
- Unique observations (e.g., cases of very high BP in young individuals).
- Correlation trends between Mizaj and arterial/BP profiles.
- Suggested interventions and preventive advice based on Unani principles.

Faculty provides feedback, clarifies misconceptions, and offers integrative interpretations.

6. Conclusion and Reflective Debrief (30 minutes)

Wrap-up session includes:

- Importance of community-level screening for early detection and prevention.
- Value of *Mizaj*-based stratification in holistic cardiovascular assessment.
- Enhancing communication and cultural sensitivity during community outreach.
- Unani perspective on prevention: role of *Tadeel-e-Mizaj*, *Asbab Sitta Zarooriya*, and regimens like *Dalak*, *Riyazat*, and *Ghiza*.

Experiential-Learning Learning 3.3: Techniques of recording pulse wave signals

Total Duration: **6 hours**

1. Conceptual Orientation and Technical Briefing by Instructor (1 hour)

- Importance of *Adilla Nabz* in Unani clinical diagnosis.
- Introduction to modern pulse wave technologies:
    - **PPG (Photoplethysmography)**: Principles, waveform components (AC/DC), perfusion index.
    - **Doppler ultrasound**: Detection of blood flow velocity and direction in arteries.
    - **Piezo-electric sensors**: Pressure wave detection via mechanical deformation.
- Objective: Explore how these modalities can quantify or analogically represent *Adilla Nabz*.

2. Demonstration of Technologies (1.5 hours)

Faculty or technician-led live demonstration of each method (Videos may also be used):

A. Photoplethysmography (PPG)

- Device setup using finger sensors.
- Recording of waveforms under different physiological states (rest, post-exercise).
- Observation of waveform features: amplitude, dicrotic notch, variability.

B. Doppler Ultrasound

- Probe placement over radial or carotid artery.
- Measurement of velocity profile, flow sound patterns.
- Variation with respiration, posture, and physical stress.

C. Piezo-electric Pulse Sensor

- Application on wrist or ankle.
- Signal acquisition and waveform analysis.
- Effect of pressure, movement, and temperature.

Safety considerations, calibration methods, and error reduction techniques are discussed.

3. Guided Hands-On Experimentation (2 hours)

- **Task 1**: Record and interpret pulse wave from each device on self and peers.
- **Task 2**: Note changes under:
    - Quiet rest
    - Mild exercise (e.g., 10 squats)
    - Controlled breathing or Valsalva
- **Task 3**: Attempt analogical mapping of recorded waveforms to Unani *Adilla Nabz:*
    - Forceful wave = *Qawi Nabz* or *Haar* temperament
    - Soft/low amplitude = *Za'eef Nabz* or *Barid* temperament

4. Collaborative Analysis and Adaptation (1 hour)

- Palpated *Nabz* and recorded signals.
- Limitations and benefits of each technology in assessing *Adilla Nabz*.
- Proposals for adapting or modifying signal interpretation to better reflect Unani parameters.

5. Reflection, Integration, and Takeaways (30 minutes)

- How modern technology enhances traditional Nabz assessment.
- Possibilities for integrative clinical tools in Unani medicine.
- Research opportunities: validation of *Nabz* types using sensor-based outputs.
- Ethical and practical challenges in applying tech to subjective diagnostic traditions.

Experiential-Learning Learning 3.4: Hemodynamic compromise

Total Duration: **6 hours**

1. Clinical Framing and Theoretical Orientation by faculty (1 hour)

- Definition and clinical types of **shock** (hypovolemic, cardiogenic, distributive, obstructive).
- Pathophysiology and presentation of **edema**: systemic vs. localized; transudate vs. exudate.
- Key hemodynamic parameters: preload, afterload, cardiac output, capillary hydrostatic pressure, oncotic pressure.
- **Unani concepts** relevant to hemodynamic compromise:
  - *Imtilla'* (plethora, overfilling of vessels or organs).
  - *Tahabuj* (congestion or vascular hyperemia).
  - *Sū'-e-Mizāj* leading to circulatory disturbances.

2. Case-Based Group Discussions – Shock Scenarios (2 hours)

Each Team/Student receives 2 detailed case vignettes (real or simulated) representing:

- **Hypovolemic shock** (e.g., post-trauma hemorrhage, dehydration).
- **Cardiogenic shock** (e.g., post-MI).

- **Septic shock** (e.g., fever, vasodilation, altered mental status).

Tasks:

- Identify presenting signs: hypotension, cold extremities, tachycardia, oliguria.
- Determine type and likely cause of shock.
- Correlate with classical signs of *Imtilla'*, *Tahabuj*, *Zof-e-Qalb* (cardiac weakness).

3. Case-Based Group Discussions – Edema Scenarios (1.5 hours)

Each group rotates to analyze 2–3 additional clinical profiles showing:

- **Pedal edema with CHF**, **pulmonary edema**, or **nephrotic syndrome**.
- **Ascites with liver dysfunction**, or **generalized anasarca**.

Tasks:

- Determine whether edema is due to cardiac, renal, hepatic, or nutritional origin.
- Link with physiological imbalances in hydrostatic vs. oncotic pressure.
- Interpret findings from a Unani lens.

Students recommend Unani interventions (e.g., *Idrār*, *Taqwiyat-e-Qalb*).

4. Group Presentations and Expert Commentary (1.5 hour)

Each group presents one selected case from shock or edema discussion:

- Key clinical findings.
- Diagnostic reasoning (modern and Unani).
- Proposed management strategies (including Unani interventions).

Faculty provides:

- Feedback on diagnostic logic and integration of Unani principles.
- Correction of any clinical or conceptual gaps.
- Commentary on research or clinical trends in integrative hemodynamic care.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Quizzes (10 Marks): : Short quizzes on each theory/ Lecture session. Practical Skills Assessment (15 Marks): OSPE on assessment of autonomic function using HRV, deep breathing test, and Valsalva manoeuvre. Portfolio (25 marks): Community-based screening of BP and arterial health and correlate with *Mizaj* types. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 4 : نظامِ تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the mechanics of breathing, pressure changes, and neural control of respiration.
2. Describe alveolar ventilation, gas diffusion, and transport in pulmonary circulation.
3. Analyze the physiological basis of respiratory abnormalities such as hypoxia, asphyxia, and dyspnoea.
4. Discuss clinical conditions affecting the respiratory system, including asthma, ARDS, and fibrosis.
5. Discuss respiratory adaptations to high-altitude and deep-sea environments.
6. Integrate respiratory physiology with common pathological states and environmental stressors.

Unit 1 تنفّس کی میکانیات Mechanics of breathing

4.1.1 تنفّس کی اقسام

(Types of breathing)

4.1.2تنفّس کے دوران دباؤ میں تبدیلیاں

(Pressure changes during breathing)

4.1.3جہدالتنفس

(Work of breathing)

4.1.4حُبَیبَاتِ رِئَوی(الویولائی) کا استحکام(Stability of alveoli)

4.1.5تنفُّس کا عصبی نظم(Neural regulation of respiration)

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the mechanics of breathing, types of breathing and pressure changes during breathing	1	Lecture	CC	Knows-how	SDL,TUT,L&PPT
CO2,CO4	Identify characteristic respiratory sounds through auscultation in normal and pathological conditions	4	Practical4.1	PSY-MEC	Shows-how	C_L,D-BED,CBL,RLE,Mnt
CO2,CO4	Demonstrate respiratory mechanics in ICU/clinical settings, focusing on assisted ventilation and neural regulation	6	Experiential-Learning4.1	PSY-GUD	Does	FV,D-BED,Mnt,D,DIS
CO2	Describe the work of breathing, stability of alveol and Regulation of respiration	1	Lecture	CC	Knows-how	BL,L_VC,DIS

Unit 2 تہویۃالرئۃ Pulmonary ventilation

4.2.1حُبَیبَاتِ رِئَوی کا تہویۃ

Alveolar ventilation

4.2.2ریہ میں تدفق

Perfusion of lungs

4.2.3پھیپھڑوں میں گیسوں کا انتشار

Diffusion of gases in the lungs

4.2.5 گیسوں کی نقل وحمل

Transport of gases

4.2.6 گیسوں کا تبادلہ اور ان کی بے ضابطگیاں

Gaseous exchange and their abnormalities

References: 26,27,28,29,30,31,32,33,34

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the concept of alveolar ventilation and factors affecting it Describe ventilation-perfusion coupling and its physiological significance Describe the mechanisms of gas diffusion, transport in blood, and abnormalities in gaseous exchange	2	Lecture	CC	Knows-how	DIS,L&PPT ,TUT,C_L
CO2,CO4	Perform analysis of blood gases (ABG interpretation) in physiological and abnormal states	6	Practical4.2	PSY-MEC	Shows-how	CBL,D,DL,PT
CO2,CO4	Examinne patients with impaired gas exchange (e.g., COPD, pneumonia)	4	Experiential-Learning4.2	PSY-SET	Does	D-BED,DL,FV,CBL,RLE

Unit 3 تنفّس کی اطلاقی فزیالوجی Applied physiology of Respiration

4.3.1 نقص الأکسجین Hypoxia

4.3.2 اختناق Asphyxia

4.3.3 فرط التنفس Hyperventilation

4.3.4 ضیق التنفس وضعی Orthopnoea

4.3.5 ربو القصبی Bronchial asthma

4.3.6 تلیف الرؤی مجہول السبب Idiopathic pulmonary fibrosis

4.3.7 عسرتنفس Dyspnoea

4.3.8 ضائقةالتنفسيةمتلازمةحاد Acute Respiratory Distress Syndrome

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Classify types of hypoxia and discuss their physiological mechanisms Describe the pathophysiology of asthma, ARDS, and pulmonary fibrosis	3	Lecture	CC	Knows-how	SDL,FC,DIS,L_VC
CO2,CO4	Demonstrate the physiological effects of hyperventilation, hypoxia, and orthopnea using simulated clinical scenarios	4	Practical4.3	PSY-SET	Shows-how	PT,SIM,CBL
CO2,CO4	Design the patient education programe on respiratory diseases	6	Experiential-Learning4.3	PSY-ORG	Does	BS,DIS,RP,SIM,C_L

Unit 4 بلندیاورگہرےسمندرمیںغوطہزنیکیفزیالوجی Physiology of high altitude and deep-sea diving

4.4.1 تأقلم ارتفاعاتعالیہ Acclimatization to high altitude

4.4.2 داءالجبال Mountain sickness

4.4.3 ارتفاتعالیہپراوذیماریویہ High altitude pulmonary oedema

4.4.4 ائٹروجننارکوسساوراضطرابضغط Nitrogen narcosis & Dysbarism

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the acclimatization to high altitude. Explain the mountain sickness. pulmonary oedema at high attitude Describe the nitrogen narcosis and dysbarism.	3	Lecture	CC	Knows-how	FC,C_L,SY,CBL,DIS

CO2,CO3, CO4	Measure physiological adaptations to simulated high-altitude environments using software or chamber models	6	Practical4.4	PSY-MEC	Shows-how	DIS,SIM,CBL,BL,D-M
CO2,CO4	Evaluate high-altitude expedition medical records or case reports to evaluate treatment needs	10	Experiential-Learning4.4	CAP	Does	CBL,BS,LRI,SIM,DIS

Practical Training Activity

Practical Training 4.1 Auscultation of respiratory sounds

Total Duration: 4 hours

1. Orientation and Theoretical Overview by Instructor (30 minutes)

- Principles of auscultation and stethoscope handling.
- Normal breath sounds: vesicular, bronchial, and their distribution.
- Adventitious sounds: crackles (rales), wheezes, rhonchi, pleural rubs.
- Pathological associations:
    - Crackles: pneumonia, pulmonary edema, fibrosis.
    - Wheeze: asthma, COPD.
    - Pleural rub: pleuritis.
- Zones of auscultation: anterior, posterior, and lateral chest wall.
- Hygiene and infection control during auscultation.

2. Demonstration of Normal and Abnormal Respiratory Sounds (30 minutes)

- Live or recorded demonstration of:
    - Normal vesicular and bronchial breath sounds.
    - Audio clips or simulation manikin showing:
        - Fine and coarse crackles.

        - Monophonic and polyphonic wheeze.
        - Pleural friction rub.
- Faculty demonstrates proper technique for locating and auscultating lung fields.
- Students encouraged to note sound qualities and differentiate between types.

3. Hands-On Auscultation Practice in Healthy Volunteers (1 hour)

- Students work in pairs or trios to:
    - Practice auscultating normal lung fields on peers or healthy standardized patients.
    - Identify areas where vesicular and bronchial breath sounds are expected.
    - Note timing, duration, intensity, and pitch of breath sounds.
    - Fill in a checklist/chart for each auscultation site.

4. Auscultation of Respiratory Sounds in Patients with Respiratory Conditions (1.5 hours)

- Conducted in clinical/lab setting with access to:
    - Real patients (e.g., admitted cases with pneumonia, COPD, asthma), **or**
    - High-fidelity simulation manikins with programmable sound features.
- Each student rotates through 3–4 stations:
    - Observe and auscultate abnormal breath sounds.
    - Record findings: location, type of sound, likely clinical condition.
    - Discuss pathophysiological basis with faculty or facilitator.
    - Correlate findings with patient's symptoms (e.g., dyspnea, cough, wheeze).

If real patients unavailable, structured auscultation via audio simulation stations can be used with interpretive quizzes.

5. Debriefing and Summary (30 minutes)

- Group reflection:
    - Share observations and difficulties in distinguishing sounds.
    - Faculty reviews common mistakes (e.g., stethoscope placement, sound misidentification).

- Revisit clinical significance:
    - How auscultatory findings guide diagnosis and management.
    - Value of repeated auscultation in tracking disease progression.

Practical Training 4.2 Analysis of blood gases

Total Duration: 6 hours

1. Introduction and Conceptual Orientation by Faculty (1 hour)

- Purpose and clinical relevance of Arterial Blood Gas (ABG) analysis.
- Key ABG parameters:
    - pH, $PaCO_2$, PaO_2, HCO_3^-, SaO_2, base excess.
- Normal values and physiological regulation:
    - Respiratory vs. metabolic components of acid-base balance.
- Stepwise approach to ABG interpretation:
    1. Assess pH.
    2. Identify primary disorder (respiratory or metabolic).
    3. Evaluate compensation.
    4. Assess oxygenation.
- Common abnormal patterns:
    - Respiratory acidosis/alkalosis.
    - Metabolic acidosis/alkalosis.
    - Mixed disorders.
- Introduction to **clinical contexts**: COPD, asthma, DKA, renal failure, sepsis, hypoxia.

2. Demonstration: ABG Sample Collection and Machine Handling (30 minutes)

- **Demonstration by faculty/lab technician**:

- Arterial blood sampling technique (site, angle, precautions).
- Use of heparinized syringes, avoiding air contamination.
- Calibration and operation of ABG analyzer.
- Safety and biohazard protocols.

- Pre-recorded videos or dummies can be used if live demonstration isn't feasible.

3. Guided ABG Interpretation Workshop (2 hours)

Hands-on activity:

- Each student/group provided with **10–12 real or simulated ABG reports** representing various clinical scenarios:
  - Normal physiology (post-exercise, mild hypoventilation).
  - Isolated respiratory/metabolic disorders.
  - Combined acid-base disorders.
  - Hypoxemia and hypercapnia patterns.

Tasks:

- Stepwise interpretation using provided worksheet.
- Identify disorder and compensation.
- Correlate with brief case summaries (e.g., COPD with CO_2 retention, sepsis with lactic acidosis).
- Predict potential clinical symptoms and management priorities.

4. Unani Integration and Conceptual Correlation (30 minutes)

Facilitated discussion:

- Link ABG alterations with classical signs of *Sū'-i-Mizāj*.
- Relate acidosis/alkalosis with dysfunction of *Quwā-e-Tābi'iyya* and *Tabiat*.
- Traditional interpretations of altered breathing (e.g., *Ziq-un-Nafs*, *Sūdā'i Nafas*).

5. Case-Based Discussion and Summary (1 hour)

- Groups present selected ABG cases:

- Key findings.
- Diagnosis and compensation analysis.
- Probable causes and management plan.

- Faculty provides detailed feedback, encourages pattern recognition.

Practical Training 4.3 Clinical effects of hyperventilation, hypoxia, and orthopnea

Total Duration: 4 hours

1. Conceptual Introduction and Safety Briefing (30 minutes)

- Definitions and physiology of hyperventilation, hypoxia, and orthopnea.
  - Respiratory alkalosis due to hyperventilation.
  - Oxygen desaturation and compensatory responses during hypoxia.
  - Positional breathing difficulty (orthopnea) in cardiopulmonary compromise.
- Clinical manifestations and diagnostic indicators.

- Safety precautions and ethical considerations in conducting simulations, including:
  - Avoiding undue stress to participants.
  - Monitoring SpO_2 and heart rate.
  - Immediate cessation upon discomfort.

2. Simulation 1: Hyperventilation (45 minutes)

- **Activity**:
  - Volunteers perform controlled rapid breathing (deep and fast) for 1–2 minutes.
  - Observe physical and physiological responses:
    - Dizziness, tingling, light-headedness.
    - Respiratory rate, heart rate changes.
    - If possible, record changes in end-tidal CO_2 ($ETCO_2$) using capnography (if equipment available).

3. Simulation 2: Mild Hypoxia (30 minutes)

- **Activity**:
  - Simulated using rebreathing into a paper bag (brief and cautiously) or through moderate exertion (e.g., stair climbing for a minute) to induce a controlled drop in SpO_2.
  - Observe:
    - Signs of mild hypoxia: fatigue, breathlessness, tachycardia.
    - SpO_2 monitoring using pulse oximeter.
  - (Ensure no participants with cardiovascular/respiratory disorders are involved.)

4. Simulation 3: Orthopnea (45 minutes)

- **Activity**:
  - Simulate positional breathing difficulty by:
    - Asking participants to lie flat for a minute, then assess ease of breathing vs. sitting upright.
    - Use of adjustable beds or pillows to demonstrate graded positions.
  - Observe:
    - Changes in respiratory comfort and effort.
    - Discussion on fluid redistribution in heart failure patients.

5. Case-Based Correlation and Summary (30 minutes)

- Students review 2–3 short clinical vignettes:
  - A patient with anxiety and hyperventilation.
  - A COPD case with chronic hypoxia.
  - A CHF patient with orthopnea and nocturnal dyspnea.

Practical Training 4.4 High altitude physiology

Duration: 6 Hours

1. Introduction & Theoretical Background (1 hour)

- **Lecture & Discussion (30 mins):**
  - High-altitude physiology: Hypoxia, respiratory/cardiovascular responses, acclimatization.
  - Risks: Acute Mountain Sickness (AMS), HAPE, HACE.
- **Software/Chamber Demonstration (30 mins):**
  - Overview of the simulation tool (e.g., **BIOGLOBE**, **AltitudeOS**) or hypobaric chamber.
  - Safety protocols and experimental design principles.

2. Baseline Measurements & Control Data (1 hour)

- **Activity: Pre-Exposure Assessment (30 mins):**
  - Record resting HR, SpO_2, blood pressure, respiratory rate.
  - Perform a baseline spirometry test (FEV1/FVC).
- **Group Discussion (30 mins):**
  - Predictions: How will these parameters change under hypoxia?

3. Simulated High-Altitude Exposure (2 hours)

- **Hypoxia/Chamber Simulation (1 hour):**
  - Groups exposed to simulated altitudes (e.g., 3,000m, 5,000m).
  - Monitor real-time changes in SpO_2, HR, ventilation rate.
- **Data Recording & Analysis (1 hour):**
  - Compare acute responses (e.g., hyperventilation, tachycardia).
  - Plot trends using software (Excel, LabChart).

4. Long-Term Adaptation Analysis (1 hour)

- **Case Study Review (30 mins):**
  - Examine data from high-altitude populations (e.g., Sherpas, Andeans).
- **Software Modelling (30 mins):**

- Simulate prolonged exposure (weeks/months) to observe hematocrit changes, VO_2 max adaptations.

5. Debriefing & Clinical Applications (1 hour)

- **Group Presentations (30 mins):**
  - Each group presents findings on acute vs. chronic adaptations.
- **Discussion (30 mins):**
  - Relevance for athletes, climbers, and patients with respiratory diseases.
  - Limitations of simulation vs. real-world conditions.

Tools & Resources:

- Hypoxic generator/barochamber (if available) or validated software (e.g., **AltitudeOS**).
- Pulse oximeters, ECG monitors, spirometers.
- Data analysis tools (Excel, GraphPad Prism).

Experiential Learning Activity

Experiential-Learning Learning 4.1: Mechanics of respiration

Total Duration: **6 hours**

1. Pre-Clinical Briefing and Concept Orientation (1 hour)

- **Overview of respiratory mechanics**:
  - Role of diaphragm, intercostal muscles, and neural inputs (medullary respiratory centres, vagal modulation).
  - Pressure gradients in normal vs. laboured breathing.
- **Introduction to assisted ventilation**:
  - Indications (e.g., respiratory failure, ARDS, COPD exacerbation).
  - Modes of ventilation: CPAP, BiPAP, volume-controlled, pressure-controlled.
  - Parameters observed on ventilators: tidal volume, PEEP, FiO_2, respiratory rate.
- **Neurological regulation of respiration**:

- Central and peripheral chemoreceptors.
- Reflexes: Hering–Breuer reflex, cough reflex.
- Autonomic involvement and vagal tone modulation in ICU patients.

- Safety protocols, etiquette, and roles during observation in ICU/critical care unit.

2. Clinical Exposure: Observation of Ventilation and Respiratory Support (3 hours)

Supervised rotation in ICU or high-dependency respiratory units, in small batches (2–3 students per instructor):

- Observe 3–4 patients on different respiratory support systems (oxygen therapy, CPAP, mechanical ventilation).
- Key observations:
  - Type of ventilator and mode of support.
  - Monitoring respiratory rate, tidal volume, airway pressure, and synchrony with patient effort.
  - Chest rise, use of accessory muscles, work of breathing.
  - Patient-ventilator interaction (e.g., asynchrony, triggering issues).
- In some cases, observe ABG reports and ventilator settings adjusted accordingly.
- Discuss with ICU/respiratory therapist:
  - Adjustments based on neural feedback and chemoreceptor signaling.
  - Role of sedation, weaning trials, and spontaneous breathing assessments.

3. Clinical Discussion and Integration (1.5 hours)

- Each group presents:
  - Patient ventilator mode and clinical condition.
  - Observed signs of respiratory effort/mechanical compromise.
  - Patterns of neural control observed (e.g., breathing rhythm, reflexive adjustments).
- Faculty facilitates discussion on:
  - Role of central and peripheral neural mechanisms in critical respiratory care.
  - Challenges in maintaining respiratory homeostasis in ICU patients.

- Conceptual integration with *Unani* understanding of *Tanaffus, Quwā-e-Nafsānīyya,* and conditions such as *Zīq al-Nafs*.

4. Reflective Debrief and Feedback (30 minutes)

- Students reflect on:
  - How clinical exposure enhanced their understanding of respiratory physiology.
  - Insights into assisted breathing and patient variability.
  - Ethical and emotional challenges in ICU environments.
- Faculty summarizes:
  - Interplay between mechanical, neural, and pathological factors in respiratory function.
  - Importance of integrative understanding for holistic care.

Experiential-Learning Learning 4.2: Impaired gas exchange

Total Duration: **4 hours**

1. Pre-Round Orientation and Briefing by faculty (30 minutes)

- Overview of impaired gas exchange: pathophysiology and clinical features.
- Common causes: COPD, pneumonia, pulmonary edema, ARDS.
- Parameters to observe: respiratory rate, oxygen saturation, ABG values, use of accessory muscles, auscultatory findings.
- Clinical signs of hypoxia, hypercapnia, and respiratory distress.
- Brief recap of Unani insights on breathing difficulty (*Zīq-un-Nafs*), imbalance of *Rūḥ* and *Tabiat*, and concept of *Qillat-e-Tanaffus* in chronic conditions.

2. Clinical Ward Round Participation (2 hours)

- Students accompany the attending physician, pulmonologist, or critical care specialist.
- Visit patients diagnosed with:
  - **Chronic Obstructive Pulmonary Disease (COPD)**
  - **Community-acquired pneumonia**

- **Interstitial lung disease** or other causes of impaired gas exchange.

- Observation Focus:
  - Patient history: symptom duration, comorbidities, risk factors.
  - Physical examination: cyanosis, breathing pattern, auscultation.
  - Monitoring data: oxygen saturation (SpO_2), respiratory support (e.g., nasal cannula, BiPAP).
  - Review of clinical documentation: ABG reports, chest X-rays, lab findings.
  - Therapeutic interventions: antibiotics, bronchodilators, corticosteroids, oxygen therapy.
- Students may ask focused questions under supervision and make brief bedside assessments where allowed.

3. Post-Round Case Review and Discussion (1.5 hours)

- Small group discussion led by faculty.
- Each student shares reflections on at least one patient case.
- Key discussion points:
  - Clinical findings and diagnostic impressions.
  - Nature of gas exchange impairment (e.g., ventilation-perfusion mismatch, diffusion defect).
  - Treatment strategies and outcomes.
  - Unani perspective: how chronic respiratory conditions were conceptualized and treated classically.
  - Integration of modern diagnostics with *Usool-e-Ilaj* and *Tadābīr* in chronic respiratory illnesses.

Experiential-Learning Learning 4.3: Patient education programe of respiratory diseases.

Duration: 6 Hours

1. Introduction & Overview (30 mins)

- Participants share personal experiences or observations about respiratory diseases.
- Discuss the importance of patient education in respiratory diseases.
- Outline key respiratory diseases to cover (asthma, COPD, pneumonia, TB).

2. Understanding the Target Audience (1 hour)

- **Group Discussion (20 mins):**
  - Who are the patients? (Adults, children, elderly, caregivers?)
  - What are their literacy levels, cultural beliefs, and barriers to learning?
- **Activity: Role-Playing (40 mins):**
  - Divide into groups; each group assumes a patient profile (e.g., elderly COPD patient, parent of an asthmatic child).
  - Discuss what educational approach would work best for their assigned profile.

3. Content Development (1.5 hours)

- **Brainstorming Key Topics (30 mins):**
  - Symptoms, prevention, medication use, lifestyle modifications, emergency management.
- **Activity: Content Mapping (1 hour):**
  - Groups create a structured outline for their education module.
  - Include visuals, FAQs, myths vs. facts, and interactive elements.

4. Designing Interactive Learning Methods (1.5 hours)

- **Presentation & Discussion (30 mins):**
  - Review different teaching methods (videos, infographics, demonstrations, quizzes).
- **Activity: Prototype Development (1 hour):**
  - Groups design a sample activity (e.g., inhaler demo, breathing exercise session, quiz game).
  - Present their prototype to the class.

5. Pilot Testing & Feedback (1 hour)

- **Mock Patient Education Session (40 mins):**
  - Each group conducts a 10-minute demo of their program.
- **Peer Feedback (20 mins):**
  - Strengths, areas for improvement, and suggestions.

6. Finalization & Reflection (30 mins)

- **Group Discussion (15 mins):**
  - What worked well? What challenges did they face?
- **Key Takeaways & Next Steps (15 mins):**
  - How can this program be improved and implemented in real healthcare settings?

Experiential-Learning Learning 4.4: Adaptations of the human body to high altitude

Duration: 10 Hours

1. Introduction to High-Altitude Medicine (1.5 Hours)

- **Lecture (30 min):**
  - Key physiological stressors at high altitude (hypoxia, cold, exertion).
  - Common medical emergencies (AMS, HAPE, HACE, frostbite).
- **Case Report Overview (30 min):**
  - Discuss famous expeditions (e.g., 1996 Everest disaster, Annapurna 1970).
- **Group Brainstorm (30 min):**
  - What factors contribute to medical emergencies at altitude? (e.g., rapid ascent, dehydration, poor acclimatization).

2. Case Report Analysis (4 Hours)

- **Small Group Work (3 hrs):**
  - Each group receives 2-3 anonymized expedition medical records (e.g., Everest ER, Denali climbers).
  - Analyze:
    - Symptoms & diagnosis
    - Treatment given (O_2, dexamethasone, descent protocols)
    - Outcome (survival, complications, evacuation)
  - **Guiding Questions:**

        - Was the response timely and appropriate?
        - Could this case have been prevented?
- **Group Presentations (1 hr):**
    - Each team presents key findings, lessons learned, and alternative approaches.

3. Ethical & Logistical Challenges (2 Hours)

- **Debate (1 hr):**
    - "Should climbers with known health risks be allowed to attempt extreme altitudes?"
- **Scenario-Based Discussion (1 hr):**
    - Case: A climber with early HAPE refuses to descend. What actions are justified?
    - Discuss:
        - Patient autonomy vs. guide responsibility
        - Legal/ethical implications of forced evacuation

4. Simulation & Decision-Making Exercise (1.5 Hours)

- **Role-Playing (1 hr):**
    - Groups act as expedition medical teams responding to a simulated emergency (e.g., HACE at 7,000m).
    - Must prioritize treatment with limited resources.
- **After-Action Review (30 min):**
    - Compare decisions with real-world outcomes.

5. Reflection & Application (1 Hour)

- **Individual Written Reflection (30 min):**
    - "What was the most surprising lesson from these cases?"
    - "How would you apply this knowledge in a real expedition?"
- **Group Closing Discussion (30 min):**
    - Key takeaways for future climbers, medics, and researchers.

Materials Needed:

Real case reports (e.g., Himalayan Rescue Association, UIAA MedCom archives)

Medical guidelines (e.g., Wilderness Medical Society protocols)

Hypothetical scenarios for role-play

Adaptations:

- **Virtual option:** Use digital archives.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Open Book Test (10 marks): The students may be given an open book test on mechanics of breathing, types of breathing and pressure changes during breathing. Structured LAQ (10 Marks): on ventilation-perfusion coupling and its physiological significance. Case Based Assessment (15 Marks): Auscultate and appreciate the respiratory sounds in healthy and diseased persons. Practical Viva (15 Marks): Measure physiological adaptations to simulated high-altitude environments using software or chamber models. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 5

Module 5 : کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe renal functions and correlate them with the Unani concept of *Istifrāgh*.
2. Describe urine characteristics under different *Mizāj* and physiological states.
3. Discuss micturition control and its disorders in light of Unani concepts.
4. Analyze renal roles in acid-base and electrolyte balance.
5. Explain urinary concentration/dilution and diuretic mechanisms.
6. Describe body temperature regulation and its behavioral and pathological aspects.
7. Relate thermoregulatory disturbances with clinical and Unani views.
8. Perform urine and temperature assessments using standard techniques.
9. Integrate theoretical and practical insights through clinical observation and Unani correlation.

Unit 1 افعال کلیہ اور اسکے یونانی تصورات Renal Function and its Unani concept

5.1.1 کلیہ کے افعال اور اِستِفراغ سے ربط

(Functions of Kidneys and its correlation with *Istefirag)*

5.1.2 مختلف مِزاج میں فحص بول

(Examination of Urine in different *Mizaj)*

5.1.3 مختلف فعلیاتی حالات میں فحص بول

(Examination of Urine under different Physiological conditions)

References: 1,3,7,8,9,10,11,12,14,15,16,17,18,19,20,22,26,27,28,29,32,33

3A	3B	3C	3D	3E	3F	3G
CO1,CO2, CO4	Observe correlation of Unani therapeutic interventions involving *Istefrāgh* (diuresis, *Hammām*, etc.) with renal physiology	4	Experiential-Learning5.1	PSY-SET	Does	CBL,TPW,LRI,RLE,DA

CO1,CO2	Describe the functions of kidneys and correlate with the Unani concept of *Istefrāgh*	1	Lecture	CC	Knows-how	L&GD,DIS,TUT
CO1,CO2, CO3	Describe the basis and interpretation of urine examination in different *Amzaja*	1	Lecture	CC	Knows-how	BL,L&GD,C_L,TUT,DIS
CO1,CO2, CO4	Perform routine and microscopic urine examination under varying physiological conditions—such as hydration, fasting, and exercise—and interpret the findings in relation to Mizāj types	4	Practical5.1	PSY-MEC	Shows-how	D,PT,DL

Unit 2 تبول کا میکانیزم اور اضطرابات Micturition Mechanism and abnormalities

5.2.1 تبول کا عصبی کنٹرول

(Nervous Control of Micturition)

5.2.2 کثرت تبول اور قُوّتِ ماسِکہ کی کمی (ذیابیطس میں)

(Correlation of Polyuria with weakness of *Quwate Maska* as in Diabetes)

5.2.3 عمل تبول اور قُوّتِ دَافِیَہ کا تعلق

(Correlation of Micturition with *Quwate Dafiya)*

5.2.4 اضطرابات تبول

(Disorders of Micturation)

References: 1,8,15,24,26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Perform reflex testing and neurological examination related to micturition pathways	4	Practical5.2	PSY-MEC	Shows-how	DIS,D-BED,BL,CBL,SIM
CO1,CO2	Discuss common micturition disorders and their correlation with *quwate dafiya* and *Zauf Quwate Masika*	1	Lecture	CC	Knows-how	FC,DIS,L&GD

CO2,CO4	Demonstrate assessment of bladder control using urodynamic parameters/simulators	4	Practical5.3	PSY-MEC	Does	LRI,DIS,DL,TUT,D
CO2	Describe the nervous control of micturition	1	Lecture	CC	Knows-how	L&PPT ,TUT
CO1,CO2, CO3,CO4	Interpret micturition disorders based on unani principals	4	Experiential-Learning5.2	PSY-ADT	Does	CBL,DIS,PL,LRI,Mnt

Unit 3 حمضی قاعدی توازن Acid Base Balance

5.3.1 حمضی قاعدی توازن کی تنظیم کلوی اور توازن کہارل

(Renal Regulation of Acid-Base & Electrolyte Balance)

5.3.2 حمضی قاعدی عدم توازن

(Acid-Base Imbalance)

5.3.3 ترکیز و تخفیف بول کا میکانیہ

(Concentrating and diluting mechanism of Urine)

5.3.4 مُدِرّات اور اُن کے عمل کے طریقے

(Diuretics and their Mechanisms of action)

References: 26,27,28,29,30,31,32,33,34,202

3A	3B	3C	3D	3E	3F	3G
CO2	Describe renal mechanisms in acid-base regulation and electrolyte balance Describe acid-base imbalances and compensatory mechanisms.	2	Lecture	CC	Knows-how	L&PPT ,TUT,BL
CO2,CO3	Discuss Concentrating and Diluting Mechanism of Kidneys and the role of diuretics	2	Lecture	CC	Knows-how	C_L,L_VC,BL

CO2,CO4	Perform urine specific gravity and osmolality tests under varying conditions	2	Practical5.4	PSY-MEC	Shows-how	DL,D,PT
CO2,CO4	Evaluate use of diuretics in various disorders	4	Experiential-Learning5.3	CE	Does	FV,LRI,SIM,RLE,D
CO2,CO4	Perform analysis of case files for management of renal tubular acidosis, dehydration, and edema	4	Experiential-Learning5.4	PSY-MEC	Does	IBL,DIS,LRI,CBL

Unit 4 جسمانی حرارت کی تنظیم Regulation of Body Temperature

5.4.1 جسمانی حرارت کی تنظیم

(Regulation of Body Temperature)

5.4.2 جسمانی حرارت کا ارادی وسلوکی کنٹرول

(Behavioural and Voluntary control of body temperature)

5.4.3 جسمانی حرارت کی خرابیاں

(Abnormalities of Body temperature)

5.4.4 جسمانی حرارت کی پیمائش

(Measurement of Body temperature)

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3, CO4	Analyze thermal stress responses in patients (e.g., fever, heat stroke, hypothermia)	4	Experiential-Learning5.5	CAN	Does	LRI,BS,D-BED,SIM,CBL
CO2	Describe physiological mechanisms regulating core body temperature	2	Lecture	CC	Knows-how	PBL,C_L,TUT,L&GD

CO2,CO4	Demonstrate use of different thermometry methods and interpret readings in various conditions	4	Practical5.5	PSY-MEC	Shows-how	SIM,CBL,D,LRI,DL
CO2,CO4	Measure and analyze thermoregulation in different Climates	6	Experiential-Learning5.6	PSY-MEC	Does	BL,FV,SDL,SIM,Mnt
CO2,CO4	Demonstrate the body's adaptive responses to thermal stress through simulated exposure to hot and cold environments	2	Practical5.6	PSY-GUD	Shows-how	D,PT,SIM,LRI,CBL

Practical Training Activity

Practical Training 5.1 Urine examination under different physiological conditions and in different *Amzaja*

Duration: 4 hours

Part 1: Pre-Practical Briefing (30 minutes)

- **Overview of renal physiology:**
  - Role of kidneys in water-electrolyte balance, acid-base regulation, and metabolic waste removal.
- **Discussion** on how hydration status, fasting, and exercise influence urine composition.
- **Unani Perspective:**
  - Urine as an indicator of *mizāj* and humoral imbalance.
  - Unani criteria of urine: color, quantity, consistency, odor etc..
  - Link to temperaments: hot/dry (*ḥārr yābis*), cold/wet (*bārid ratb*), etc.

Part 2: Urine Sample Collection and Testing (2 hours)

Students rotate through three conditions (hydrated, fasting, post-exercise):

- Each student (or assigned volunteer) provides samples at each stage.

A. Routine Urinalysis (Physical + Chemical):

- **Parameters:**

- Color, clarity, specific gravity, pH
- Protein, glucose, ketones, bilirubin, urobilinogen, blood (dipstick method)
- Odor and volume

B. Microscopic Examination:

- **Centrifuged sediment study:**
  - RBCs, WBCs, epithelial cells
  - Casts (hyaline, granular, etc.)
  - Crystals (urates, phosphates, oxalates)
  - Microorganisms

Part 3: Documentation and Comparative Analysis (1.5 hour)

- Tabulate findings under each condition:
  - **Hydration**: diluted urine, low SG, pale color
  - **Fasting**: ketonuria, slightly acidic urine
  - **Post-exercise**: concentrated urine, transient proteinuria or hematuria
- Discuss:
  - Which findings are physiological vs. pathological?

How does each condition shift the body's internal balance and *mizāj*?

Practical Training 5.2 Reflex testing and neurological examination related to micturition pathways

Duration: **4 Hours**

1. Theoretical Briefing by facilitator (60 minutes)

1.1. **Mini-Lecture/Presentation (30 minutes)**

- Anatomy and physiology of micturition pathways
- Central and peripheral nervous system components

- Reflexes involved: bulbocavernosus reflex, anal wink reflex
- Clinical relevance: neurogenic bladder, spinal cord injuries, multiple sclerosis, cauda equina syndrome

1.2. **Q&A + Group Discussion (30 minutes)**

- Discussion on case vignettes:
    - LMN bladder vs UMN bladder
    - Typical reflex findings
    - CNS lesions and their urological impact

2. Demonstration (60 minutes)

2.1. **Instructor Demonstration (40 minutes)**

- **General Neurological Exam**:
    - Lower limb motor and sensory testing
    - Reflexes (knee jerk, ankle jerk)
- **Focused Reflex Testing**:
    - Bulbocavernosus reflex (BCR)
    - Anal wink reflex
    - Perineal sensation
    - Digital rectal exam (for tone and reflex)
- **Bladder Scan (if available)**

2.2. **Interactive Q&A (20 minutes)**

- Safety and consent in pelvic/rectal exams
- Common errors in technique
- Differentiating reflex responses

3. Hands-on Student Practice (60 minutes)

3.1. **Skills Stations (Rotational - 15 mins each)**

1. **Station 1**: Reflex Testing (using manikins or standardized patients)
2. **Station 2**: Lower limb neurological exam
3. **Station 3**: Case-based diagnosis (video/virtual simulation or written case)

3.2. **Peer & Instructor Feedback (during rotation)**

- Use checklists or OSCE-style rubrics

4. Clinical Correlation and Assessment (60 minutes)

4.1. **Group Case Analysis (30 minutes)**

- 2 clinical cases presented:
    - Spinal cord injury with UMN bladder signs
    - Cauda equina syndrome with LMN bladder signs
- Groups identify lesion level, expected reflexes, and management priorities

4.2. **Practical Assessment (20 minutes)**

- Short OSCE-style exam (1 station per student)
- Oral questioning on reflex pathways and lesion localization

4.3. **Feedback and Wrap-Up (10 minutes)**

- Instructor gives feedback on performance
- Summary of key takeaways
- Further reading or e-learning suggestions

Practical Training 5.3 Assessment of bladder control using urodynamic parameters/simulators

Total Duration: 4 hours

Part 1: Introduction and Demonstration (45 minutes)

- Overview of bladder physiology:
    - Neurological control (parasympathetic, sympathetic, somatic).

    - Filling and voiding phases – role of detrusor and sphincters.
- Urodynamic tests explained:
    - **Uroflowmetry**: Measures flow rate and pattern.
    - **Cystometry**: Assesses detrusor pressure during filling/voiding.
    - **EMG**: Measures sphincter activity.
    - **PVR estimation** using ultrasound.
- Demonstration of simulator use or real patient video (if live testing not feasible).

Part 2: Hands-on Simulator Practice/Data Interpretation (2 hours)

Option A: With Simulators

- Students in small groups operate urodynamic simulators:
    - Record simulated uroflow patterns.
    - Interpret bladder compliance graphs and pressure-volume curves.
    - Perform simulated cystometric and PVR evaluations.

Option B: Without Simulators (if not available)

- Use pre-recorded or case-based datasets:
    - Provide students with anonymized urodynamic reports.
    - Students interpret flow curves, detrusor pressures, and EMG traces.
    - Match findings to clinical symptoms and probable diagnosis.

Part 3: Case-Based Clinical Correlation (45 minutes)

- Presentation of 2–3 clinical cases of:
    - Overactive bladder
    - Neurogenic bladder (e.g., diabetic, spinal cord injury)
    - Post-prostate surgery incontinence
- Students analyze the urodynamic data and correlate with:

- Clinical symptoms (urgency, hesitancy, dribbling, etc.)
- Possible Unani diagnosis
- Suggested Unani and modern treatment approaches

Part 4: Summary, Q&A, and Integration (30 minutes)

- Recap of bladder control mechanisms and diagnostic tools.
- Discussion:
  - Strengths and limitations of urodynamic testing.
  - Scope for integrating Unani therapeutic interventions (*Muqawwiyāt-i-Kulliya*, *Mudirr-i-Bawl*) with clinical findings.
- Feedback from students on skill confidence and clinical relevance.

Practical Training 5.4 Urine specific gravity and osmolality tests

Total Duration: 2 hours

Part 1: Introduction and Demonstration (30 minutes)

- **Overview of Urine Concentration Tests:**
  - **Urine Specific Gravity (USG):** Measures the density of urine compared to water, indicating the concentration of solutes.
  - **Urine Osmolality:** Measures the number of dissolved particles per unit of water in urine, providing a precise assessment of urine concentration.
- **Demonstration:**
  - **USG Measurement:**
    - **Refractometer Method:** A drop of urine is placed on the prism of the refractometer, and the specific gravity is read directly.
    - **Dipstick Method:** A reagent strip is dipped into the urine sample, and the colour change is compared to a chart to estimate specific gravity.
  - **Osmolality Measurement:**
    - **Freezing Point Depression Osmometry:** The urine sample is cooled, and the freezing point is measured; the extent of freezing point depression correlates with osmolality.

Part 2: Hands-On Practice (60 minutes)

1. **Collect Urine Samples:**
    - **Baseline Sample:** Collected after normal fluid intake.
    - **Post-Hydration Sample:** Collected after consuming 500 ml of water.
    - **Post-Dehydration Sample:** Collected after a period of fluid restriction (e.g., 4 hours without intake).
2. **Measure Specific Gravity:**
    - Using both refractometer and dipstick methods.
3. **Measure Osmolality:**
    - Using freezing point depression osmometry.
4. **Record Observations:**
    - Document the specific gravity and osmolality readings for each condition.

Part 3: Data Analysis and Interpretation (30 minutes)

- **Compare Results:**
    - Analyze how specific gravity and osmolality values change with hydration status.
    - Discuss the physiological basis for these changes, focusing on kidney function and the role of antidiuretic hormone (ADH).
- **Unani Correlation:**
    - Discuss how variations in *Mizāj* (temperament) and *Mizāj-i-Kulliya* (renal temperament) influence urine concentration.

Practical Training 5.5 Different thermometry methods

Total Duration: 4 hours

Part 1: Introduction and Demonstration (60 minutes)

- Brief overview of thermoregulation mechanisms.
- Types of body temperature and normal ranges:
    - Core vs. peripheral temperature
    - Circadian variations

- **Thermometry methods explained**:
    - Mercury/analog (oral, rectal, axillary)
    - Digital (oral, axillary, rectal)
    - Tympanic (infrared)
    - Temporal artery (forehead strip/infrared)
    - Non-contact infrared thermometers
- Live demonstration of each method with emphasis on:
    - Site-specific protocols
    - Sources of error
    - Hygiene and patient safety

Part 2: Hands-on Practice in Groups (1.5 hours)

Stations setup with rotating groups:

Station Activity1: Oral and axillary thermometry (digital and analog). 2 Tympanic and forehead infrared measurement 3. Rectal thermometry (simulated mannequin only) 4. Non-contact infrared measurement in different room temperatures 5. Recording and documentation of readings under different postures (rest, post-exercise, covered/uncovered)

- Students record and compare readings.
- Discussion of variability and reliability.

Part 3: Simulation of Clinical Scenarios and Interpretation (60 minutes)

- Simulated or real cases:
    - **Fever case** (e.g., malaria, pneumonia)
    - **Heat exhaustion or post-exercise** temperature
    - **Hypothermia** (e.g., post-surgery or exposure)
- Students take/interpret temperatures using different methods.
- Compare accuracy and clinical relevance.

- Correlate with other signs: pulse, RR, perfusion.

Part 4: Integration with Unani Concepts and Wrap-Up (30 minutes)

- *Harārat Gharīzīyah* and fever (*Humma*) in Unani medicine.
- Role of thermometry in assessing *Sū'-i-Mizāj*.
- How thermal patterns relate to temperament and season (*Aklīm*).

Practical Training 5.6 Body's thermal responses

Total Duration: 2 hours

Part 1: Introduction and Safety Briefing (15 minutes)

- Overview of thermoregulation:
  - Hypothalamic regulation, vasomotor responses, sweating, shivering.
  - Feedback loops and set point theory.
- Unani interpretation: Heat and cold as modifiers of *mizāj*, and their role in pathophysiology.
- Safety precautions:
  - Mild exposures only (not exceeding 10–15 minutes).
  - Monitor for discomfort or abnormal vital signs.

Part 2: Simulation and Data Collection (75 minutes)

Group A: Heat Exposure (35 minutes)

- **Method:**
  - Warm room setting or localized radiant heater (max 35–37^{o}C).
  - Light physical activity (e.g., hand grip exercise) to induce mild hyperthermia.
- **Parameters Measured (pre, during, post):**
  - Core body temperature (digital oral thermometer or tympanic)
  - Heart rate (pulse)

- Respiratory rate
- Skin temperature (infrared or skin sensor)
- Onset and degree of sweating (qualitative)

- **Observation Focus:**
  - Vasodilation, perspiration, increase in pulse and respiratory rate.

Group B: Cold Exposure (35 minutes)

- **Method:**
  - Exposure to a cool room (~18–20°C) or immersion of forearm in cold water (~10–15°C) for 1–2 minutes.
- **Parameters Measured (pre, during, post):**
  - Core temperature
  - Pulse and BP (watch for sympathetic response)
  - Onset of shivering
  - Peripheral vasoconstriction signs (e.g., cold extremities, pallor)
- **Observation Focus:**
  - Vasoconstriction, shivering, sympathetic activation, increased BP.

Students will rotate through both stations and record all readings.

Part 3: Interpretation and Group Discussion (30 minutes)

- **Compare thermal responses** in heat and cold exposure:
  - What autonomic changes occurred?
  - Were the responses appropriate and within expected physiological limits?
- **Correlate with Unani concepts:**
  - How *barid* and *ḥārr* agents influence bodily functions.
  - Role of *su al-mizāj* (altered temperament) in heat/cold illnesses.
  - Application in conditions like *ḥummā*, *nazla*, and *waj' al-mafāṣil*.

Experiential Learning Activity

Experiential-Learning Learning 5.1: *Istefrāgh* (diuresis, *Hammām*, etc.) and renal physiology

Total Duration: 4 hours

Part 1: Pre-Intervention Briefing and Group Formation (30 minutes)

- Orientation session explaining the objectives, ethical considerations, safety protocols.
- Brief review of renal physiology (glomerular filtration, water/salt balance).
- Discussion on Unani theory of *Istefrāgh* via kidneys and skin.
- **Group allocation**: Students divided into small groups (2-3) to conduct and observe specific interventions.

Part 2: Intervention Observation (2 hours)

1. **Diuretic therapy (*Mudirr-i-Bawl*)**:
    - Observation of a volunteer (healthy subject or patient under care) administered Unani diuretic drugs (e.g., *Berge Kasni*, *Shahtara*, *Jawārish Zarūnī*).
    - Monitoring: Pre- and post-intervention urine volume, pulse, blood pressure, and subjective hydration status.
2. ***Hammām* (steam bath)**:
    - Observation of traditional *Hammām* session.
    - Monitoring: Sweat output (estimated), change in vitals, and subjective feedback on comfort, fatigue, and urination.
3. **Combined therapy or *Hijāmah* with diuresis** (optional):
    - If feasible, observe combination therapies and note effects on hydration and excretion.

Note: Appropriate ethical approval and informed consent must be taken for all human participation.

Part 3: Data Analysis and Correlation (45 minutes)

- Students consolidate data from observations.
- Compare findings with known renal physiological responses: diuresis, plasma osmolality effects, hormonal regulation (ADH, RAAS), skin-kidney axis.
- Group discussion facilitated by faculty to interpret how Unani descriptions like *Istifrāgh Mādda Muzirra* correspond to observed physiological changes.

Part 4: Integration and Reflection (45 minutes)

- Clinical utility and safety of these Unani therapies.
    - Complementary perspectives from both Unani and modern physiology.
    - Potential for clinical documentation and further research.

Experiential-Learning Learning 5.2: Unani interpretation of disorders of Micturition

Total duration: 4 hours

Part 1: Introductory Orientation (30 minutes)

- **Short Lecture/Interactive Review**
    - Physiology of micturition: neural, muscular, hormonal control
    - Overview of common urinary disorders: retention, urgency, frequency, incontinence
    - Introduction to Unani views.

Part 2: Case-Based Group Work (2 hours)

Divide class into 2–3 small groups. Each group receives a clinical case file with prompts.

Sample Case 1: Dysuria and Scanty Urine in Elderly Male

- History of urgency, burning micturition, small volume, fatigue
- Lab: concentrated urine, mild leukocyturia
- **Tasks**:
    - Identify likely biomedical diagnosis
    - Interpret in Unani terms: possible *sue mizāj-i-kulliya* etc
    - Propose suitable *musakkin*, and *mudirr* drugs

Sample Case 2: Nocturia and Polyuria in Diabetic Patient

- History of frequent urination, especially at night, thirst
- Urinalysis: glucose ++, low specific gravity

- **Tasks**:
    - Determine possible underlying cause
    - Suggest Unani treatment principles

Sample Case 3: Urinary Retention after Surgery

- Female patient, postoperative, unable to void
- Catheter used; mild suprapubic tenderness
- **Tasks**:
    - Link to physiological inhibition of micturition reflex
    - Unani concept of suppression of *quwwat dafiah*
    - Unani Treatment

Part 3: Group Presentations and Moderated Discussion (1.5 hour)

- Each group presents:
    - Biomedical and Unani diagnosis
    - Pathophysiological understanding
    - Line of Unani management and justification
    - Relevance of *mizāj* variation in symptomatology

Experiential-Learning Learning 5.3: Management of renal tubular acidosis, dehydration, and edema

Duration: 4 hours

Part 1: Orientation and Background (30 minutes)

- Physiology of acid-base balance and renal handling of H^+/HCO_3^-.
- Pathophysiology of:
    - **RTA types I & II**: defect in H^+ secretion or HCO_3^- reabsorption
    - **Dehydration**: hypovolemia, hyper/hyponatremia

- **Edema**: imbalance of Starling forces, hypoalbuminemia, sodium retention

Part 2: Case File Analysis – Small Group Work (2 hours)

Students are divided into 2–3 small groups and provided with de-identified clinical case files. Each file includes history, physical examination, lab results, imaging (if relevant), and treatment plan.

Case 1: Renal Tubular Acidosis (Type I or II)

- Findings: Fatigue, polyuria, nephrolithiasis, low serum bicarbonate, normal anion gap metabolic acidosis, urine pH >5.5
- Tasks:
  - Identify type of RTA and defect site
  - Interpret ABG, electrolytes
  - Explain rationale for alkali therapy and potassium supplementation

Case 2: Moderate to Severe Dehydration

- Findings: Diarrhoea history, hypotension, tachycardia, dry mucosa, increased serum Na^+, urea/creatinine ratio
- Tasks:
  - Assess dehydration severity
  - Analyze fluid therapy and choice of IV fluids
  - Predict response to rehydration

Case 3: Edema in Heart or Liver Failure

- Findings: Bilateral leg swelling, weight gain, dyspnoea, low albumin, ascites
- Tasks:
  - Differentiate transudate vs. exudate
  - Explain rationale for diuretics, fluid restriction, salt control
  - Discuss complications and Unani interpretation

Part 3: Group Presentations and Discussion (1.5 hour)

- Each group presents:

- Summary of case
- Key physiological and pathological processes
- Diagnostic reasoning and treatment analysis
- Suggestions for Unani diagnostic and treatment parallels

Experiential-Learning Learning 5.4: Use of diuretics in various disorders

Total Duration: 4 hours

Part 1: Orientation & Clinical Background (45 minutes)

- Mechanisms of diuretic action (site of action along nephron).
- Commonly used diuretics: furosemide, hydrochlorothiazide, spironolactone, mannitol.
- Clinical uses in:
  - **Hypertension**
  - **Congestive Heart Failure (CHF)**
  - **Nephrotic Syndrome / CKD**
  - **Cirrhosis-related Ascites**
- Introduction to Unani equivalents: *Mudirr-i-Bawl* drugs, *Ḥammām*, and *Hijāma* for fluid regulation.

Part 2: Case-Based Clinical Observations (1 hour 30 minutes)

Choose one of the following depending on institutional setup:

Option A: Clinical Case Observations in Wards

- Observe 2–3 patients under diuretic therapy (e.g., furosemide for CHF, spironolactone for ascites).
- Collect:
  - Drug used, dosage, route.
  - Clinical indication.
  - Response: urine output, weight loss, edema relief, blood pressure change.

- Side effects: hypotension, electrolyte imbalance (if labs are accessible).

Option B: Simulated Cases / Clinical Vignettes

- Analyze 3 case scenarios with lab data and prescriptions.
- For each case:
  - Identify rationale for diuretic use.
  - Predict physiological outcome.
  - Interpret lab reports (urine output, serum sodium/potassium).

Part 3: Group Analysis and Discussion (45 minutes)

- **Small Group Discussions:**
  - What physiological systems were affected?
  - What feedback mechanisms were triggered (e.g., RAAS)?
  - What adverse reactions or complications were observed?
  - How does Unani medicine classify and handle such fluid retention cases?
- **Cross-reference with Unani Approaches:**
  - Concepts of *sue mizāj* and *Istifrāgh bi-Tanqiya*.
  - Role of *Mudirrat* and hydration regulation in Unani therapeutics.

Part 4: Synthesis & Takeaways (30 minutes)

- Facilitator-led debrief:
  - Compare effectiveness and safety of different diuretics.
  - Discuss integrative approaches combining modern pharmacology and Unani principles.
  - Clinical pearls and cautions (e.g., use of diuretics in geriatrics or patients with hepatic disease).
- **Reflective log prompt** for students:
- *"What are the physiological bases of diuresis, and how can Unani and allopathic methods complement each other in clinical care?"*

Experiential-Learning Learning 5.5: Thermal stress responses in patients

Total Duration: 4 hours

Part 1: Pre-Observation Briefing (30 minutes)

- Overview of thermoregulation:
    - Hypothalamic set-point, peripheral sensors, and effectors (sweat glands, vasomotor tone, shivering, etc.).
    - Pathophysiology of fever, heat stroke, and hypothermia.
- Unani correlates:
    - Concept of *Harārat Gharīzīyah* (innate heat), *Mizāj-i-Hār o Bārid*, and effects of climate (*Aklīm*).
- Safety and ethical guidelines for clinical observation.

Part 2: Patient Observation and Data Collection (2 hours)

Students will observe patients under supervision in a clinical setting (ward/emergency/outpatient), focusing on:

1. **Fever Cases**:
    - Observe temperature, heart rate, respiration, sweating, chills, and mental status.
    - Note response to antipyretic measures (cooling sponges, hydration, Unani formulations if applicable).
2. **Heat Stroke/Heat Exhaustion** (if seasonally relevant or through case files/simulated data):
    - Symptoms: Hot dry skin, tachycardia, confusion, hypotension.
    - Observe or review emergency cooling interventions, fluid replacement.
3. **Hypothermia** (if present in cases or via documented case studies/simulated mannequins):
    - Cold extremities, bradycardia, altered consciousness, shivering.
    - Observe use of passive/active rewarming measures.

In absence of live cases, pre-recorded video cases or simulation-based scenarios may be used.

Part 3: Analysis and Interpretation (45 minutes)

- Group-wise discussion of observed signs and compensatory mechanisms (vasoconstriction, sweating, behavioural changes).
- Correlation with:
    - Central thermoregulation (hypothalamic control).

- Hormonal responses (thyroid, catecholamines).
- Unani viewpoint: Imbalances of *Harārat* and *Rutūbat*, management with *Mufarrihāt*, *Mubarridāt* etc.

Part 4: Synthesis and Reflective Presentation (45 minutes)

- Summary of cases observed.
- Clinical and physiological analysis.
- Unani understanding of patient's *Mizāj* and *Sūʾ Mizāj* (e.g., *Hār Yābis*, *Bārid Rattab*).
- Recommended Unani therapeutic approach (e.g., *Dafʿ-i-Ḥummā*, *Tadbīr-i-Ḥarrat*, etc.)

Experiential-Learning Learning 5.6: Thermoregulation in different Climates

Total Duration: 6 hours

Part 1: Introduction and Conceptual Framing (1 hour)

- **Mini-lecture or briefing session** (indoor or field location):
  - Overview of thermoregulation: hypothalamic control, heat loss/gain mechanisms, acclimatization.
  - Introduction to *Iklīm* in Unani medicine: Six Climates, seasonal *Mizāj*, and related *Amrāz*.

Part 2: Observational Field Activity / Simulation-Based Analysis (3 hours)

(Choose either real-world fieldwork OR structured climate simulation activities depending on institutional feasibility)

Option A: Field-Based Observational Visits (Recommended)

- **Students divided into 3 groups**, each visiting or analyzing 3 types of settings:
  1. **Hot-humid** (e.g., greenhouse, kitchen, enclosed summer setting)
  2. **Cold/dry** (e.g., air-conditioned room, early morning outdoors)
  3. **Temperate** (e.g., shaded classroom or neutral lab environment)
- **Each group records for volunteers (self or others)**:
  - Ambient temperature, humidity
  - Skin temperature (IR thermometer)

- Pulse rate, respiratory rate, and sweating response
- Subjective sensation of thermal comfort/discomfort

Option B: Simulation / Data-Based Analysis

- Use available environmental physiology datasets or smart lab tools (wearable biosensors, pulse oximeter, skin temperature probes).
- Simulate exposure changes (e.g., hot packs, fan, cold compress) and observe physiological responses in safe, ethical conditions.

Part 3: Data Interpretation & Group Analysis (1 hour)

- Each group presents:
  - Observed changes in vitals and thermoregulatory responses
  - Environmental conditions recorded
  - Comparative table of findings
  - Discussion of *adaptive vs. maladaptive* responses
- Facilitator adds discussion on:
  - Heat exhaustion vs. acclimatization
  - Cold-induced vasoconstriction vs. hypothermia
  - Behavioral thermoregulation

Part 4: Unani Correlation and Clinical Relevance (1 hour)

- Changes in *Mizāj* due to seasonal/climatic shifts
- *Sū'-i-Mizāj* from environmental extremes
- Climate-induced diseases

Modular Assessment

Assessment	Hour

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (20 marks): shall be conducted on topics like basis and interpretation of urine examination in different *Amzaja*, common micturition disorders and their correlation with *quwate dafiya* and *Zauf Quwate Masika*, Concentrating and Diluting Mechanism of Kidneys and the role of diuretics or any other topic from cognitive domain. Log Book (15 marks): Practical on urine specific gravity and osmolality tests under varying conditions recorded in Log book shall be evaluated. Creative Writing (15 marks): Thermal stress responses in patients (e.g., fever, heat stroke, hypothermia). Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 6 : تناسلی ونشوونمائی فزیالوجی Reproductive & Developmental Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the hormonal and neuroendocrine regulation of male and female reproductive functions.
2. Describe physiological changes during pregnancy, lactation, menopause, and developmental stages.
3. Relate Unani concepts of reproductive powers and lifecycle changes with modern physiology.
4. Identify key causes of infertility and their interpretation in both modern and Unani frameworks.
5. Analyse the role of hygiene, lifestyle, and environment in maintaining reproductive health.

Unit 1 افعال تناسلیہ کی نیوروایںڈوکرائن تنظیم Neuroendocrine Regulation of Reproductive Function

6.1.1 نخامی وطائی تناسلی محور

(Hypothalamic-Pituitary-Gonadal (HPG) Axis)

6.1.2 مردوعورت میں دورہ تناسلیہ کا ہارمونی کنٹرول

(Hormonal Control of Male & Female Reproductive Cycles)

6.1.3 فیڈبیک میکانیزم اور نیورواینڈوکرائن ریفلیکسز

(Feedback Mechanisms & Neuroendocrine Reflexes)

6.1.4 طب یونانی میں قُوّتِ مُوَلِّدہ اور تَناسُلیہ کے مفاھیم

(Unani Concepts of *Quwwat-e-Muwallida* and *Tanasuliya)*

References: 1,3,4,6,7,8,9,10,11,12,16,17,26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the structure and function of the Hypothalamic-Pituitary-Gonadal (HPG) axis and its regulation	1	Lecture	CC	Knows-how	SDL,TUT,L&PPT ,PER
CO2,CO4	Interpret hormone level profiles (LH, FSH, estrogen, progesterone, testosterone) during various phases of the reproductive cycle	4	Practical6.1	PSY-ORG	Shows-how	DIS,LRI,BS,SDL,CBL
CO1,CO2, CO3	Discuss Unani concepts of *Quwwat-e-Muwallida* and *Tanasuliya* with reproductive physiology	6	Experiential-Learning6.1	PSY-SET	Does	LRI,IBL,CBL,RP,DIS
CO2	Discuss the hormonal control of male and female reproductive cycles and their physiological regulation	1	Lecture	CC	Knows-how	BL,FC,TUT,L&PPT ,DIS
CO2	Describe the neuroendocrine regulation of lactation	1	Lecture	CC	Knows-how	SDL,L&GD,DIS

Unit 2 حمل، رضاعت اور سن یاس Pregnancy, Lactation and Menopause

6.2.1 حمل کے دوران فعلیاتی تبدیلیاں

(Physiological Changes During Pregnancy)

6.2.2 افرازِ شیر کا رسیلیاتی نظم

(Hormonal Regulation of Lactation)

6.2.3 سن یاس: رسیلیاتی تغیرات اور نظام جسمانی پر انکے اثرات

(Menopause: Hormonal Shifts and Systemic Impact)

6.2.4 تناسلی مراحل پر یونانی نظریات

(Unani views on Reproductive transitions)

References: 1,3,4,7,8,9,10,11,12,15,19,26,27,28,29,30,31,32,33,34

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the physiological changes and hormonal adaptations during pregnancy	1	Lecture	CC	Knows-how	L&PPT ,TUT,BL
CO2	Analyze the hormonal and systemic changes during menopause and their health implications	2	Lecture	CAN	Knows-how	DIS,L&PPT ,FC,TUT
CO2,CO3, CO4	Apply standardized tools and hormone panels to assess menopausal symptoms	4	Practical6.2	CAP	Shows-how	SIM,RP,C_L,LRI,CBL
CO1,CO2, CO4	Discuss Unani perspectives on pregnancy and menopause with modern physiological understanding	6	Experiential-Learning6.2	PSY-SET	Does	CBL,Mnt,LRI,C_L,BS

Unit 3 نشوونما کی فزیالوجی Developmental Physiology

6.3.1 مضغی و جنینی نشوونما

(Embryonic and Fetal Development)

6.3.2 بلوغت اور جنسی پختگی

(Puberty and Sexual Maturation)

6.3.3 تقدم سن میں تناسلی نظام کی فعلیاتی تبدیلیاں

(Physiological Changes in Aging Reproductive System)

زندگی کے مراحل پر یونانی نقطہ نظر 6.3.4

(Unani Perspectives on Lifecycle Changes)

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,26,27,28,29,30,31,32,33

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the stages of embryonic and fetal development with physiological markers	1	Lecture	CC	Knows-how	L&GD,TUT,PL
CO2,CO4	Examine fetal development through case-based learning with ultrasonography and growth charts	4	Practical6.3	CAN	Shows-how	LRI,CBL,PT,BL,DIS
CO1,CO2, CO3,CO4	Examine puberty and aging from both biomedical and Unani viewpoints through patient scenarios	6	Experiential-Learning6.3	CAN	Does	LRI,CBL,DIS,RP
CO2	Describe hormonal and physiological changes during puberty and sexual maturation	1	Lecture	CC	Knows-how	L&PPT ,PER,DIS,SDL,TUT

Unit 4 عقر، صحت انجابیہ اور طرزِ زندگی کے اثرات Infertility, Reproductive Health & Lifestyle Impact

مرد و خاتون میں عقر کی فعلیاتی وجوہات 6.4.1

(Physiological Causes of Infertility in Males and Females)

یونانی ربط: سُوءِ مزاج اور ضُعفِ قُوّتِ تناسُلی 6.4.2

(Unani Correlations: *Su-e-Mizaj* and *Zofe Quwate Tanasuli)*

ناسلی صفائی اور اُصولِ حِفظانِ صحت 6.4.3

(Reproductive Hygiene and *Usool-e-Hifzan-e-Sehat)*

تناسلی صحت پر ماحول و طرزِ زندگی کے اثرات 6.4.4

(Lifestyle and Environmental Factors Affecting Reproductive Health)

References: 1,3,7,8,9,15,18,19,20,26,27,29,32,33,189

3A	3B	3C	3D	3E	3F	3G
CO2	Identify the physiological causes of infertility in males and females	1	Lecture	CC	Knows-how	L&PPT ,SY,SDL
CO2,CO4	Perform semen analysis, hormone profiles, and ovulatory status to evaluate infertility cases	4	Practical6.4	PSY-MEC	Shows-how	D,CBL,DL,LRI
CO1,CO2, CO3,CO4	Design personalized reproductive health strategies combining Unani and modern approaches	6	Experiential-Learning6.4	PSY-ORG	Does	RP,Mnt,CBL,SIM,LRI
CO1,CO2, CO3,CO4	Perform risk assessments for environmental and lifestyle-related reproductive disorders	4	Practical6.5	PSY-MEC	Shows-how	PT,CBL,TBL,LRI
CO2,CO3, CO4,CO6	Perform simulated counseling sessions on infertility, hygiene, and reproductive wellness	2	Experiential-Learning6.5	PSY-ADT	Does	CBL,TBL,SIM,RP,BL
CO2,CO3	Describe the influence of environmental and lifestyle factors on reproductive physiology	1	Lecture	CC	Knows-how	L&PPT ,DIS,TUT

Practical Training Activity

Practical Training 6.1 Hormone level profiles during reproductive cycle.

Duration: 4 hours

Part 1: Overview of Hormonal Physiology by Facilitator (30 minutes)

- Phasic secretion patterns of LH, FSH, estradiol, progesterone, testosterone
- Feedback loops: hypothalamic-pituitary-gonadal (HPG) axis
- Hormonal events during ovulation, menstruation, luteal support

- Male reproductive hormone trends

Part 2: Case-Based Interpretation Stations (2.5 hours)

Students rotate through 4 interpretation stations (35 minutes each) with hormone reports and case backgrounds.

Each station includes Unani overlays to encourage integrative understanding.

Station 1: Normal Cycle Interpretation

Task: Analyze hormone levels from early follicular, mid-cycle (ovulation), and mid-luteal phases in a healthy woman.

Objective: Recognize physiologic surges and feedback mechanisms.

Station 2: Anovulatory Cycle / PCOS

Task: Interpret lab data showing high LH:FSH ratio, low mid-luteal progesterone.

Objective: Correlate with signs of chronic anovulation, cystic ovaries, and *sue mizāj*.

Discussion: Role of *muṣaffī* and *muqawwiyāt-i-rahim* in Unani practice.

Station 3: Ovarian Failure / Menopause

Task: Identify patterns of low estrogen and high FSH in a menopausal profile.

Objective: Recognize loss of ovarian feedback and possible intervention needs.

Discussion: Use of *muqawwiyāt* and *muwallid-i-manī* agents in age-related decline.

Station 4: Male Hormonal Patterns

Task: Analyze low testosterone and altered FSH/LH in male infertility.

Objective: Understand hypogonadotropic and hypergonadotropic profiles.

Discussion: Link findings with *du'f-i-quwwat*, *sue mizāj barid*, and stress factors.

Part 3: Group Analysis and Integration (1 hour)

- Students collaboratively complete a hormone interpretation worksheet based on a new integrated male/female reproductive case.
- Guided discussion on clinical reasoning and personalized intervention planning.
- Unani insights: Linking hormone patterns with *Akhlaat* and *mizāj* correction.

Practical Training 6.2 Menopausal symptoms

Duration: 4 hours

Part 1: Introduction to Menopausal Physiology and Tools (30 minutes)

- Overview of menopause: hormonal changes, stages (perimenopause, menopause, postmenopause)
- Common symptoms: vasomotor (hot flashes), emotional (mood swings, anxiety), physical (sleep disturbances, weight gain, vaginal dryness)
- **Standardized Tools:**
  - Menopause Rating Scale (MRS)
  - Kupperman Index
  - Greene Climacteric Scale
- **Hormonal Changes:**
  - Decrease in estrogen, progesterone
  - Increase in FSH and LH

Part 2: Practical Assessment Exercise (1 hours)

Students will work in pairs to conduct practical assessments on simulated or real volunteer patients (with consent).

Activity 1: Use of Standardized Tools (1 hour)

- **Objective:** To assess and document the severity of menopausal symptoms using standardized tools.
  - Each student will administer the **Menopause Rating Scale** (MRS) or **Greene Climacteric Scale** to a simulated patient.
  - Guide the patient through the questions and record responses.
  - Discuss how to score and interpret results based on severity of symptoms.

Activity 2: Hormonal Panel Interpretation (30 minutes)

- **Objective:** To assess hormonal levels and interpret results.
  - Provide simulated hormone panel results (e.g., elevated FSH, decreased estrogen, low progesterone).
  - Students will interpret these hormone levels and correlate them with the stage of menopause.
  - Discuss the implications of these results for patient management (e.g., estrogen therapy, lifestyle changes).

Part 3: Integration with Unani Principles and Management Recommendations (1 hour)

- **Objective:** To combine findings from standardized tools and hormone panels with Unani assessment to develop an integrative management plan.
    - **Case Study Example:** A 50-year-old woman with hot flashes, mood swings, and sleep disturbances during perimenopause. Hormonal test shows elevated FSH and low estrogen.
    - **Tasks:**
        - Discuss how the patient's *mizāj* may be affected (e.g., shift toward *barīd* or *ḥarārāt* imbalance).
        - Evaluate symptoms in the context of *quwwat-e-muwallida* decline and suggest Unani interventions (e.g., *ilāj bi'l-ghidhā*, *tadbīr*).
        - Discuss lifestyle changes, diet, herbal remedies and biomedical interventions (e.g., HRT, SSRIs for mood).
        - Create a personalized management plan including both biomedical and Unani approaches.

Practical Training 6.3 Fetal development

Duration: 4 hours

Part 1: Orientation and Review by Faculty (30 minutes)

- Overview of key fetal development stages (organogenesis, differentiation, maturation)
- Introduction to USG parameters:
    - Crown-Rump Length (CRL)
    - Biparietal Diameter (BPD)
    - Femur Length (FL)
    - Abdominal Circumference (AC)
    - Estimated Fetal Weight (EFW)
- Review of fetal growth charts and percentile interpretation (e.g., WHO or Hadlock)
- **Unani framework**:
    - Concepts of *takwīn* (formation), *tanmiya* (nourishment/growth), *arkān* (elements), and *mizāj* of fetus
    - Effect of maternal *mizāj*, lifestyle, and *ghidhā* on fetal development

Part 2: Case-Based Group Work with USG Reports (2 hours)

Provide anonymized case files with USG printouts and gestational details.

Case Example 1: Normal Pregnancy (24 Weeks)

- CRL, FL, AC within normal range
- Placenta anterior, normal amniotic fluid
- **Tasks**:
    - Interpret values on growth chart
    - Predict gestational age
    - Describe physiological changes expected at this stage

Case Example 2: Intrauterine Growth Restriction (IUGR)

- BPD and FL <10th percentile
- Maternal history of anemia, poor nutrition
- **Tasks**:
    - Analyze growth lag using chart
    - Identify risk factors
    - Discuss possible Unani interpretation (*du'f al-quwwat ghādhiyah*, *sue mizāj al-jīnīn*)
    - Suggest supportive Unani approach.

Part 3: Presentation and Discussion (45 minutes)

- Each group presents:
    - Case summary
    - Growth parameter interpretation
    - Biomedical and Unani perspectives
    - Suggested management or follow-up plan
- Facilitator discusses:
    - How fetal development assessment integrates with maternal care

- Role of *tadbīr-i-ḥaml* in Unani practice

Part 4: Hands-On Demonstration (Optional / if resources available) (30 minutes)

- Live or recorded demonstration of fetal USG (if ethical clearance and equipment are available)
- Mapping observed measurements to gestational chart
- Observing fetal movements, cardiac activity, placenta, amniotic fluid

Practical Training 6.4 Semen analysis, hormone profiles, and ovulatory status

Duration: 4 hours

Part 1: Briefing and Introduction by Instructor (30 minutes)

- Overview of male and female infertility
- Key parameters in semen analysis: volume, count, motility, morphology
- Hormones relevant to reproduction: FSH, LH, prolactin, testosterone, estradiol, AMH
- Ovulation markers: basal body temperature (BBT), cervical mucus, mid-luteal progesterone
- Unani viewpoint: role of *quwwat tanasulia*, *muwallid-i-manī*, *akhlāṭ sāliḥa*

Part 2: Hands-on Practical Stations (3 hours)

Rotate students through the following 3 stations (1 hour each):

Station 1: Semen Analysis (Hands-On)

Activities:

- Microscopy-based examination of semen samples (prepared or simulated)
- Counting spermatozoa using Neubauer chamber or CASA (if available)
- Assessing motility grades and morphology
- Interpreting results using WHO 2021 criteria

Station 2: Hormone Profile Interpretation (Case-Based)

Activities:

- Examine hormone reports of infertile patients (male and female cases)
- Identify hormonal patterns suggesting hypogonadism, PCOS, hyperprolactinemia, or menopause
- Discuss relevance of serum FSH, LH, TSH, AMH, testosterone, estradiol, prolactin, etc.

Station 3: Ovulatory Status Evaluation

Activities:

- Study and interpret ovulation charts (BBT, cervical mucus tracking)
- Review ultrasound follicular study findings (images/video if available)
- Analyze progesterone levels in luteal phase
- Correlate signs with Unani indicators of reproductive strength

Part 3: Integration and Wrap-Up (30 minutes)

- Consolidate findings from all stations
- Discuss how to form a comprehensive infertility evaluation report
- Introduce Unani management principles. Quick quiz or verbal case-based review to reinforce key concepts

Practical Training 6.5 Risk assessments for environmental and lifestyle-related reproductive disorders

Duration: 4 hours

Part 1: Introduction and Orientation (30 minutes)

- Brief lecture on environmental and lifestyle factors affecting fertility and reproductive function:
    - **Environmental:** exposure to endocrine disruptors, pollutants, heat, radiation, pesticides, heavy metals
    - **Lifestyle:** poor sleep, stress, obesity, sedentary behavior, substance use, nutrition, digital exposure

Part 2: Practical Risk Assessment Exercise (2.5 hours)

Students will work in pairs or small groups to conduct assessments using structured tools on simulated or real volunteer subjects (with consent).

Tools Provided:

- Environmental exposure checklist

- Lifestyle risk evaluation form
- Semen/reproductive hormone test interpretation guide
- BMI and waist-hip ratio chart
- Optional: WHO fertility risk score sheet

Activities at Assessment Stations:

Station 1:

Assess lifestyle parameters (diet, sleep, stress, physical activity)

→ Fill lifestyle risk scoring grid

Station 2:

Evaluate exposure to potential endocrine disruptors (plastics, solvents, occupational factors)

→ Complete environmental risk grid

Station 3:

Interpret a set of hormone profiles (e.g., LH/FSH, testosterone, prolactin, AMH) and correlate with case history

→ Identify early warning signs

Station 4:

Analyze sample reproductive case files (infertility, irregular cycles, low libido) and trace contributory environmental/lifestyle risks

Part 3: Group Discussion and Risk Management Planning (1 hour)

- Present findings in groups:
    - Top 3 risk factors identified
    - Their physiological implications
    - Suggested Unani management plan: *tadbīr*, *ilāj bi'l-ghidhā*, *ilāj bi'l-dawā'*, behavioral changes as per *Asbabe Sitta Zarooriya*

Experiential Learning Activity

Experiential-Learning Learning 6.1: Correlation of *Quwwat-e-Muwallida* and *Tanasuliya with Reproductive physiology*

Duration: 6 hours

Part 1: Theoretical and Textual Foundations (1.5 hours)

- Key classical sources: *Kāmil al-Ṣanā'a*, *Al-Qānūn*, *Zakhīra Khwārizmshāhī*, *Tibb-i-Akbar*
- Definitions and descriptions:
    - *Quwwat-e-Muwallida*: generative force responsible for the formation of gametes and embryonic development
    - *Quwwat-e-Tanasuliya*: force governing sexual desire, performance, and reproductive capability
- Distinction between *quwā ghāziyya*, and *quwā jādhība*
- Linkages with *akhlāṭ*, *mizāj*, and organ-specific strength

Correlate with Physiology:

- Gametogenesis, hormone regulation (FSH, LH, GnRH, testosterone, estrogen), libido, and fertility phases

Part 2: Group-Based Comparative Analysis (1.5 hours)

Activity: Thematic Group Discussions + Flipchart Summaries

- Divide students into 3 groups:
    - **Group A:** Puberty and maturation — how *quwwat tanāsuliyya* emerges (compare to HPG axis activation)
    - **Group B:** Optimal adult reproductive functioning — balance of *quwwat* with hormonal and anatomical readiness
    - **Group C:** Decline and dysfunction — menopause, andropause, *du'f quwwat*, infertility

Each group:

- Maps Unani and biomedical understandings
- Lists signs of dysfunction and associated *sue mizāj*
- Suggests Unani interventions (diet, *tadbīr*, pharmacotherapy)

Part 3: Case-Based Simulation & Role Play (2 hours)

Activity: Simulated Patient Interactions

Each group receives a case with Unani and biomedical profile components:

- Case 1: Young male with low libido, fatigue, cold temperament

- Case 2: Female with irregular cycles, emotional instability, *sue mizāj*
- Case 3: Couple with unexplained infertility and lifestyle stress

Tasks:

- Diagnose using both systems
- Identify dysfunctions of *quwwat tanāsuliya* and/or *muwallida*
- Correlate with hormone profiles, reproductive anatomy
- Plan management strategy (Unani + optional biomedical inputs)

Role play physician-patient consultation with justification of approaches.

Part 4: Reflection and Synthesis (1 hour)

- What do *quwwat tanāsuliya* and *muwallida* offer conceptually that enhances reproductive care?
- How does understanding *mizāj* and *quwā* influence diagnosis and treatment in Unani medicine?
- How can these be translated for contemporary reproductive health services?

Experiential-Learning Learning 6.2: Unani perspectives on pregnancy and menopause

Duration: 6 hours

Part 1: Thematic Introduction and Comparative Framework (1 hour)

- Unani concepts of pregnancy:
  - *ḥaml* (pregnancy)
  - *Tadbīr-i-ḥāmil* (regimen for pregnant women)
  - Role of *mizāj* of uterus and *ghidhā* (nutritive forces)
  - Functions of *quwwat-e-jādhba*, *māsika*, and *muwallida*
- Unani views on menopause:
  - Seen as decline in *quwwat-e-muwallida*
  - Natural cessation of *ḥayz*, change in *mizāj*

- Biomedical overview:
    - Pregnancy physiology: hormonal orchestration (hCG, progesterone, estrogen), maternal adaptation, placenta function
    - Menopause: ovarian failure, drop in estrogen/progesterone, increase in FSH/LH, symptom profiles
- **Objective:** Establish a structured comparison template for further exploration.

Part 2: Textual Correlation Workshop (1.5 hours)

Students will analyze selected passages from Unani classical texts (e.g., *Canon*, *Kāmil al-Ṣanāʿa*, *Kitāb al-Murshid*) on pregnancy and menopause.

- Each group identifies:
    - Description of reproductive function during pregnancy or menopause
    - Mention of *arkān*, *mizāj*, and *quwā*
    - Management regimens (*tadbīr*, *ilāj*)
    - Assumptions about physiological change with aging or conception
- **Follow-Up Task:** Compare these findings with selected modern physiology textbook excerpts (provided) on the same topic.
- **Outcome:** Present a comparison chart highlighting aligned or differing understandings.

Part 3: Clinical Case Discussions (1.5 hours)

- **Activity:** Analyze and correlate Unani and modern interpretations of pregnancy and menopause through cases.

Two case scenarios will be discussed in groups:

1. **Pregnancy Case:** A 30-year-old pregnant woman in her second trimester with fatigue and digestive discomfort
2. **Menopause Case:** A 52-year-old woman experiencing hot flashes, mood changes, and sleep disturbance

- For each case:
    - Identify physiological explanations (modern and Unani)
    - Discuss *mizāj* implications and signs of *iʻtidāl* or *ikhtilāl*
    - Recommend management options (Unani: *ghidhā*, *tadbīr*, etc; Modern: supplements, HRT, counseling)
- **Reflection:** How might integrated care improve patient outcomes?

Part 4: Experiential Integration Activity – Concept Mapping (2 hours)

- **Activity:** Construct integrated concept maps linking Unani and biomedical physiology of pregnancy and menopause
- Each group creates two visual concept maps:
    1. *Stages and Systems in Pregnancy*: hormonal axes, *quwā*, maternal adaptations
    2. *Menopausal Transition*: hormonal decline, *mizāj* shifts, symptom expression
- **Map Components to Include:**
    - Hormones (modern) ↔ *quwā* and *arkān*/*akhlaat* (Unani)
    - Organ system changes (CVS, endocrine, neuropsychological)
    - Management strategies from both systems
    - Pathological vs physiological distinctions
- Groups present and discuss, followed by synthesis from the facilitator.

Experiential-Learning Learning 6.3: Puberty and aging: an integrative viewpoint

Duration: 6 hours

Part 1: Thematic Overview & Foundation Lecture by facilitator (60 minutes)

- **Biomedical perspective:**
    - Hormonal triggers of puberty (GnRH, LH/FSH, estrogen/testosterone)
    - Menarche/spermarche, secondary sexual characteristics, growth spurts
    - Aging processes: cellular senescence, hormonal decline, neurodegeneration, sarcopenia
- **Unani perspective:**
    - Life stages (*marāḥil al-ʻumr*): *sin al-sabāba*, *shabāb*, *kuhūlat*, *shaykhūkhat*
    - *Mizāj* evolution across life stages
    - Decline of *quwwat ghādhiyah*, *quwwat nāmiyah*
    - Role of *akhlāṭ* and *arkān* in maintaining health or triggering degeneration

Part 2: Case-Based Group Work (2 hours)

Divide students into 3 groups, each assigned a life-stage-specific patient scenario. Each group analyses both biomedical and Unani dimensions and prepares a care plan.

Case 1: Early Puberty in 9-Year-Old Girl

- Physical changes started prematurely (breast budding, height spurt)
- Family anxiety and social issues
- **Discussion Tasks:**
    - Define and differentiate precocious puberty (biomedical)
    - Interpret early activation of *quwwat nāmiyah* and hormonal *mizāj* shift
    - Unani interventions

Case 2: 17-Year-Old Male with Delayed Puberty

- No facial hair, voice change, or genital development
- Low self-esteem
- **Discussion Tasks:**
    - Causes of delayed puberty (hormonal, nutritional, genetic)
    - Unani concepts
    - Unani Supportive care

Case 3: 65-Year-Old Woman with Fatigue, Joint Pain, and Forgetfulness

- Post-menopausal changes and cognitive decline
- Biomedical issues: estrogen loss, bone resorption, neurodegeneration
- **Discussion Tasks:**
    - Aging physiology (biomedical): endocrine, musculoskeletal, neurological
    - Unani viewpoint: *inḥitāt al-quwā*, decline in *quwwat muḥarrika*
    - Unani approaches: *muqawwī dimāgh*, *muqawwī ʿaṣāb*, *tadbīr-i-mashayikh* (regimens for elderly)

Part 3: Role-Play and Peer Teaching (1.5 hours)

- Each group presents:
    - Summary of their case
    - Integrative diagnosis (biomedical + Unani)
    - Cross-system plan for management and lifestyle modification
    - Role-play 5-minute segment (physician-patient counselling) demonstrating:
        - Unani reasoning
        - Temperament-based advice
        - Psycho-social considerations

Part 4: Guided Moderated Discussion (1 hour)

- Facilitator synthesizes themes:
    - Role of *mizāj* in life transitions
    - Harmony between modern endocrinology and Unani *quwwat* models
    - Ethical and practical relevance of Unani lifestyle counselling
    - Modern relevance of *tadbīr-i-ṭifl* and *tadbīr-i-shaykhūkhat*

Part 5: Reflective Writing and Group Feedback (30 minutes)

- Individual task: Write a reflective note on:

"How do Unani insights into aging or puberty influence your clinical perspective?"

Experiential-Learning Learning 6.4: Personalized reproductive health strategies

Duration: 6 hours

Part 1: Conceptual Orientation and Integration Primer (1 hour)

- Overview of reproductive personalization in contemporary and Unani systems
- Biomedical tools: hormone panels, ovulatory tracking, fertility markers, and psychosocial variables
- Unani framework: *mizāj*, *akhlāṭ*, *quwwat*, *umūr-ṭabī'iyya*, life stage (*marāḥil al-'umr*)

- Evidence base for combining systems in preconception, fertility, menstrual, and menopausal care

Part 2: Case Portfolio Development (2 hours)

Each student receives a unique composite case including history, labs, and Unani parameters.

Example Cases:

- **Case A:** Female, 32, PCOS, irregular cycles, stress-related sleep issues
- **Case B:** Male, 38, asthenospermia, low libido
- **Case C:** Post-menopausal female, 52, hot flushes, forgetfulness
- **Case D:** Young couple, unexplained infertility, lifestyle-induced imbalances

Tasks for Each student:

- Evaluate biomedical findings (hormonal, ultrasonographic, physical)
- Determine Unani diagnosis
- Draft a personalized care plan integrating:
    - Unani pharmacological and non-pharmacological methods
    - Biomedical interventions where necessary
    - Psychosocial and lifestyle modifications

Part 3: Simulation and Peer Review (2 hours)

Activities:

- Students present their strategy as a reproductive health consultation (simulated physician-patient interaction)
- Must include:
    - Explanation of the integrative rationale to the “patient”
    - Lifestyle advice
    - Dietary guidance
    - Herbal/formula prescription and duration

Part 4: Consolidation, Discussion, and Reflection (1 hour)

Moderator-led Session:

- Comparative discussion on strategies used by each group
- Ethical implications and boundaries in integrative care
- Documentation and follow-up models in an integrative clinic
- Takeaways on designing realistic and culturally congruent reproductive strategies

Reflective Exercise:

"How does an Unani understanding of *quwwat* and *mizāj* enhance personalization in reproductive medicine?"

Experiential-Learning Learning 6.5: Counseling sessions on infertility, hygiene, and reproductive wellness

Duration: 2 hours

Part 1: Orientation and Framework (20 minutes)

- Brief lecture/discussion on principles of effective reproductive counselling:
    - Empathy and non-judgment
    - Clarity of explanation (simplifying Unani concepts)
    - Gender and cultural sensitivity
    - Integrating Unani regimens
- Topics overview:
    - **Infertility counselling:** causes, stigma,
    - **Hygiene education:** genital hygiene, menstruation, infections, seasonal care
    - **Wellness promotion:** reproductive health maintenance across lifespan (diet, exercise, stress, sexual health)

Part 2: Simulated Counselling Role Plays (1 hour)

Students will work in pairs or small groups to perform role-play exercises. Each student will take turns acting as counsellor and client.

Scenarios (Choose 2–3):

1. A couple with unexplained infertility seeking natural options

2. A young woman concerned about irregular menstruation and hygiene
3. An elderly male worried about loss of libido and vitality
4. A teenage girl seeking understanding of puberty changes
5. A patient anxious about side effects of hormonal contraceptives seeking Unani alternatives

Each group:

- Conducts a 10–15 minute simulated counselling session
- Uses patient-friendly language
- Incorporates both Unani and biomedical information
- Documents advice and rationale

Part 3: Reflection and Feedback (40 minutes)

- Peer feedback using a structured checklist:
    - Communication clarity
    - Cultural appropriateness
    - Correctness of information
    - Patient empowerment

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. App Based Question (20 Marks): An App Based Question shall be prepared on any of the Topics covered through lectures (Cognitive domain).	4

Practical Viva (15 Marks): for the practical like hormone level profiles (LH, FSH, estrogen, progesterone, testosterone) during various phases of the reproductive cycle, standardized tools and hormone panels to assess menopausal symptoms, semen analysis, hormone profiles, and ovulatory status to evaluate infertility cases etc. Class Presentation (15 Marks): on the topic the influence of environmental and lifestyle factors on reproductive physiology shall taken as assessment. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Semester No : 6

Module 7 : غدودی اور میٹابولک انضمام Endocrine & Metabolic Integration

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the types and mechanisms of hormone signaling and their effects on target organs.
2. Describe the hormonal regulation of metabolism and energy balance, including inter-hormonal crosstalk.
3. Analyze circadian variations in hormone secretion and their clinical relevance.
4. Identify major endocrine and metabolic disorders and their underlying hormonal dysregulation.
5. Integrate Unani concepts like *Mizaj* and *Baroodat* with endocrine physiology and propose integrative approaches for prevention and treatment.

Unit 1 ہارمونی سگنلنگ اور ہدف عضو کا ردِ عمل Hormonal Signalling & Target Organ Response

7.1.1 ہارمون سگنلنگ کی اقسام (آٹو کرائن، پیراکرائن، اینڈوکرائن)

(Types of hormone signalling (autocrine, paracrine, endocrine)

7.1.2 ہارمون کے عمل کے میکانیزم

Mechanisms of hormone action

7.1.3 ہدف عضو کی حساسیت، ریسپٹر اظہار، فیڈبیک ریگولیشن

Target organ sensitivity, receptor expression, and feedback regulation

7.1.4 ہائپوتھیلامس-ہائپوفیزپورٹل سسٹم

(Hypothalamic-Hypophysial portal system)

References: 26,27,28,29,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe types of hormone signaling and key differences in their physiological roles	1	Lecture	CC	Knows-how	L&PPT ,TUT,DIS
CO2,CO4	Demonstrate feedback mechanisms via case reviews of endocrine axis disorders	4	Practical7.1	PSY-SET	Shows-how	SDL,PER,CBL,DIS
CO2,CO4	Discuss clinical case scenarios involving hypo- or hyper- secretion of hormones	3	Experiential-Learning7.1	PSY-GUD	Does	LRI,IBL,CBL,Mnt
CO2,CO3	Describe mechanisms of action of steroid and peptide hormones on target cells	1	Lecture	CC	Shows-how	SDL,L&PPT
CO2,CO3, CO4	Demonstrate the use of diagnostic endocrine tests, such as ACTH stimulation, through simulation to identify hormonal resistance disorders.	3	Experiential-Learning7.2	PSY-GUD	Shows-how	LRI,RP,DIS,SIM,CBL
CO2	Describe the mechanism of action of Pituitary hormones	1	Lecture	CC	Knows-how	L&PPT ,SY,SDL

Unit 2 استحالوی نظم اور رسیاتی تداخل Metabolic Regulation & Hormonal Crosstalk

7.2.1 ہارمونز کے ذریعے گلوکوز، لپڈ، اور پروٹین میٹابولزم کی تنظیم

(Hormonal regulation of glucose, lipid, and protein metabolism)

7.2.2 انسولین، گلوکاگون، کورٹیسول، نمو ی ہارمون، اور تھائرائیڈ ہارمون کا باہمی تعامل

(nsulin, glucagon, cortisol, GH, thyroid hormone interactions)

توانائی کا توازن، میٹابولک لچک، اور ہارمونل موافقت پذیر ردعمل7.2.3

(Energy balance, metabolic flexibility, and adaptive hormonal response)

References: 26,27,28,29,30,31,32,33,34,49

3A	3B	3C	3D	3E	3F	3G
CO2,CO3, CO4	Discuss Interpretation of metabolic panels (glucose, insulin, lipid profile) and hormonal biomarkers	4	Practical7.2	PSY-GUD	Shows-how	CBL,Mnt,SIM,DIS,SDL
CO1,CO2, CO3,CO4	Construct patient-centric hormonal maps showing endocrine-metabolic interactions	4	Experiential-Learning7.3	PSY-ORG	Does	Mnt,C_L,CBL,TUT,DIS
CO2,CO3	Evaluate metabolic changes under physiological vs. stress conditions using lab data and case studies	4	Practical7.3	CE	Shows-how	SDL,DIS,PER,PT,LRI
CO2	Discuss the roles of key hormones in regulating carbohydrate, protein, and lipid metabolism	1	Lecture	CC	Knows-how	DIS,L&GD,FC
CO1,CO2, CO3,CO4	Discuss Vitamin D Estimation with Different Temperaments	2	Experiential-Learning7.4	PSY-MEC	Does	C_L,LRI,PT,CD,CBL
CO2	Describe the integrated hormonal response during fasting, feeding, and exercise	1	Lecture	CC	Knows-how	TUT,DIS,L&PPT

Unit 3 Circadian Endocrine Rhythms & Hormonal Disorders یوماوی وابینڈوکرائن نظم اور ہارمونوی عوارض

افراز رسیلات کا یومیہ تغیر (کورٹیسول، میلے ٹونن، رسیلہ نمویِ)7.3.1

(Diurnal variation in hormone secretion (cortisol, melatonin, GH))

نظم یوماوی کی خرابی کے اینڈوکرائن صحت پر اثرات7.3.2

(Impact of circadian rhythm disruption on endocrine health)

ہارمونوی توازن کی خرابیاں: ہارمون کی زیادتی یا کمی7.3.3

(Disorders of hormonal balance: Hyper/Hypo secretion of hormones)

References: 26,27,28,29,30,31,32,33,34,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Discuss circadian regulation of hormone secretion and its physiological significance	1	Lecture	CC	Knows-how	L&PPT ,C_L,SDL
CO2,CO3, CO4	Perform case-based discussions on lifestyle-induced endocrine disruptions (e.g., shift work, stress)	2	Experiential-Learning7.5	PSY-MEC	Shows-how	TUT,LRI,C_L,CBL,IBL
CO2,CO3	Describe pathophysiological basis of hormonal imbalance disorders and their systemic effects	3	Lecture	CC	Knows-how	L&PPT ,PL,DIS
CO2,CO3, CO4	Investigate clinical cases of hypothyroidism, adrenal insufficiency, and their metabolic effects	4	Practical7.4	CAN	Shows-how	FV,L&PPT ,L&GD,L,IBL
CO2,CO3, CO4	Design circadian lifestyle interventions integrating sleep-wake cycles with hormonal health	2	Experiential-Learning7.6	PSY-ORG	Does	CBL,TUT,LRI,IBL,DIS

Unit 4 طرزِ زندگی، استحالوی عوارض اور مزاج Lifestyle, Metabolic Disorders & Mizaj in Endocrine Physiology

سمن مفرط، پی سی او ایس، اور ٹائپ ٹو ذیابیطس کی پیتھوفیزیالوج7.4.1

(Pathophysiology of obesity, PCOS, and Type 2 diabetes)

یونانی ارتباط: مزاج، بَرُودَت اور ہارمونی بے ترتیبی7.4.2

(Unani correlation: *Mizaj*, *Baroodat*, and endocrine imbalances)

جدید و یونانی اُصولوں کا تکامل: علاجی و احتیاطی تدابیر7.4.3

(Preventive and therapeutic approaches integrating Unani and modern frameworks)

References: 15,18,19,20,21,22,25,29,32,33,189

3A	3B	3C	3D	3E	3F	3G
CO2	Describe endocrine pathophysiology of obesity, PCOS, and diabetes mellitus	1	Lecture	CC	Knows-how	L&PPT ,TUT,Mnt
CO2,CO4	Analyze patient data with obesity, PCOS, and diabetes for endocrine profiles and *Mizaj* classification	2	Practical7.5	CAN	Shows-how	CBL,SDL,CD,PT
CO1,CO2, CO3,CO4	Design case-based Unani treatment plans for PCOS and obesity, supported by modern endocrine evidence	4	Experiential-Learning7.7	PSY-ORG	Does	DIS,C_L,SDL,CBL
CO1,CO2, CO3,CO4	Evaluate patient simulations or group discussions focusing on endocrine lifestyle correction using Unani approaches	2	Experiential-Learning7.8	CE	Does	Mnt,C_L,PSM,CBL,DIS
CO1,CO2, CO3,CO4	Design lifestyle intervention protocols from both Unani and modern paradigms	4	Experiential-Learning7.9	PSY-ORG	Does	IBL,DIS,BS,CBL,PSM
CO2,CO3, CO4	Interpret hormonal panels in metabolic disorders with anthropometric data	2	Practical7.6	CAN	Shows-how	C_L,LRI,CD,CBL,IBL

Practical Training Activity

Practical Training 7.1 Feedback mechanisms of endocrine axis

Total Duration: 4 Hours

1. **Briefing and Conceptual Refresher (Instructor-led) (1 hour)**
    - Overview of endocrine axes (e.g., HPA, HPT, HPG).

- Types of feedback mechanisms: negative vs positive.
- Examples of feedback loops (e.g., cortisol loop in HPA).

2. **Guided Case Review: HPA Axis Dysfunction (1 Hour)**

- **Activity:**
  - Presentation of a detailed case (e.g., Cushing's syndrome or Addison's disease).
- **Student Tasks:**
  - Identify primary, secondary, or tertiary dysfunction.
  - Map out the hormonal feedback loop.
  - Fill in a feedback chart indicating expected vs actual hormone levels.

3. **Small Group Case Reviews: HPT & HPG Axis Disorders (1 Hour)**

- **Cases:**
  - Group A: Hypothyroidism (Hashimoto's thyroiditis).
  - Group B: Hyperthyroidism (Graves' disease).
  - Group C: Hypogonadotropic hypogonadism.
- **Tasks:**
  - Each group analyzes the assigned case.
  - Diagrams disrupted feedback pathways.
  - Presents causes, lab findings, and feedback dynamics.

4. **Consolidation, Integration, and Assessment (1 Hour)**

- **Activity:**
  - Whole-class discussion led by instructor.
  - Q&A on Unani equivalents of endocrine dysfunction.
  - Rapid quiz: match disorders to disrupted feedback types.
- **Deliverables:**

- Each student submits a filled-in feedback loop template for one disorder.
- Reflective note (100 words): “How do Unani principles align with hormonal feedback understanding?

Practical Training 7.2 Metabolic panels (glucose, insulin, lipid profile) and hormonal biomarkers

Total Duration: 4 Hours

Hour 1 – Orientation & Guided Interpretation of Standard Panels

- **Activity:**
  - Instructor introduces standard metabolic panels:
    - Fasting glucose, HbA1c, fasting insulin, HOMA-IR.
    - Lipid profile: TC, LDL, HDL, TG.
    - Basic hormone markers: TSH, cortisol, prolactin, testosterone, estradiol.
- **Learner Task:**
  - Review normal reference ranges.
  - Understand physiological regulation and compensatory responses.
- **Integration:**
  - Unani perspectives on digestion and metabolism.

Hour 2 – Clinical Case-Based Panel Analysis

- **Activity:**
  - Students are divided into small groups (2-3 learners).
  - Each group receives two clinical cases with lab results.
    - Case A: Insulin resistance with dyslipidemia.
    - Case B: Subclinical hypothyroidism with abnormal lipids.
- **Learner Tasks:**
  - Interpret lab findings in context.

- Identify key hormonal-metabolic relationships.
- Suggest diagnosis and initial management considerations.

Hour 3 – Hormonal Biomarker Simulation and Pattern Recognition

- **Activity:**
  - Interactive pattern recognition using de-identified lab datasets.
    - Dataset 1: PCOS hormonal profile (↑LH:FSH, ↑androgens, insulin resistance).
    - Dataset 2: Addison's disease (↓cortisol, ↑ACTH).
    - Dataset 3: Central hypothyroidism (↓T3/T4, normal/low TSH).
- **Learner Tasks:**
  - Match biomarker profiles to likely clinical scenarios.
  - Plot values against diagnostic thresholds.
  - Brief explanation of compensatory hormonal responses.

Hour 4 – Integration, Reflection, and Unani Correlation

- **Activity:**
  - Group presentations of findings with reasoning.
  - Instructor-led discussion on how Unani assessment of *Kaifiyat*, *Mizāj al-Badan*, and *Taqwiyat-e-Tabi'at* can complement biochemical interpretation.
- **Unani Integration Points:**
  - *Istifragh* and its role in managing hyperlipidemia and insulin resistance.
  - Role of *Mizāj*, *Afʿāl al-Aʿzā*, and *Tabi'at* in endocrine-metabolic health.

Practical Training 7.3 Metabolic changes under physiological vs. stress conditions

Total Duration: 4 hours

1. Introduction & Theoretical Background (1 hours)

- **Instructor Presentation (30 min)**
    - Overview of metabolism: anabolism vs. catabolism
    - Key metabolic pathways (glycolysis, gluconeogenesis, lipolysis, ketogenesis)
    - Hormonal regulation (insulin, glucagon, cortisol, adrenaline)
- **Discussion (30 min)**
    - Differences between physiological and stress metabolism
    - Examples of stress conditions (exercise, fasting, trauma, infection)

2. Lab Data Analysis (1 hour)

- **Group Activity (40 min)**
    - Provide datasets (blood glucose, lactate, free fatty acids, ketones, cortisol) from:
        - Normal resting state (physiological)
        - Post-exercise (acute stress)
        - Prolonged fasting (chronic stress)
    - Students compare trends and interpret hormonal influences
- **Group Presentations (20 min)**
    - Each group presents findings on one metabolic parameter

3. Case Study Analysis (1 hour)

- **Case 1 (30 min) – Diabetic Ketoacidosis (DKA) vs. Normal Metabolism**
    - Compare lab values (pH, glucose, ketones, electrolytes)
    - Discuss insulin deficiency and counterregulatory hormones
- **Case 2 (30 min) – Post-Exercise Recovery vs. Overtraining Syndrome**
    - Analyze lactate, cortisol, and glycogen depletion patterns
    - Link to anaerobic vs. aerobic metabolism

4. Interactive Discussion & Synthesis (1 hour)

- **Debate (30 min)** – "Is stress metabolism always harmful?"
    - Groups argue pros (adaptive) vs. cons (pathological) using evidence
- **Wrap-up & Quiz (30 min)**
    - Summary of key differences (table format)
    - 10-min MCQ quiz (e.g., "Which hormone dominates in fasting?")

Practical Training 7.4 Hypothyroidism, adrenal insufficiency, and their metabolic effects

Duration: 4 hours

Objective: To analyze clinical cases of hypothyroidism and adrenal insufficiency, interpret lab results, and correlate them with metabolic derangements (e.g., weight changes, hypoglycemia, dyslipidemia).

Time Breakdown & Structure

1. Introduction & Key Concepts (30 min)

- **Lecture (20 min)**
    - **Hypothyroidism:**
        - Role of TSH, T3/T4 in metabolism
        - Metabolic effects (↓ BMR, weight gain, hyperlipidemia, cold intolerance)
    - **Adrenal Insufficiency (Addison's vs. Secondary):**
        - Cortisol's role in glucose metabolism, stress response
        - Hypoglycemia, fatigue, hyponatremia, hyperpigmentation
- **Case Preview (10 min)**
    - Brief overview of cases to be analyzed

2. Case-Based Lab Analysis (2 hours)

Station 1: Hypothyroidism (60 min)

- **Case 1 (30 min) – Primary Hypothyroidism (Hashimoto's)**

- Lab data: ↑ TSH, ↓ Free T4, anti-TPO antibodies
- Metabolic effects: Elevated LDL, weight gain, fatigue
- **Task:** Calculate BMR change using the Harris-Benedict equation (pre- vs. post-treatment).

- **Case 2 (30 min) – Subclinical Hypothyroidism**
  - Lab data: Mildly ↑ TSH, normal T4
  - Debate: "When to treat?" (Discuss guidelines)

Station 2: Adrenal Insufficiency (60 min)

- **Case 3 (30 min) – Primary Adrenal Insufficiency (Addison's)**
  - Lab data: ↓ Cortisol, ↑ ACTH, hyponatremia, hyperkalemia
  - Metabolic effects: Hypoglycemia, weight loss
  - **Task:** Simulate an ACTH stimulation test (interpret results).
- **Case 4 (30 min) – Secondary Adrenal Insufficiency (Pituitary Tumor)**
  - Lab data: ↓ Cortisol, ↓ ACTH
  - Compare with Addison's (skin pigmentation, electrolytes).

3. Metabolic Correlation & Clinical Reasoning (1 hour)

Group Activity (40 min)

- **Task 1:** Match metabolic complications (e.g., hypoglycemia, hyperlipidemia) to each disorder.
- **Task 2:** Design a treatment plan (e.g., levothyroxine vs. hydrocortisone dosing).

Debate (20 min)

- "Which condition has more severe metabolic consequences: Hypothyroidism or Adrenal Insufficiency?"

4. Wrap-Up & Assessment (30 min)

- **Quiz (15 min)**
  - Short-answer: "Why does Addison's cause hyponatremia?"
  - MCQs: Lab interpretation (e.g., ↑ TSH + normal T4 = ?)

- **Reflection (15 min)**
    - "How would you differentiate these disorders in a fatigued, overweight patient?"

Materials Needed:

- Printed lab reports (TSH, T3/T4, cortisol, ACTH, electrolytes)
- Metabolic complication flashcards (for matching game)
- Calculators for BMR estimation
- ACTH test simulation sheets

Assessment:

- Case analysis accuracy (40%)
- Group debate participation (20%)
- Quiz performance (30%)
- Reflection submission (10%)

Key Takeaway: Students will integrate lab diagnostics with clinical metabolic effects, enhancing their ability to diagnose and manage endocrine disorders.

Practical Training 7.5 Endocrine profiles in Obesity, PCOS, and diabetes and *Mizaj* classification

Duration: 2 Hours

Hour 1 – Case Review and Endocrine Profile Interpretation

- **Activity:**
    - History, clinical presentation, BMI, menstrual pattern, physical exam.
    - Lab results: glucose panel, insulin, HOMA-IR, lipid profile, LH, FSH, testosterone, prolactin, TSH.
- **Tasks:**
    - Identify and interpret endocrine abnormalities.
    - Diagnose the primary endocrine/metabolic condition (e.g., insulin resistance in PCOS, T2DM).
    - Note overlapping features among the three conditions.

Hour 2 – Mizāj Classification and Unani Correlation

- **Activity:**
  - Using a structured *Mizāj* assessment tool (e.g., temperament scoring sheets), groups classify the *Mizāj*:
    - *Safrāwī, Balghamī, Damwī*, or *Saudāwī* (or mixed).
  - Assess *Kaifiyāt* (hot/cold, moist/dry), temperament of affected organs (*A'zā-e-Raīsa*), and dominant derangements (*Su-e-Mizāj*).
- **Discussion Prompts:**
  - What *Mizāj* patterns are most common in obesity, PCOS, and diabetes?
  - How does Unani diagnosis complement biochemical findings?
  - Suggest Unani interventions (*Ilāj bit-Tadbīr*, *Ghizā*, *Dawā*) alongside modern treatment.

Practical Training 7.6 Hormonal panels in metabolic disorders and correlate with anthropometric data

Total Duration: 2 hours

1. Introduction & Background (20 min)

- **Instructor Presentation (10 min)**
  - Key hormones in metabolism (insulin, glucagon, cortisol, thyroid hormones, leptin, adiponectin)
  - Common metabolic disorders (Type 2 diabetes, PCOS, Cushing's syndrome, hypothyroidism)
  - Importance of anthropometry (BMI, waist-hip ratio, skinfold thickness)
- **Discussion (10 min)**
  - How hormonal imbalances lead to weight changes (e.g., insulin resistance → central obesity)

2. Hormonal Panel Analysis (40 min)

- **Group Activity (30 min)**
  - Provide lab reports (fasting glucose, insulin, HbA1c, TSH, cortisol, leptin) from:
    - Healthy individual
    - Type 2 diabetic patient

- PCOS patient
- Hypothyroid patient

- Students calculate HOMA-IR (insulin resistance index) and interpret trends

- **Group Discussion (10 min)**
  - Each group presents key hormonal abnormalities in their assigned case

3. Anthropometric Correlation (40 min)

- **Hands-on Measurement (20 min)**
  - Students pair up and record:
    - BMI (weight/height²)
    - Waist circumference (indicator of visceral fat)
    - Body fat % (if callipers/BIA available)
- **Data Interpretation (20 min)**
  - Compare hormonal data with anthropometry (e.g., high cortisol ⟶ ↑ waist circumference)
  - Discuss clinical significance (e.g., waist circumference > 94 cm in men = metabolic risk)

4. Case-Based Synthesis & Discussion (20 min)

- **Case Study (10 min) – Metabolic Syndrome**
  - Given lab data (high triglycerides, low HDL, elevated fasting glucose) + anthropometry
  - Students identify hormonal dysregulation (insulin/leptin resistance)
- **Wrap-up Quiz (10 min)**
  - Short quiz (e.g., "Which hormone is most linked to abdominal obesity?")
  - Q&A and key takeaways

Experiential Learning Activity

Experiential-Learning Learning 7.1: Hypo- or Hyper- secretion of hormones

Total Duration: 3 Hours

Hour 1 – Interactive Case Immersion (Instructor-Guided)

- **Activity:**
  - Presentation of two contrasting cases:
    - Case 1: Hyposecretion – e.g., Primary Hypothyroidism
    - Case 2: Hypersecretion – e.g., Acromegaly
- **Method:**
  - Realistic clinical vignettes with presenting symptoms, lab results (TSH, T3, T4 / GH, IGF-1), imaging findings (if applicable).
- **Learner Task:**
  - Extract key data from clinical history and diagnostics.
  - Identify hormone abnormality and determine the site of dysfunction (glandular/pituitary/hypothalamic).

Hour 2 – Group-Based Clinical Simulation & Role Play

- **Activity:**
  - Learners split into small groups (3–4 per group).
  - Each group receives a unique case scenario (e.g., Addison's disease, Cushing's syndrome, Pheochromocytoma, Grave's disease).
- **Roles:**
  - One learner acts as the patient.
  - Others act as Unani and modern physicians.
- **Tasks:**
  - Conduct simulated clinical interview.
  - Formulate provisional diagnosis.
  - Suggest diagnostic steps and management plan (biomedical + Unani perspective).

Hour 3 – Unani Integration & Reflective Rounds

- **Activity:**

- Groups present clinical impressions.
- Integrate Unani understanding:
  - *Tabi'at*, *Akhlāṭ* imbalance, *A'zā-e-Raīsa* involvement.
  - Role of *Ilāj bit-Tadbīr*, *Ghizā*, and *Dawā* in hormonal imbalances.

- **Facilitated Reflection:**
  - Instructor leads a discussion linking modern hormonal feedback disruption with Unani views of systemic imbalances.
  - Prompt: *"Can hormonal disorders be interpreted as disruptions in Mizāj of specific A'zā?"*

Experiential-Learning Learning 7.2: Endocrine testing algorithms

Total Duration: 3 Hours

Hour 1 – Clinical Simulation of ACTH Stimulation Testing

- **Activity:**
  - Simulated setup of a **Standard (Short) ACTH Stimulation Test** using case-based data.
- **Components:**
  - Case: Suspected adrenal insufficiency.
  - Baseline and post-injection cortisol levels provided.
- **Learner Tasks:**
  - Plot results against normal ranges.
  - Decide: Normal vs primary adrenal failure vs secondary adrenal insufficiency.
  - Discuss test timing, indications, and possible pitfalls.

Hour 2 – Interactive Simulation of Testing Algorithms in Target Organ Resistance

- **Activity:**
  - Rotation through **three endocrine testing scenarios** using case-based simulations:
    - **TRH Stimulation Test** – for suspected TSH resistance.

- **GnRH Stimulation Test** – to evaluate delayed puberty.
- **Dexamethasone Suppression Test** – for suspected Cushing's syndrome.

- **Learner Roles:**
  - Diagnostic analyst, interpreter, clinical explainer (rotating within groups).
- **Tasks:**
  - Construct simplified test algorithms.
  - Match lab results with expected physiological responses.
  - Identify resistance (e.g., end-organ unresponsiveness) based on hormone profiles.
- **Learning Tools:**
  - Printed flowcharts with test pathways and expected hormone levels at each step.

Hour 3 – Clinical-Pathophysiological Mapping and Unani Integration

- **Activity:**
  - Groups select one simulated test case and:
    - Map the endocrine axis and feedback loop.
    - Diagnose the site of resistance or failure.
    - Propose differential diagnoses.

Experiential-Learning Learning 7.3: Patient-centric hormonal maps

Total Duration: 4 Hours

Hour 1 – Introduction and Conceptual Framework

- **Faculty-led briefing (30 min):**
  - Overview of key hormonal axes (HPA, HPG, HPT, insulin-glucagon, GH-IGF-1).
  - Endocrine feedback loops and metabolic interactions.
  - Unani equivalents and interpretations:

        - *Su-e-Mizāj*, *Quwā*, *Afʿāl*, *Ghalba* of *Akhlaṭ*, etc.
    - Sample endocrine-metabolic maps shown.
- **Small group preparation (30 min):**
    - Groups receive 1 clinical case (e.g., PCOS, metabolic syndrome, hypothyroidism, Cushing's syndrome).
    - Provided with patient profile, labs, symptoms, and *Mizāj* description.
    - Begin identifying key hormonal and metabolic nodes to be included in the map.

Hour 2 – Mapping Hormonal and Metabolic Pathways

- **Activity:**
    - Groups construct detailed flowcharts or mind maps:
        - Start from hypothalamic-pituitary input.
        - Include hormonal levels (e.g., insulin, cortisol, TSH, LH/FSH).
        - Integrate effects on metabolism: glucose, lipids, muscle/fat tissue, ovulation, etc.
        - Mark feedback inhibition points, amplification loops, and interactions.
        - Parallel Unani mapping: *Mizāj*, involved *Aʿzā*, *Su-e-Mizāj*, *Afʿāl* disruption, dietary/lifestyle triggers.
- **Tools:**
    - Whiteboards or chart paper, markers, or digital mapping tools if available (e.g., MindMeister, Lucidchart).

Hour 3 – Clinical Application and Presentation

- **Each group presents (10–12 min):**
    - Clinical summary.
    - Hormonal-metabolic map with explanatory narrative.
    - Correlation with Unani understanding.
    - Identification of therapeutic targets (both biomedical and Unani).
- **Faculty and peer feedback:**
    - Accuracy, clarity, integration, creativity, clinical relevance.

Hour 4 – Synthesis and Cross-Case Integration

- **Facilitated discussion:**
  - Common patterns and divergences across cases.
  - How multiple axes interact in endocrine syndromes.
  - Role of *Tabi'at* in systemic regulation.
  - Examples where Unani diagnosis predicted or paralleled modern endocrine findings.
- **Reflection exercise:**
  - Learners individually answer:
    - *"How can visual hormonal mapping enhance clinical reasoning in Unani endocrinology?*

Experiential-Learning Learning 7.4: Estimation of Vitamin D and Correlation with Different Temperaments

Duration: 2 hours

1. Introduction & Theoretical Background (20 min)

- **Instructor Presentation (10 min)**
  - Role of vitamin D in mood and cognition
  - Overview of temperament theory (Hippocratic/Galenic or modern personality models)
  - Hypothesized links: e.g., low vitamin D ⟶ melancholic traits (fatigue, low mood)
- **Discussion (10 min)**
  - Can temperament influence sun exposure behavior (e.g., extroverts vs. introverts)?
  - Confounding factors (diet, skin tone, geographic location)

2. Data Collection & Vitamin D Estimation (40 min)

- **Self-Report Temperament Assessment (15 min)**
  - Students complete a brief temperament/personality questionnaire (e.g., shortened Keirsey or Big Five test)
  - Classify into dominant temperament groups

- **Vitamin D Status Survey (15 min)**
    - Sun exposure habits (daily duration, sunscreen use)
    - Dietary sources (fatty fish, fortified foods, supplements)
    - Previous vitamin D test results (if available)
- **Optional Rapid Testing (10 min, if available)**
    - Finger-prick vitamin D test (e.g., portable ELISA-based kits) for volunteers

3. Group Analysis & Correlation (40 min)

- **Small Group Work (20 min)**
    - Compile class data:
        - Temperament distribution
        - Self-reported vitamin D risk factors
        - (If tested) Actual vitamin D levels
    - Look for trends (e.g., melancholic participants reporting less sun exposure)
- **Group Presentations (20 min)**
    - Each group shares findings and debates causality vs. correlation

4. Critical Discussion & Reflection (20 min)

- **Case Study (10 min)**
    - Review published studies on vitamin D and depression/anxiety
    - Compare with class findings
- **Wrap-Up Debate (10 min)**
    - "Can temperament predict vitamin D deficiency, or is it purely environmental?"
    - Personal reflections: How might this influence clinical recommendations?

Experiential-Learning Learning 7.5: Lifestyle-induced endocrine disruptions

Total Duration: 2 Hours

Hour 1 – Group Case Discussion

- **Activity:**
    - Each student/group receives 1–2 clinical scenarios, e.g.:
        - A nurse with irregular night shifts developing PCOS and menstrual irregularity.
        - A corporate worker under chronic stress developing central obesity and pre-diabetes.
        - A young student with poor sleep, fast food habit, and early signs of thyroid dysfunction.
- **Task:**
    - Identify lifestyle contributors to endocrine disturbance.
    - Discuss likely hormonal axes affected (e.g., HPA dysregulation, circadian disruption, cortisol, insulin).
    - Classify patient's *Mizāj* and relevant Unani concepts
    - Formulate key *Ilāj bit-Tadbīr* and dietary recommendations.

Hour 2 – Integrated Group Sharing and Reflection

- **Activity:**
    - Each Student/group presents a 5-minute summary of their case analysis and recommendations.
    - Facilitator guides a comparative discussion across groups:
        - How does Unani medicine interpret "stress" or sleep loss?
        - What classical texts describe such dysfunctions (*Su-e-Tadbīr*, *Khilt Ghalīz*, etc.)?
        - Which Unani interventions (herbal, regimental, or dietary) are best suited for such conditions?
        - How can preventive strategies be adapted for modern lifestyle contexts?

Experiential-Learning Learning 7.6: Circadian lifestyle interventions

Total Duration: 2 hours

1. Introduction to Circadian Hormones (20 min)

- **Mini-Lecture (10 min)**
    - Key hormones: Cortisol (AM peak), Melatonin (night rise), Insulin (day sensitivity), Ghrelin/Leptin (hunger cues)
    - Impact of disrupted rhythms: Obesity, diabetes, insomnia, mood disorders
- **Case Example (10 min)**
    - Night-shift worker: High cortisol at night → insulin resistance → weight gain

2. Self-Assessment & Problem Identification (30 min)

- **Circadian Audit (15 min)**
    - Participants track their own:
        - Sleep/wake times (e.g., "Do you wake up before sunrise?")
        - Meal timing ("Do you eat late at night?")
        - Light exposure ("Do you use screens after 10 PM?")
- **Hormonal Symptom Checklist (15 min)**
    - Fatigue, cravings, poor sleep → link to cortisol/melatonin imbalance

3. Intervention Design Workshop (50 min)

Group Activity (30 min)

- **Team Challenge:** Design a 7-day circadian reset plan for:
    - **Scenario 1:** College student with late-night screen use → melatonin suppression
    - **Scenario 2:** Office worker with chronic stress → dysregulated cortisol
- **Key Strategies:**
    - **Light:** Morning sunlight vs. blue-light blocking
    - **Food:** Time-restricted eating (e.g., 12-hour fasting)
    - **Sleep:** Consistent bedtime, pre-sleep routine
    - **Stress:** Cortisol-lowering techniques (breathwork, nature exposure)

Pitch Presentations (20 min)

- Each group presents their plan + scientific rationale

4. Implementation & Reflection (20 min)

- **Personal Action Plan (10 min)**
    - Each participant commits to **one** circadian change (e.g., "I will stop eating after 8 PM").
- **Debrief Discussion (10 min)**
    - "Which hormone is hardest to regulate with lifestyle? Why?"

Experiential-Learning Learning 7.7: Case-based Unani treatment plans for PCOS and obesity

Duration: 4 Hours

Hour 1 – Clinical Case Analysis and *Mizāj* Profiling

- **Activity:**
    - Each Student/group receives two detailed clinical cases:
        - Case 1: PCOS with menstrual irregularity, acne, insulin resistance.
        - Case 2: Obesity with metabolic syndrome features (T2DM, dyslipidemia).
    - Case files include:
        - History, signs/symptoms, BMI, menstrual history, lab results (LH:FSH ratio, testosterone, insulin, lipids, glucose, HOMA-IR), psychological profile.
- **Tasks:**
    - Analyze biomedical and Unani dimensions.
    - Determine *Mizāj* (temperament), *Su-e-Mizāj*, affected organs, and lifestyle contributors.
    - Discuss corresponding Unani concepts (e.g., *Barūdah*, *Rutoobat*, *Imtila*, *Su-e-Hadm*).

Hour 2 – Designing Unani Treatment Plan (Ilāj bit-Tadbīr, Ghizā, Dawā)

- **Activity:**
    - Each group prepares a personalized treatment plan for both cases.

- Components must include:
    - **Ilāj bit-Tadbīr** (regimen): physical activity, sleep, lifestyle modifications.
    - **Ghizā'i Tadābīr**: dietary principles and modifications based on *Mizāj* and modern evidence.
    - **Dawā** (medication): selection of classical Unani drugs (e.g., *Qust*, *Zanjabeel*, *Sudāb*, *Shibbat*, *Tukhm Kharpaza*), with rationale.
- **Integration Requirement:**
    - Reference at least one modern study or guideline (e.g., Rotterdam criteria, Endocrine Society, evidence on metformin, anti-androgens) to support chosen strategies.

Hour 3 – Group Presentations and Peer Review

- **Activity:**
    - Each group presents:
        - Brief case summary.
        - Unani diagnosis and rationale.
        - Treatment plan (structured into Tadbīr, Ghizā, Dawā).
        - Biomedical justification for Unani choices (e.g., lipid-lowering herbs, insulin-sensitizing actions, hormonal modulation).
- **Peer Review:**
    - Other groups give feedback, raise questions, and suggest enhancements.

Hour 4 – Faculty-Led Integration and Comparative Analysis

- **Activity:**
    - Faculty facilitates discussion on:
        - Patterns in *Mizāj* and pathophysiology of PCOS and obesity.
        - Comparison of Unani treatments with biomedical pharmacotherapy (e.g., metformin, lifestyle changes, OCPs).
        - Exploring synergy between *Taqwiyat-e-Tabi'at* and endocrine restoration.
        - Discuss case extensions: managing infertility, metabolic comorbidities, long-term relapse prevention.

Experiential-Learning Learning 7.8: Endocrine lifestyle correction using Unani approaches

Duration: 2 Hours

Hour 1 – Patient Simulation: Lifestyle Counselling Role-Plays

- Activity:
    - Learners are split into small groups of 2–3.
    - Each group receives a brief patient profile (e.g., young woman with PCOS and poor sleep, middle-aged man with T2DM and sedentary lifestyle, obese adolescent with screen addiction and stress).
- Roles:
    - One student acts as the physician.
    - One as the patient.
    - Others as observers and feedback providers.
- Task for "Physician" Role:
    - Conduct brief lifestyle assessment (diet, activity, sleep, stress).
    - Counsel using Unani concepts.
    - Offer practical advice on:
        - Diet according to *Mizāj*.
        - Exercise type and timing (*Riyāzat*)
        - Regulation of sleep and wake cycles.
        - Stress reduction using Unani principles.
- Observers' Task:
    - Use a checklist to assess clarity, relevance, Unani integration, empathy, and confidence.

Hour 2 – Group Discussion and Reflective Integration

- Activity:
    - Rotate roles within groups for a second round with a new scenario.
    - After two rounds, all groups join for a facilitated discussion.

- **Discussion Prompts:**
    - What Unani lifestyle principles were most applicable in each case?
    - How did students balance scientific rationale and Unani tradition?
    - What challenges were faced in translating Unani advice into real-life recommendations?
    - How can Unani physicians improve patient motivation and adherence?

Experiential-Learning Learning 7.9: Lifestyle intervention protocols

Total Duration: 4 Hours

Hour 1 – Orientation and Protocol Assignment

- **Faculty briefing (20 min):**
    - Overview of key elements in lifestyle intervention protocols (diet, exercise, sleep, stress, behavioral therapy).
    - Introduction to Unani concepts: *Ilāj bit-Tadbīr*, *Asbāb-e-Sittah Zarūriyah*, *Tanqiyah*, *Riyāzat*, and *Ghizā*.
    - Modern guidelines briefly introduced (e.g., ADA, Endocrine Society, NICE guidelines).
- **Group division (40 min):**
    - Learners are divided into small groups (2-3 per group).
    - Each group is assigned:
        - One Unani lifestyle protocol (e.g., for PCOS or diabetes from Unani texts or published papers).
        - One modern lifestyle protocol (clinical guideline or peer-reviewed study).

Hour 2 – Critical Review in Groups

- **Activity:**
    - Each group critically analyzes both protocols along the following parameters:
        - Theoretical foundation and clinical rationale.
        - Evidence base or textual authority.
        - Specific lifestyle components.

- Feasibility and patient acceptability.
- Scope for personalization.
- Alignment with physiological mechanisms.
- Duration, monitoring, and outcomes.

- Use of structured review checklist provided.

Hour 3 – Group Presentations and Peer Feedback

- **Each group presents (10–12 min):**
  - Summary of the two protocols.
  - Strengths and limitations of each.
  - Suggestions for integration or improvement.
  - Highlight one or two case-based applications.
- **Faculty and peer questions and feedback (after each presentation):**
  - Clarity of comparison, critique depth, practical relevance, integration insight.

Hour 4 – Collaborative Protocol Design and Reflection

- **Integrative Task:**
  - Based on their analysis, each group proposes a hybrid "best-practice" lifestyle intervention protocol for their assigned condition.
  - Must incorporate:
    - Core Unani principles tailored to *Mizāj*.
    - Scientifically validated modern lifestyle strategies.
    - Patient-centered goals and realistic application.
- **Reflection Questions (individual submission):**
  - What elements of Unani lifestyle protocols are underutilized in modern practice?
  - How can Unani principles complement biomedical lifestyle recommendations in chronic endocrine conditions?

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. SAQ (5 Marks each)- 03 SAQs: Three SAQs on any topics from cognitive domain of this module shall be given for assessment- Trainers Report (15 Marks): on Case-based discussions on lifestyle-induced endocrine disruptions (e.g., shift work, stress) or any other experiential activity during the semester shall be taken for assessment. Teaching Test (20 Marks): Topic circadian regulation of hormone secretion and its physiological significance should be given to the student 02 days prior to the assessment. The student shall prepare the topic for presentation. The Content, use of media, communication skills shall be taken as assessment. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 8 : نیوروفزیالوجی، تناؤ، اور خاص حسّات Neurophysiology, Stress, and Special Senses

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the integration of nervous and neurohumoral systems in central regulation of body functions.
2. Analyze the physiological basis of stress, adaptation, and neurobehavioral disorders.
3. Describe the functioning and disorders of special senses with reference to both biomedical and Unani models.
4. Discuss higher brain functions, including learning, memory, emotion, and sleep, with psychophysiological correlations.
5. Apply Unani regimens and concepts in interpreting and managing neurophysiological and sensory health issues.

Unit 1 عصبی و نیوروہیومورل نظام کا اِندماج Functional Integration of Nervous & Neurohumoral Systems

8.1.1 عصبی و ہارمونی نظام کا فعالی اندماج

(Functional Integration of Nervous and Hormonal Systems)

8.1.2 جسمانی افعال کا مرکزی ضبط (آٹونومک وانڈوکرائن نظم)

(Central Regulation of Body Functions (Autonomic & Endocrine Interplay)

8.1.3 یونانی تدابیر کی نیوروفزیالوجی: ریاضَت، مساج، نُطول، آرام کے طریقے

(Neurophysiology of Unani Regimens: *Riyazat*, Massage, *Nutool*, Relaxation Techniques)

8.1.4 نیوروانڈوکرائن نظم میں گٹ-برین ایکس کا کردار اور یونانی علاج

(Role of Gut-Brain Axis in Neuroendocrine Regulation and Unani Therapeutics)

References: 19,26,27,28,29,30,31,32,33,34,44

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the integration between the nervous and endocrine systems for homeostasis	1	Lecture	CC	Knows-how	C_L,SDL,L&PPT
CO2,CO3	Demonstrate gut-brain interaction through observation of GI and stress-related symptoms	4	Practical8.1	PSY-SET	Shows-how	Mnt,CBL,DL,C_L,PT
CO1,CO2, CO3,CO4	Demonstrate massage, *Riyazat* and relaxation protocols	4	Experiential-Learning8.1	PSY-SET	Shows-how	RLE,D-BED,CBL
CO1,CO2, CO3	Discuss the physiological effects of *Riyazat*, massage, and Unani regimens on neurohumoral balance	1	Lecture	CC	Knows-how	L&GD,DIS,BS

Unit 2 اظطراب، تکیف، اور امراض Stress, Adaptation, and Disorders

8.2.1 اظطراب کی فزیالوجی: حادہ بمقابلہ دائمی اظطراب

(Stress Physiology: Acute vs Chronic Stress)

8.2.2 تکیف کے میکانیہ جات

(Mechanisms of Adaptation)

8.2.3 اضطراب، اِکتِئاب اور سہر کی نیوروفزیالوجی

(Neurophysiological Basis of Anxiety, Depression & Insomnia)

8.2.4 تکیف کے عوارض کا یونانی طریقہ علاج میں اِندماج

(Integration of Stress Disorders in Unani Therapeutics)

References: 26,27,28,29,32,33,44,189

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Discuss the physiological and neuroendocrine responses to stress	2	Lecture	CC	Knows-how	PAL,Mnt,L&GD
CO2,CO3, CO4	Perform stress assessment techniques (HR, BP, cortisol profile interpretation)	6	Practical8.2	PSY-MEC	Shows-how	DL,CBL,PT,C_L,TUT
CO2,CO3, CO4	Demonstrate clinical acquemen in recognizing psychosomatic disorders	6	Experiential-Learning8.2	PSY-SET	Does	IBL,CBL,RP,SIM,LRI
CO1,CO2, CO3,CO4	Analyze sleep patterns and insomnia-related case studies	3	Practical8.3	CAN	Shows-how	IBL,C_L,PSM,CBL,BS

Unit 3 خصوصی حواس کی فزیالوجی اور حسی امراض Physiology of Special Senses and Sensory Disorders

8.3.1 حِسّی فزیالوجی: بصارت، سماعت، ذائقہ، بُو، لمس

(Sensory Physiology: Vision, Hearing, Taste, Smell, Touch)

8.3.2 حواس خاصہ کے امراض

(Disorders of Special Senses)

8.3.3 یونانی طریقوں سے اِدراکی صلاحیت میں اِضافہ

(Cognitive Enhancement through Unani Techniques)

References: 26,27,28,29,31,32,33,43,189

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the physiology of major sensory modalities and related brain processing	2	Lecture	CC	Knows-how	L&PPT ,TUT
CO2,CO4	Perform sensory testing (visual acuity, audiometry, olfactory/taste discrimination)	4	Practical8.4	PSY-MEC	Shows-how	DL,D,PT
CO2,CO4	Perform sensory therapy sessions using aroma, touch, and visual stimulation	3	Experiential-Learning8.3	PSY-ADT	Does	PT,DIS,CBL,SDL,D
CO2,CO3, CO4	Anlyze the cases of anosmia, presbycusis, and related sensory dysfunctions	3	Experiential-Learning8.4	CAN	Does	C_L,LRI,CD,DIS,CBL
CO2	Describe common disorders of special senses and their physiological basis	2	Lecture	CC	Knows-how	L&PPT ,PBL

Unit 4 اعلیٰ دماغی افعال اور نیند کی فزیالوجی Higher Brain Functions and Sleep Physiology

8.4.1 تعلم، یادداشت، اور جذبات کی تنظیم

(Learning, Memory and Emotional Regulation)

8.4.2 نفسیاتی۔فعلیاتی اندماج: ذہن۔جسم کا تعلق

(Psychophysiological Integration: Mind-Body Axis)

8.4.3 نفسیاتی۔فعلیاتی اندماج: ذہن۔جسم کا تعلق

(Physiology and Significance of Sleep & Dreams)

8.4.4 یونانی تصورات: قُوّتِ حافِظہ، نَوم، اور جذباتی سلامتی

(Unani Concepts of *Quwwat-e-Hafiza*, *Nawm*, and Emotional Well-being)

References: 1,3,7,10,11,15,19,26,27,28,29,32,33,206

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the neurophysiology of learning, memory and emotional circuits	1	Lecture	CC	Knows-how	L&PPT ,SDL,TUT
CO2,CO3, CO4	Measure EEG sleep stages and cognitive assessment charts	3	Practical8.5	PSY-MEC	Shows-how	DL,D,PT,CBL,SIM
CO2,CO4	Demonstrate the use of relaxation-based methods to improve memory performance	4	Experiential-Learning8.5	PSY-MEC	Does	CBL,IBL,BS,C_L,DIS
CO1,CO2, CO3,CO4	Evaluate case reflections on cognitive disorders with Unani application insights	6	Experiential-Learning8.6	CE	Does	DIS,IBL,C_L,D,CBL
CO2	Describe the physiology and stages of sleep and their functional relevance	1	Lecture	CC	Knows-how	C_L,L_VC,TUT,SDL

Practical Training Activity

Practical Training 8.1 Gut-brain interaction

Total Duration: 4 hours

1. Introduction to the Gut-Brain Axis (45 min)

- **Lecture (25 min)**
  - Neuroanatomy: Vagus nerve, ENS, HPA axis
  - Key mechanisms:
    - Stress → gut permeability ("leaky gut")
    - Microbiota → serotonin/GABA production
  - Clinical links: IBS, anxiety, GERD, IBD

- **Case Study Discussion (20 min)**
    - Review a patient with stress-induced IBS symptoms

2. Symptom Tracking & Stress Exposure (1 hour)

Part A: Baseline Assessment (30 min)

- **GI Symptom Diary**
    - Bloating, pain, stool consistency (Bristol scale)
    - Food log (processed vs. fermented foods)
- **Stress Metrics**
    - Perceived Stress Scale (PSS-10)
    - Heart rate variability (HRV) demo (if devices available)

Part B: Acute Stress Simulation (30 min)

- **Cold Pressor Test (Lab Component)**
    - Submerge hand in ice water (1 min) ⟶ measure:
        - Immediate GI discomfort (self-report)
        - Pulse changes (vagal response)
- **Cognitive Stressor (Alternative)**
    - Timed math test ⟶ observe self-reported gut reactions

3. Biomarker Correlation Lab (1 hour 15 min)

Station 1: Microbiota & Stress Markers (30 min)

- Analyze fecal calprotectin (inflammation) + cortisol (salivary) data from:
    - High-stress vs. low-stress patient case studies
- **Task:** Correlate microbial diversity (hypothetical data) with anxiety scores

Station 2: Serotonin & Gut Motility (30 min)

- Compare serum serotonin/5-HIAA levels in:

- Diarrhea-predominant IBS vs. healthy controls
- **Demo:** Stethoscope bowel sound auscultation (stress vs. rest)

Discussion (15 min)

- "Can stress reduction improve IBS more than probiotics?"

4. Intervention Design & Debrief (1 hour)

Group Activity (40 min)

- Design a 4-week gut-brain rehab plan for:
  - **Case 1:** Student with exam stress + bloating
  - **Case 2:** CEO with GERD and insomnia
- **Tools:**
  - Vagus nerve stimulation (breathwork, humming)
  - Psychobiotics (specific strains like *L. rhamnosus*)
  - Fiber modulation (soluble vs. insoluble)

Presentations & Debate (20 min)

- Groups pitch plans + debate:
  - "Which is more impactful: Diet or stress management?"

Adaptation Note: If lab resources are limited, use published datasets for biomarker analysis.

Practical Training 8.2 Stress assessment techniques

Total Duration: 6 hours

1. Introduction to Stress Physiology (1 hour)

Lecture (40 min)

- **Biomarker Overview:**
  - **Acute Stress:** ↑HR, ↑BP, ↑Salivary cortisol

- **Chronic Stress:** Elevated baseline cortisol, ↓HRV, hypertension

- **Clinical Correlations:**
  - Cardiovascular risk, burnout, metabolic syndrome

Case Study (20 min)

- Analyze a patient's stress profile (e.g., shift worker with insomnia + hypertension)

2. Cardiovascular Stress Assessment (2 hours)

Station 1: Heart Rate (HR) & Heart Rate Variability (HRV) (1 hour)

- **Tools:** ECG monitors/Polar HRV sensors
- **Protocols:**
  - **Resting Baseline:** 5-minute seated measurement
  - **Stress Test:** 3-minute mental math challenge ⟶ track recovery
- **Interpretation:**
  - Low HRV = Poor stress resilience (autonomic dysfunction)

Station 2: Blood Pressure (BP) Reactivity (1 hour)

- **Technique:** Manual vs. digital sphygmomanometry
- **Stress Simulation:**
  - Cold pressor test (1-minute ice water immersion) ⟶ BP spikes
- **Clinical Thresholds:**
  - Normal vs. stress-induced hypertension (>140/90 mmHg post-test)

3. Endocrine & Biochemical Profiling (2 hours)

Station 3: Cortisol Dynamics (1 hour)

- **Salivary Cortisol ELISA Demo (30 min)**
  - Collect samples pre/post stressor (simulated lab data if kits unavailable)
  - Diurnal curve analysis (AM peak vs. PM flatline in chronic stress)

- **Case Interpretation (30 min)**
    - Compare cortisol profiles:
        - Healthy vs. Cushing's vs. Adrenal fatigue

Station 4: Inflammatory Markers (1 hour)

- **CRP/IL-6 Correlation (30 min)**
    - Review data linking stress to inflammation (e.g., high CRP in depression)
- **Microbiome-Stress Axis (30 min)**
    - Gut permeability markers (zonulin) in anxiety disorders

4. Integrated Stress Reports (1 hour)

Group Activity (40 min)

- **Task:** Synthesize data from a mock patient:
    - Elevated HR + low HRV + flattened cortisol curve
    - **Diagnose:** Autonomic dysfunction + HPA axis dysregulation
    - **Intervention Plan:** HRV biofeedback + circadian reset

Debate (20 min)

- "Which biomarker is most predictive of long-term stress damage: Cortisol or HRV?"

Adaptations:

- Virtual option: Use apps (e.g., Elite HRV) + pre-recorded lab data

Practical Training 8.3 Sleep patterns and insomnia

Total Duration: 3 hours

1. Introduction to Sleep Physiology in Unani Medicine (30 min)

- *Naum* (sleep) as a *Tabee'i Af'al* (natural function) regulated by *Mizaj-e-Dimāgh* (brain temperament)
- Role of *Bālgham* (phlegm) in hypersomnia vs. *Safarā* (yellow bile) in insomnia

- **Modern Correlates:**
    - Circadian rhythms ↔ *Asbāb-e-Sittah Zarooriya* (six essentials)
    - Sleep stages (NREM/REM) and *Arwāh-e-Haywāniya* (vital spirits)

Poll (10 min):

- "Which *Mizaj* is most prone to insomnia: *Saudāwī* or *Safarawī*?"

2. Sleep Assessment Techniques (1.5 hours)

Station 1: Unani Diagnostics (45 min)

- **Case 1:** *Bālghamī* patient with excessive daytime sleepiness
    - **Assessment:**
        - *Nabz* (pulse): Slow, viscous
        - Tongue: Pale, moist coating
    - **Intervention:**
        - *Tadbeer-e-Muqawwiyat-e-Dimāgh* (brain stimulants: *Qust-e-Shireen*)
        - *Dalk* (massage) with *Roghan-e-Zaitoon* (olive oil)

Station 2: Modern Tools (45 min)

- **Actigraphy Demo:** Analyze sleep-wake cycles from wristband data
- **Sleep Diary Review:** Identify patterns (e.g., caffeine → delayed sleep onset)

3. Insomnia Case Studies (1 hour)

Case 2: *Safarawī* Insomnia (30 min)

- **Symptoms:** Restlessness, vivid dreams, early awakenings
- **Unani Rx:**
    - *Arq-e-Gulab* (rose water) compress
    - *Sharbat-e-Banafsha* (violet syrup) at bedtime

Case 3: *Saudāwī* Sleep Fragmentation (30 min)

- **Symptoms:** Frequent awakenings, nightmares
- **Unani Rx:**
    - *Hijama* (cupping) for *Istifragh-e-Saudā*
    - *Roghan-e-Kaddu* (pumpkin seed oil) nasal instillation

4. Integrative Management Debate (30 min)

Group Activity:

- Debate: "*Dawa* (drugs) vs. *Tadbeer* (lifestyle) for chronic insomnia?"
- **Vote:** Which approach aligns best with *Tibb-e-Unani* principles?

Practical Training 8.4 Sensory testing (visual acuity, audiometry, olfactory/taste discrimination)

Total Duration: 4 hours

1. Introduction to Sensory Testing (30 min)

Lecture (20 min)

- **Neuroanatomy Review:**
    - Visual pathway (optic nerve → occipital lobe)
    - Auditory pathway (cochlea → temporal lobe)
    - Olfactory/gustatory pathways (cranial nerves I, VII, IX, X)
- **Clinical Relevance:**
    - Early detection of MS (optic neuritis), acoustic neuroma, COVID-19 anosmia

Demo (10 min)

- Instructor performs rapid cranial nerve screening (II, VIII, I)

2. Visual Acuity & Field Testing (1 hour)

Station 1: Snellen Chart & Near Vision (30 min)

- **Technique:**

- Standard 6m Snellen chart (simulated at 3m if space-limited)
- Jaeger card for near vision

- **Pathology Correlation:**
  - Myopia vs. presbyopia
  - Optic neuritis (reduced red desaturation)

Station 2: Confrontational Visual Fields (30 min)

- **Method:**
  - Finger counting in quadrants (compare participant vs. examiner)
- **Case Study:**
  - Bitemporal hemianopia (pituitary tumor) vs. homonymous hemianopia (stroke)

3. Audiometry & Hearing Assessment (1 hour)

Station 3: Pure-Tone Audiometry (30 min)

- **Tools:** Portable audiometer or smartphone app (e.g., Mimi Hearing Test)
- **Protocol:**
  - Air conduction thresholds (250Hz–8kHz)
  - Masking techniques (if available)
- **Interpretation:**
  - Conductive (middle ear) vs. sensorineural (cochlear) hearing loss

Station 4: Weber & Rinne Tests (30 min)

- **Tuning Fork Practice (512Hz):**
  - Weber: Lateralization to affected ear (conductive) or good ear (sensorineural)
  - Rinne: AC > BC normal; BC > AC conductive loss

4. Olfactory & Taste Testing (1 hour)

Station 5: Smell Identification (30 min)

- **Scratch-and-Sniff Test (e.g., UPSIT or DIY cloves/coffee/vanilla)**
    - Anosmia vs. hyposmia scoring
    - COVID-19 case correlation

Station 6: Taste Discrimination (30 min)

- **Swab Tests:**
    - Sweet (sucrose), salty (NaCl), sour (citric acid), bitter (quinine)
    - Map tongue regions (debunk "taste zone" myths)
- **Clinical Link:**
    - Zinc deficiency (hypogeusia), Bell's palsy (chorda tympani damage)

5. Integrated Case Studies (30 min)

Group Activity:

- **Case 1:** Diabetic patient with sudden vision loss + peripheral neuropathy
- **Case 2:** Elderly patient with hearing loss + falls (BPPV vs. acoustic neuroma)
- **Task:** Propose next-step tests (e.g., MRI, HbA1c, ENG)

Debrief:

- "Which sensory test is most underutilized in primary care?"

Materials Needed:

- Snellen chart
- Jaeger cards
- Tuning forks (512Hz)
- Portable audiometer/smartphone app
- Smell/taste test kits
- Cotton swabs/taste solutions

Adaptations:

- **Low-resource:** Use whispered voice test (hearing), flashlight visual fields
- **Virtual:** Pre-recorded demos + at-home self-tests (e.g., spice jars for smell)

Practical Training 8.5 EEG sleep stages and cognitive assessment

Total Duration: 3 hours

1. Introduction to EEG & Sleep Physiology (30 min)

Lecture (20 min)

- Waveforms (delta, theta, alpha, beta)
- Sleep stages (N1–N3, REM) and their cognitive significance
- MoCA vs. MMSE: Domains tested (memory, executive function)

Interactive Quiz (10 min):

- Match EEG waveforms to sleep stages using snippet flashcards

2. EEG Sleep Stage Analysis (1.5 hours)

Station 1: Normal Sleep Architecture (45 min)

- **Task:**
  - Label 30-second EEG epochs (W, N1, N2, N3, REM) from healthy adult data
  - Calculate sleep efficiency (% time asleep vs. in bed)

Station 2: Pathological Patterns (45 min)

- **Case 1:** Insomnia (excessive N1, reduced N3)
- **Case 2:** Obstructive Sleep Apnea (EEG arousals + SpO2 dips)
- **Case 3:** REM Behavior Disorder (loss of REM atonia)

3. Cognitive Assessment Integration (1 hour)

Station 3: MoCA/MMSE Chart Review (30 min)

- **Case 4:** Mild Cognitive Impairment (MoCA=24, poor recall)

- Correlate with EEG slowing (theta/delta intrusion)

- **Case 5:** Depression (pseudodementia; MMSE=26 but diffuse theta)

Station 4: Intervention Planning (30 min)

- **Group Task:**
  - For a patient with sleep-deprived EEG + MoCA=22:
    - Recommend CBT-I vs. stimulants vs. CPAP

4. Debrief & Clinical Pearls (30 min)

Mystery Case Challenge (20 min):

- Unlabeled EEG + cognitive scores → Teams diagnose (e.g., narcolepsy vs. Alzheimer's)

Key Takeaways (10 min):

- "EEG cannot diagnose dementia alone—but theta waves + poor MoCA attention = red flag"

Adaptations:

- **Virtual:** Use digital EEG viewers (e.g., Persyst)

Experiential Learning Activity

Experiential-Learning Learning 8.1: Massage, *Riyazat* and relaxation protocols

Total Duration: 4 hours

1. Introduction to Mind-Body Therapies (45 min)

- **Lecture & Discussion (30 min)**
  - Massage: Parasympathetic activation, cortisol reduction
  - *Riyazat*: Posture, breathwork, gentle mobility
  - Relaxation Protocols: Progressive muscle relaxation (PMR), autogenic training
  - Chronic pain, anxiety, insomnia, musculoskeletal rehab
- **Live Demo (15 min)**

- Instructor performs a 5-minute seated neck/shoulder massage + 3-minute PMR (Progressive Muscle Relaxation)

2. Massage Techniques (1 hour 15 min)

Station 1: Swedish Massage Basics (30 min)

- **Key Skills:** Effleurage (gliding), petrissage (kneading), tapotement (tapping)
- **Practice:** Partnered sessions on hands/back (sanitized oils provided)
- **Focus:** Pressure gradients for stress (lighter strokes) vs. muscle tension (deeper work)

Station 2: Acupressure for Stress Relief (30 min)

- **Target Points:** LI4 (hand), GV24.5 (third eye), PC6 (wrist)
- **Task:** Partner pairs locate points + apply 30-second holds

Debrief (15 min)

- "Which technique felt most effective? Why?"

3. *Riyazat*, *Dalak* & Therapeutic Movement (1 hour)

Guided Session (45 min)

- **Breath-Synchronized Motion (15 min):**
  - Slow squats + inhale/exhale cues
  - Spinal twists for Vagus nerve stimulation
- **Postural Alignment Drills (30 min):**
  - Wall slides for scapular stability
  - Cervical retractions to relieve tech neck

Discussion (15 min)

- "How might *Riyazat* differ from yoga/Pilates in clinical settings?"

4. Relaxation Protocols & Integration (1 hour)

Group 1: Progressive Muscle Relaxation (30 min)

- **Script-Guided Practice:** Tense/release from toes to scalp

- **Variation:** Breath-holding + release (enhances parasympathetic response)

Group 2: Autogenic Training (30 min)

- **Phrases:** "My arms are heavy and warm" (self-hypnosis technique)
- **Biofeedback Option:** HRV monitors to measure real-time relaxation

Closing Circle (15 min)

- Participants share: "One technique I'll use daily is _____ because _____."

Note: Adjust for virtual participation with self-massage/chair exercises if needed.

Experiential-Learning Learning 8.2: Psychosomatic disorders

Total Duration: 6 hours

1. Introduction to Psychosomatic Medicine (1 hour)

Lecture & Discussion (45 min)

- Mind-body interactions (HPA axis, vagal tone, neuroinflammation)
- DSM-5/ICD-11 criteria for somatic symptom disorder, conversion disorder
- Prevalence in primary care (e.g., 20% of visits lack organic cause)
- Cultural variations in symptom presentation

Activity (15 min)

- "Share a personal observation of stress manifesting physically (e.g., tension headaches)"

2. Clinical Case Observations (2 hours)

Station 1: Conversion Disorder (1 hour)

- **Video Case:** Patient with unexplained paralysis + normal MRI
- **Group Tasks:**
  - Identify "positive signs" (e.g., Hoover's sign)
  - Role-play breaking the diagnosis empathetically

Station 2: Somatic Symptom Disorder (1 hour)

- **Simulated Patient Encounter:**
    - Chronic abdominal pain with excessive health anxiety
    - **Skills Practiced:**
        - Red flag screening (organic vs. functional)
        - CBT techniques for catastrophic thinking

3. Multidisciplinary Perspectives (1.5 hours)

Panel Discussion (45 min)

- **Roles:**
    - Neurologist (rule out MS, epilepsy)
    - Psychiatrist (SSRI/talk therapy options)
    - Physical Therapist (graded motor imagery)
- **Debate:** "Is 'psychosomatic' a stigmatizing label?"

Biofeedback Demo (45 min)

- **HRV Training:** Show real-time stress → muscle tension feedback
- **Application:** Teach diaphragmatic breathing for IBS patients

4. Group Case Formulation (1 hour)

Complex Case Challenge (40 min)

- **Patient Profile:**
    - 35F with fibromyalgia, panic attacks, and multiple ER visits
- **Teams Compete** to design the best biopsychosocial plan

Reflection Circle (20 min)

- "What was most surprising about today's cases?"

5. Ethical & Cultural Considerations (30 min)

- **Small Groups:**
    - Discuss: "How would you approach a patient who rejects a psychosomatic diagnosis?"
- **Role-Play:**
    - Negotiating treatment with a traditional healer-involved family

Adaptations:

- Virtual option: Use Zoom breakout rooms for role-play
- Video case libraries (e.g., NEJM Clinical Videos)

Experiential-Learning Learning 8.3: Sensory therapy

Total Duration: 3 hours

1. Introduction to Sensory Therapy (30 min)

Lecture & Discussion (20 min)

- How smell (limbic system), touch (somatosensory cortex), and vision (occipital lobe) influence mood and cognition
- Aromatherapy for anxiety (lavender ⟶ GABA modulation)
- Tactile therapy for autism (deep pressure)
- Visual stimulation for PTSD (EMDR therapy)

Demo (10 min)

- Instructor guides a 1-minute **"sensory reset"** (deep breath + hand massage + calming visual)

2. Aromatherapy & Olfactory Training (1 hour)

Station 1: Essential Oil Blending (30 min)

- **Protocol:**
    - Participants mix oils for specific goals:
        - **Calming:** Lavender + bergamot
        - **Focus:** Peppermint + rosemary

- Discuss carrier oils (e.g., coconut vs. jojoba)

- **Science Spotlight:**
  - How inhaled molecules bind olfactory receptors ⟶ amygdala modulation

Station 2: Olfactory Rehabilitation (30 min)

- **Post-COVID Anosmia Training:**
  - Smell kits (rose, lemon, clove, eucalyptus)
  - "Sniff-retest" exercise to track recovery

3. Tactile & Somatosensory Therapy (1 hour)

Station 3: Therapeutic Touch Techniques (30 min)

- **Hands-On Practice:**
  - **Dalak/Swedish massage strokes** (effleurage, petrissage)
  - **Weighted blanket demo** (deep pressure for anxiety)
- **Clinical Correlation:**
  - Reduced cortisol levels post-massage

Station 4: Texture Discrimination (30 min)

- **Blindfolded Activity:**
  - Identify objects by touch (sandpaper, velvet, foam)
  - Relate to sensory processing disorders (e.g., ADHD hypersensitivity)

4. Visual Stimulation & Biofeedback (1 hour)

Station 5: Guided Imagery & Light Therapy (30 min)

- **Techniques:**
  - **Binaural beats + nature visuals** (entrainment for relaxation)
  - **Red light therapy demo** (circadian rhythm adjustment)
- **Case Discussion:**

- Seasonal Affective Disorder (SAD) treatment

Station 6: EMDR Simulation (30 min)

- **Simplified Exercise:**
  - Participants follow a moving light (left-right) while recalling a neutral memory
  - Discuss PTSD applications

5. Integration & Personal Plans (30 min)

Group Reflection (15 min)

- "Which sensory modality impacted you most? Why?"

DIY Sensory Toolkit (15 min)

- Participants create a **personalized sensory prescription** (e.g., "When stressed: 3 lavender sniffs + 5-min hand massage")

Experiential-Learning Learning 8.4: Sensory dysfunctions

Total Duration: 3 hours

1. Introduction to Sensory Dysfunction (30 min)

Lecture & Discussion (20 min)

- Olfactory pathway (CN I ⟶ limbic system)
- Auditory aging (cochlear hair cell degeneration)
- Anosmia: 20% of COVID-19 cases, Parkinson's early marker
- Presbycusis: 1 in 3 adults >65 years

Interactive Poll (10 min):

- "Which sensory loss would impact your life most? Smell, hearing, or taste?"

2. Anosmia Case Stations (1 hour)

Station 1: Diagnostic Challenges (30 min)

- **Case 1:** Post-COVID anosmia

- Tasks:
    - Perform “scratch-and-sniff” test (e.g., cloves, coffee)
    - Differentiate conductive (nasal polyps) vs. neural (viral damage) causes
- **Case 2:** Neurodegenerative anosmia (Alzheimer’s risk)
    - Discuss: UPSIT (University of Pennsylvania Smell ID Test)

Station 2: Olfactory Rehab (30 min)

- **Hands-On Training:**
    - Smell retraining kits (lemon, rose, eucalyptus, clove)
    - Design a 12-week rehab plan for a chef with anosmia

3. Presbycusis & Hearing Loss (1 hour)

Station 3: Audiogram Interpretation (30 min)

- **Case 3:** Age-related hearing loss
    - Analyze pure-tone audiograms:
        - High-frequency dip (classic presbycusis)
        - Compare to noise-induced loss (e.g., construction worker)
- **Tool Demo:** Smartphone audiometry apps

Station 4: Communication Strategies (30 min)

- **Simulation:**
    - Wear earplugs + attempt conversation in noise
    - Practice “hearing loss etiquette” (face speaker, reduce background noise)

4. Multisensory Integration (30 min)

Group Activity: The Forgotten Senses (30 min)

- **Case 4:** Diabetic patient with peripheral neuropathy + taste loss
    - Link: Hyperglycemia ⟶ glossopharyngeal nerve damage

- Role-play counselling on oral hygiene/flavour enhancement

5. Management Debate & Reflection (30 min)

Ethical Dilemma (15 min):

- "Should anosmia screening be mandatory for drivers?"

Takeaway Plans (15 min):

- Each participant shares **one clinical pearl** (e.g., "Always test smell in Parkinson's referrals")

Experiential-Learning Learning 8.5: Relaxation-based memory improvement techniques

Total Duration: 4 hours

1. Theoretical Foundations (45 min)

Unani Medicine Lecture (30 min)

- **Neurohumoral Theory:**
  - Link between *Safarā'* (yellow bile) → mental agitation vs. *Balgham* (phlegm) → cognitive sluggishness
  - Role of *Qūwā-e-Hāfiza* (retentive faculty) and brain cooling therapies
- **Modern Correlates:**
  - Stress-induced cortisol → hippocampal atrophy
  - Relaxation → increased BDNF (brain-derived neurotrophic factor)

Discussion (15 min):

- "How might *Mizaj-e-Dimāgh* (brain temperament) influence memory styles?"

2. Relaxation Techniques (2 hours)

Station 1: Unani-Inspired Breathing (30 min)

- **Technique:**
  - Slow diaphragmatic breathing with *Unani herbal* aromatherapy
- **Science Link:**

- CO_2 reduction ⟶ cerebral vasodilation ⟶ improved focus

Station 2: Roghan Massage + *Hijamah* (45 min)

- **Protocol:**
  - *Roghan-e-Bādām* (almond oil) scalp massage + dry cups on specific points
  - Correlate to Unani *Tadbeer* (regimenal therapy) for *Istirkhā-e-Dimāgh*

3. Memory Consolidation Drills (1 hour)

Group Activity: Image Retention (30 min)

- **Task:**
  - Study intricate *Unani pharmacopeia* illustrations for 5 mins ⟶ post-relaxation recall
  - Compare retention after massage vs. breathing techniques

4. Integration & Clinical Applications (45 min)

Case Study:

- **Patient with *Nisyān* (forgetfulness) + *Saudā* dominance:**
  - Prescribe *Tadbeer*

Takeaway Plans:

- Each student designs a *Mufradāt*-based relaxation protocol for exam stress.

Experiential-Learning Learning 8.6: Cognitive disorders with Unani application

Total Duration: 6 hours

1. Foundations of Cognitive Health in Unani Medicine (1 hour)

Lecture (40 min)

- Role of *Aql* (intellect) and *Qūwā-e-Hāfiza* (memory faculty) as per *Ibn Sina*
- *Mizaj-e-Dimāgh* (brain temperament) imbalances:
  - *Saudā*-dominance (cold/dry ⟶ neurodegeneration)

        - *Safarā'* excess (heat ⟶ agitation, delirium)
    - Amyloid plaques (linked to *Saudavi Rutubat* depletion)
    - Neuroinflammation (*Harārat-e-Ghareeba* theory)

Discussion (20 min):

- "How does *Asbāb-e-Sittah Zarooriya* (six essentials) prevent *Nisyān*?"

2. Case-Based Learning (3 hours)

Station 1: Age-Related *Nisyān* (1 hour)

- **Case 1:** 70-year-old with progressive forgetfulness (*Saudā'* dominance)
    - **Unani Assessment:**
        - Pulse (*Nabz*) analysis: *Saudavi* irregularity
        - Tongue: Dry, blackish coating
    - **Intervention:**
        - *Roghan-e-Bādām* (almond oil) nasal instillation
        - *Majoon Ushba* (cognitive tonic) + *Tadbeer-e-Rutubat* (humidity therapy)

Station 2: *Safaravi* Cognitive Agitation (1 hour)

- **Case 2:** 50-year-old with anxiety-induced memory lapses
    - **Unani Assessment:**
        - *Nabz:* Rapid, wiry (*Safaravi*)
        - Eyes: Yellowish tinge (*Safarā'* imbalance)
    - **Intervention:**
        - *Arq-e-Gulab* (rose water) compress for *Taskeen* (calming)
        - *Sharbat-e-Banafsha* (violet syrup) to cool *Harārat*

3. Integrative Diagnostics (1 hour)

Activity 1: Modern vs. Unani Biomarkers (30 min)

Activity 2: Diet (*Ghiza*) Prescription (30 min)

- **Task:** Design a *Mizaj*-specific meal plan:

4. Therapy Demonstrations (1 hour)

Demo: *Ilaj-bit-Tadbeer* (30 min)

- *Aabzan* (foot bath) with *Khashkhash* (poppy seeds) for *Aram-e-Aasab* (nerve relaxation)
- *Dalk* (massage) with *Roghan-e-Zaitoon* (olive oil)

5. Group Reflection & Protocol Design (1 hour)

Case Challenge (40 min):

- **Complex Case:** Post-stroke cognitive decline
  - Teams propose *Unani* + modern rehab (e.g., *Hijama* + speech therapy)

Closing *Mushāwara* (20 min):

- "Can *Tibb-e-Unani* delay Alzheimer's progression? Share *Tajribāt* (clinical experiences)."

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Quiz (10 Marks): Integration between the nervous and endocrine systems for homeostasis. Self-assessment (15 marks): From the start of the module the student will prepare a self-assessment record of the skills learned on the following topics. The candidates may grade their skills on the scale of 0 to 10. - Demonstrate massage, *Riyazat* and relaxation protocols - State Sleep patterns and insomnia-related case studies - Perform sensory therapy sessions using aroma, touch, and visual stimulation	4

- Conduct relaxation-based memory improvement techniques OSCE (25 Marks): Clinical acumen in recognizing psychosomatic disorders. or OSPE (25 Marks): Perform sensory testing (visual acuity, audiometry, olfactory/taste discrimination). Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Paper No : 2(حیاتی کیمیا،جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics)

Semester No : 3

Module 9 : حیاتیاتی سالمات Biomolecules

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the structure, types, and functions of carbohydrates, proteins, lipids.
2. Describe the role of enzymes in biochemical reactions.
3. Discuss the metabolic pathways of biomolecules.
4. Analyze the clinical significance of biomolecules in normal and diseased states.

Unit 1 حیاتی کیمیائی ساختوں کے عمومی اصول General principles of biochemical structures

9.1.1 حیاتیاتی ساخت اور افعال کی بنیاد کے طور پر میکرومالیکیولر تنظیم

Macromolecular organization as the basis of biological structure and function

9.1.2 سٹیریو آئسومیرزم کا تصور

Concept of stereoisomerism

9.1.3 حیاتی سالمات (کاربوہائیڈریٹ، لیپڈز، پروٹینز، نیوکلک ایسڈز) کی ساخت اور افعال

Structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids)

9.1.4 توانائی کے میٹابولزم اور خلیائی عمل میں حیاتی سالمات کا کردار

Role of biomolecules in energy metabolism and cellular processes

9.1.5 حیاتی سالمات اور یونانی اصولوں کے درمیان تعلق

Relationship between biomolecules and Unani principles

References: 15,18,19,20,22,23,25,26,27,28,29,32,33,35,36,51,52,53,54,55,56,57,66,67,68,69,70,71,72,73

3A	3B	3C	3D	3E	3F	3G

CO3	Analyze the hierarchical organization of macromolecules and discuss how this organization underpins biological structure and function in various cellular contexts	1	Lecture	CAN	Knows-how	TUT,L&PPT ,PER
CO3	Evaluate the significance of stereoisomerism in biomolecular interactions and enzymatic reactions, illustrating how different isomers can lead to diverse biological outcomes.	1	Lecture	CAN	Knows-how	L&PPT ,TUT,BL
CO3	Investigate the role of biomolecules in energy metabolism.	1	Lecture	CAN	Knows-how	SDL,L&GD
CO1,CO3, CO4	Discuss the connections between biomolecular structures and functions and the principles of Unani medicine	5	Experiential-Learning9.1	PSY-SET	Does	BS,PT,C_L,DIS

Unit 2 پروٹینز Proteins

9.2.1 فعلیاتی اقسام: ساختانی پروٹینز، انزائمز، ٹرانسپورٹرز، ریگولیٹری پروٹینز

Functional types: Structural proteins, enzymes, transporters, regulatory proteins

9.2.2 پروٹین کی ساخت اور ترکیب

Protein composition and strucure

9.2.3 پروٹین کے تنوع کی ساختانی بنیاد

Structural basis of protein diversity

References: 26,35,36,51,53,55,56

3A	3B	3C	3D	3E	3F	3G
CO3	Describe the main functional types of proteins (structural proteins, enzymes, transporters, regulatory proteins) and explain their roles in biological systems, including examples of each type	2	Lecture	CC	Knows-how	SDL,L&GD,TUT

	Describe the structure of amino acids and explore how they engage in protein building					
CO2,CO3, CO4	Perform experiments to investigate the protein presence in a food stuff	1	Practical9.1	PSY-MEC	Shows-how	D,PT
CO3	Measure protein levels using biuret test in various foodstuffs	5	Experiential-Learning9.2	PSY-MEC	Shows-how	PT,TBL,SDL,DIS

Unit 3 لیپڈز Lipids

9.3.1 جسم میں لیپڈز کی اقسام

Types of lipids in body

9.3.2 جسم میں لیپڈز کے کردار

Roles of lipids in the body

9.3.3 لیپڈز کی ساخت اور افعال

Structure and functions of lipids

References: 26,33,35,36,51,52,53,54,56,57

3A	3B	3C	3D	3E	3F	3G
CO3	Identify different types of lipids present in the human body (e.g., triglycerides, phospholipids, sterols) Discuss the key roles of lipids in the body, including energy storage, cell membrane structure, and hormone production Describe the structure of lipids and how their structure relates to their functions in biological systems	3	Lecture	CC	Knows-how	TUT,L&PPT ,SDL

CO3	Perform the analysis of the importance of lipids in processes like insulation, protection, and signaling within the body	6	Practical9.2	PSY-MEC	Shows-how	DL,PT,D-M,D

Unit 4 کاربوہائیڈریٹس Carbohydrates

کاربوہائیڈریٹس کی ساخت اور اقسام 9.4.1

Strucure and types of carbohydrates

جسم میں کاربوہائیڈریٹس کا کردار .4.2

Role of carbohydrates in body

References: 26,27,33,35,36,53,55,56,57

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze the structural diversity of carbohydrates by differentiating between mono-, di-, and polysaccharides; explaining the formation of glycosidic bonds (1,4 and 1,6); describing pyranose and furanose ring structures; and evaluating the role of lectins and the conformational relevance of chair and boat forms in carbohydrate function.	1	Lecture	CAN	Knows-how	PER,SDL,DIS,FC,L&PPT
CO3	Describe the diverse roles of carbohydrates in the body, including their structural functions in proteoglycans (e.g., hyaluronic acid, chondroitin sulfate) within the extracellular matrix, their energy storage and metabolic pathways (glycogen, starch, cellulose), their role as biosynthetic precursors for amino acids, fatty acids, and nucleotides, and their involvement in conjugates such as glycoproteins and glycolipids, which are crucial for cell adhesion, signaling, and blood group determination (e.g., Bombay phenotype).	1	Lecture	CC	Knows-how	L&PPT ,PER,TUT

CO3	Demonstrate by experiments the inability of humans to digest cellulose	5	Practical9.3	PSY-SET	Shows-how	D,PT,DL
CO3	Measure enzyme-substrate interactions and specificity	8	Experiential-Learning9.3	PSY-MEC	Does	PT,DIS,C_L,SDL
CO3	Investigate reversible and irreversible denaturation of proteins	8	Practical9.4	CAN	Shows-how	D,DL,PT
CO3	Demonstrate by experiments the Protein Precipitation and Coagulation Mechanisms in Biological Fluids	8	Experiential-Learning9.4	PSY-SET	Does	PT,SDL,C_L

Practical Training Activity

Practical Training 9.1 Investigation of protein presence in a food stuff

Total Duration: 1 Hour

Conduct a biuret test by adding a few drops of biuret reagent to a food sample solution. A color change to violet indicates the presence of proteins. Compare results with known protein-rich and protein-free samples for accuracy.

Practical Training 9.2 Importance of lipids

Total Duration: 6 Hours

1. Introduction & Orientation by facilitator (30 minutes)

- Brief overview of lipid types and functions.
- Relevance in Unani medicine (e.g., role of fats in maintaining mizaj and preservation of ruh).
- Safety and ethical guidelines.

2. Part A: Lipids in Insulation (1.5 hours)

Activity: Comparative temperature retention

- **Objective:** Demonstrate that fat retains heat better than water.
- **Materials:**
    - 2 beakers/bottles: one filled with fat (e.g., lard), one with water
    - Thermometers
    - Hot water bath (to heat contents to equal temp)
    - Stopwatch

Procedure:

- Heat both materials to the same temperature.
- Remove and monitor temperature drop at intervals over 30–60 minutes.
- Record and compare cooling curves.

Expected Outcome: Fat loses heat more slowly, demonstrating its insulating property.

3. Part B: Lipids in Cell Signalling (1.5 hours)

Activity: Interactive simulation and model building

Procedure:

- Use simulations (e.g., on GPCR pathways, phosphoinositides) to observe how lipid-derived messengers work.
- Create group-based pathway models and explain key interactions.

Discussion: Link signaling to physiological processes like inflammation, immunity, and Unani perspectives on cellular harmony.

4. Part C: Lipids in Protection (1.5 hours)

Activity: Anatomical model/dissection examination

- **Objective:** Visualize how fat cushions and protects organs.
- **Materials:**
    - Preserved organ specimens or 3D anatomical models
    - Dissection samples (e.g., kidney, heart with visible adipose layers)

Procedure:

- Identify fat pads and their positioning.
- Discuss biomechanical role of adipose tissue.
- Correlate findings with classical Unani texts on organ preservation and protection.

5. Group Presentation (1 hour)

Each group presents:

- Summary of findings from all three parts.
- Correlation with Unani concepts of insulation (hararat), protection (difaa), and signaling (tadbeer-e-badan).
- Instructor-led wrap-up discussion and feedback.

Practical Training 9.3 Inability of Humans to digest cellulose

Total Duration: 5 Hours

1. Introduction & Conceptual Briefing by Instructor (30 minutes)

- Overview of polysaccharides: cellulose vs. starch
- Human digestive enzymes (amylase) and their specificity
- Relevance of dietary fiber in Unani medicine (role in cleansing the intestines, moderation of digestion)

2. Experiment A: Enzymatic Breakdown Test (2 hours)

Objective: Compare enzymatic digestion of starch and cellulose

Materials:

- Solutions: starch, powdered cellulose
- Salivary amylase (or saliva), buffer solution (pH ~7)
- Test tubes, iodine solution, Benedict's reagent
- Water bath (37^{o}C)

Procedure:

1. Prepare test tubes with:
    - Tube A: starch + amylase
    - Tube B: cellulose + amylase
    - Tube C: starch + water (control)
    - Tube D: cellulose + water (control)
2. Incubate at 37°C for 30–45 minutes.
3. Test for breakdown products:
    - Use **iodine test** for starch presence.
    - Use **Benedict's test** for reducing sugars.

Expected Results:

- Tube A shows starch digestion (iodine test negative, Benedict's positive).
- Tube B shows no digestion of cellulose (iodine remains unchanged, no reducing sugars).

3. Experiment B: Microscopic Analysis of Digestion (Optional/Extension) (1.5 hour)

Objective: Visualize structural differences and resistance to enzymatic breakdown

Materials:

- Microscope
- Slides of cellulose fibres before and after enzymatic exposure
- Staining dyes (e.g., Congo red or iodine)

Procedure:

- Observe fibre structure integrity before and after enzyme treatment.

Observation:

- Starch shows granule degradation; cellulose structure remains intact.

4. Discussion & Application in Unani Context (30 minutes)

- Why humans benefit from cellulose despite not digesting it

- Discussion on how traditional Unani formulations utilize fibre-rich ingredients

5. Group Reflection & Summary Presentations (30 minutes)

Each group presents:

- Key findings from both experiments
- Scientific explanation of enzyme-substrate specificity
- Integration with Unani dietotherapy principles

Practical Training 9.4 Reversible and irreversible denaturation of proteins

Total hours: 8 hrs

1. Introduction Session (1 hour)

- Overview of protein structure and the nature of denaturation.
- Differentiation between reversible and irreversible denaturation.
- Role of temperature, chemical agents (e.g., urea, SDS).
- Significance in physiology and Unani perspectives (e.g., effects of *Hararat* on proteins and body humor balance).

2. Preparation of Albumin Solutions (0.5 hours)

- Extract egg albumin and prepare a **1% solution** in phosphate buffer (pH 7.4).
- Aliquot into different test tubes for controlled treatments.

3. Part A: Reversible Denaturation by Heat (2 hours)

Objective: Observe reversible changes in protein structure by controlled heating.

Procedure:

- Heat albumin samples at **60°C, 65°C, 70°C, 75°C, and 80°C** for **10 minutes**.
- Cool samples immediately in an ice bath.
- Measure **UV absorbance at 280 nm** before and after heating.

Expected Results:

- Slight increase or decrease in absorbance at moderate temperatures.
- Changes may reverse upon cooling up to ~70°C; above this, denaturation becomes irreversible.

4. Part B: Irreversible Denaturation Using Chemicals (2 hours)

Objective: Observe permanent structural changes using chemical denaturants.

Procedure:

- Treat albumin samples with:
  - **6 M and 8 M urea**
  - **6 M and 8 M SDS**
- Incubate for **30–60 minutes at room temperature**.
- Measure **UV absorbance at 280 nm** post-treatment.

Expected Results:

- Significant and irreversible changes in absorbance due to complete unfolding and aggregation.

5. Data Analysis & Interpretation (1.5 hours)

- Compare pre- and post-treatment absorbance values.
- Plot graphs: Temperature vs. Absorbance, Urea/SDS concentration vs. Absorbance.
- Discuss molecular basis of reversible vs. irreversible denaturation.

6. Group Presentations & Discussion (1 hour)

- Each group summarizes their experiment, data, graphs, and interpretations.
- Open discussion on practical relevance (e.g., fever-related protein changes).
- Instructor-led integration of modern biochemistry with Unani doctrine.

Experiential Learning Activity

Experiential-Learning Learning 9.1: Connecting Biomolecules and Unani Medicine

Total Duration: 5 hours

1. **Introduction (30 Minutes)**
    - Begin with a brief lecture on biomolecular structures and functions, emphasizing how they relate to health.
    - Introduce the concept of *mizaj* in Unani medicine, discussing how balance among the body's elements (e.g., hot, cold, moist, dry) is vital for health.
2. **Group Discussion (45 Minutes)**
    - Divide participants into small groups. Each group discusses the roles of selected foods and herbs in Unani medicine.
    - Ask them to consider how these substances might correspond to specific biomolecules and their functions in the body (e.g., how ginger's anti-inflammatory properties relate to its molecular components).
3. **Hands-On Exploration (2.5 Hours)**
    - **Microscopy and Analysis:**
        - Have participants observe the structural characteristics of herbs and foods at the cellular level.
        - Alternatively, provide detailed images of biomolecules and ask participants to match these structures with the corresponding foods or herbs based on their properties.
    - **Biochemical Testing**
        - Conduct simple tests to analyze the presence of certain biomolecules (like sugars in honey or starches in fruits). Discuss findings in the context of both biochemical and Unani perspectives.
4. **Synthesis Activity (45 Minutes)**
    - Each group prepares a brief presentation (5-10 minutes) connecting their findings about a specific food/herb to both its biochemical role and its significance in Unani medicine.
    - Encourage them to consider questions like:
        - How does this food/herb promote balance (*mizaj*)?
        - What biochemical pathways does it influence?
        - How can this understanding inform dietary recommendations?

5. **Reflection (30 Minutes)**

Conclude with a reflective discussion. Ask participants to write in their journals about what they learned and how the integration of these two fields can enhance health practices

Experiential-Learning Learning 9.2: Protein levels estimation in various foodstuffs

Total Duration: 5 Hours

1. Introduction & Briefing (30 minutes)

- Overview of proteins and their relevance in Unani dietetics.
- Explanation of the Biuret test principle.
- Safety instructions and laboratory protocols.

2. Group Formation & Hypothesis Setting (30 minutes)

- Divide students into 4–5 small groups.
- Each group selects 3–4 common food samples (e.g., milk, egg white, pulses, almonds, yogurt).
- Set hypotheses: Which samples will have higher/lower protein content?

3. Laboratory Experiment (2.5 hours)

- **Sample Preparation:** Homogenization and dilution of food samples.
- **Biuret Test Execution:**
    - Add Biuret reagent to each sample.
    - Observe and record colour change.
- **Quantitative Estimation (Optional):**
    - Use a colorimeter (if available) to quantify protein concentration.

4. Data Analysis & Interpretation (1 hour)

- Compare colour intensity across samples.
- Discuss consistency with the initial hypothesis.

- Relate findings to traditional Unani dietary principles.

5. Group Presentations & Discussion (30 minutes)

- Each group presents:
    - Hypothesis
    - Procedure
    - Observations
    - Interpretation

Experiential-Learning Learning 9.3: Enzyme Specificity

Total Duration: 8 Hours

1. Introduction & Conceptual Briefing by facilitator(1 hour)

- Overview of enzymes, substrates, active sites, and specificity.
- Differences between **starch** (α-glycosidic bonds) and **cellulose** (β-glycosidic bonds).
- Relevance of enzymatic digestion in human physiology and Unani concepts of digestion (**Hazm**).

2. Experiment Setup: Enzyme-Substrate Assay by students (2 hours)

Objective: Assess substrate specificity of **amylase** and **cellulase** using starch and cellulose.

Materials:

- Substrates: starch, cellulose, pectin (optional)
- Enzymes: salivary amylase, commercial cellulase
- Buffer solutions (pH ~7)
- Incubation setup (37^{o}C water bath)
- Test tubes, pipettes

Procedure:

- Prepare reaction mixtures:

- Tube A: starch + amylase
- Tube B: starch + cellulase
- Tube C: cellulose + amylase
- Tube D: cellulose + cellulase
- Controls: Substrate + buffer (no enzyme)

- Incubate at 37°C for 1 hour.

3. Glucose Quantification Using Spectroscopy (2.5 hours)

Objective: Measure glucose released as a result of enzymatic digestion.

Method:

- Use **glucose oxidase-peroxidase assay (GOD-POD)** or **DNS (3,5-dinitrosalicylic acid)** method for quantification.
- Analyze absorbance using a **spectrophotometer** at appropriate wavelength (e.g., 540 nm for DNS).
- Generate a **glucose standard curve** for reference.

4. Data Analysis & Interpretation (1.5 hours)

- Record absorbance readings and convert to glucose concentrations.
- Compare enzyme-substrate activity:
  - Amylase: High activity with starch, none with cellulose
  - Cellulase: High activity with cellulose, none with starch
- Discuss implications for substrate specificity.
- Relate results to traditional Unani understanding of digestive faculties (*Quwā Hazima*).

5. Group Presentations & Integration (1 hour)

Each group presents:

- Experimental design and setup
- Glucose quantification data
- Graphical representation of enzyme activity

- Interpretation and relevance to Unani digestion theories

Materials Required:

- Starch, cellulose, pectin (optional)
- Amylase (saliva) and cellulase
- DNS or GOD-POD assay reagents
- Spectrophotometer
- Glassware, pipettes, buffer solutions
- Glucose standards

Experiential-Learning Learning 9.4: Protein Precipitation and Coagulation Mechanisms in Biological Fluids

Total Duration: 8 Hours

1. Introductory Session: Theoretical Framework (1 Hour)

- Overview of protein structure, solubility, and coagulation.
- Concepts of protein precipitation: salting out, alcohol denaturation, acid/base coagulation.
- Clinical significance: proteinuria, fever-related coagulation, dietary effects.

2. Part A: Protein Precipitation by Salts (2 Hours)

Objective: Examine how increasing ionic concentration causes protein precipitation.

Materials:

- Egg albumin solution (1%)
- Ammonium sulfate (various concentrations: 20%, 40%, 60%, 80%)
- Test tubes, pipettes, centrifuge

Procedure:

- Add different concentrations of ammonium sulfate to equal volumes of albumin.
- Incubate and centrifuge.

- Observe turbidity/precipitation visually and measure absorbance at 280 nm (optional).

Expected Outcome:

- Progressive precipitation with increasing salt concentration ("salting out").

3. Part B: Coagulation by Alcohol and Acids (2 Hours)

Objective: Observe protein coagulation due to organic solvents and pH changes.

Materials:

- Ethanol, acetic acid, hydrochloric acid
- Albumin solution
- pH meter/strips

Procedure:

- Add ethanol dropwise to albumin and observe coagulation.
- Adjust pH with acetic/HCl to reach isoelectric point and observe precipitation.
- Record pH and degree of coagulation.

Expected Outcome:

- Rapid coagulation in ethanol; max precipitation near isoelectric pH (~4.6 for albumin).

4. Part C: Heat-Induced Coagulation in Biological Fluids (Plasma/Serum) (2 Hours)

Objective: Compare protein coagulation in egg albumin vs. serum/plasma.

Materials:

- Human or animal plasma/serum
- Water bath (60–100^{o}C), tubes, timer
- Albumin solution (as control)

Procedure:

- Heat samples gradually and observe coagulation temperature/time.
- Note physical changes and compare sensitivity of different fluids.

Expected Outcome:

- Coagulation occurs at different temperatures depending on protein composition.

5. Group Analysis, Reflection, and Presentation (1 Hour)

Tasks:

- Tabulate observations for all experiments.
- Discuss and compare results.
- Reflect on factors affecting coagulation and precipitation.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. LAQ (10 Marks): On the significance of stereoisomerism in biomolecular interactions and enzymatic reactions, illustrating how different isomers can lead to diverse biological outcomes. LAQ (10 Marks): On main functional types of proteins (structural proteins, enzymes, transporters, regulatory proteins) and their roles in biological systems, including examples of each type. P-Viva (15 marks): on practical topic- experiments to investigate the protein presence in a food stuff. Quiz (15 marks): Role of biomolecules in energy metabolism. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 10 : مسارات استقلابیۃ اور انکی تنظیم Metabolic Pathways and Regulation

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the major metabolic pathways of carbohydrates, lipids, proteins, and nucleic acids.
2. Describe the mechanisms of energy production and utilization.
3. Discuss the role of enzymes and hormones in regulating metabolism.
4. Discuss the integration of different metabolic pathways.
5. Interpret the biochemical basis of common metabolic disorders.
6. Discuss metabolic regulation with clinical and laboratory findings.

Unit 1 عمومی اُصول General principle

10.1.1 انسانی میٹابولزم کی مجموعی حکمت عملی اور منطق

The overall strategy and logic of human metabolism

10.1.2 آزاد توانائی، اینٹروپی

Free energy, entropy

10.1.3 اے ٹی پی کی ساخت اور اس کا توانائی کا مواد

Structure of ATP and its energy content

10.1.4 میٹابو لک کنٹرول کے اصول

Principles of metabolic control

10.1.5 قلیل مدتی کنٹرولز: ایلوسٹیرک اثرات (ملی سیکنڈز)، کوویلنٹ ترمیم (سیکنڈز سے منٹس)

Short-term controls: Allosteric effects (milliseconds), covalent modification (seconds to minutes)

10.1.6 طویل مدتی کنٹرولز: انزائم انڈکشن/سپریشن (گھنٹوں سے دنوں تک)

Long-term controls: Enzyme induction/suppression (hours to days)

References: 26,32,33,35,36,49,51,53,56

3A	3B	3C	3D	3E	3F	3G

CO3	Describe the concept of energy flow in biological systems Discuss the role of ATP in energy transfer Describe the principles of redox reactions and their importance in metabolism	1	Lecture	CC	Knows-how	L&GD,DIS,TUT
CO2,CO3	Discuss the major metabolic pathways (glycolysis, TCA cycle, oxidative phosphorylation) Analyze the interconnections between these pathways Discuss the regulation of metabolic pathways	2	Lecture	CAN	Knows-how	TUT,PER,L&PPT
CO3	Describe free energy and entropy Discuss the relationship between free energy and spontaneity of reactions Discuss the standard free energy change for metabolic reactions	1	Lecture	CC	Knows-how	SDL,L&PPT ,DIS,FC
CO3	Describe the structure of ATP and its high-energy phosphate bonds. Discuss the mechanism of ATP hydrolysis and energy release. Discuss the coupling of ATP hydrolysis to energy-requiring reactions.	1	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC,L
CO3	Describe the principles of metabolic control and Discuss short-term control mechanisms (allosteric effects, covalent modification) and long-term control mechanisms (enzyme induction/suppression)	1	Lecture	CC	Knows-how	TUT,L&PPT
CO3,CO4	Measure urine/serum metabolites in various states	4	Practical10.1	PSY-MEC	Shows-how	LRI,DIS,PT,CBL,D
CO3,CO4	Measure Metabolic states through biochemical indicators	6	Practical10.2	PSY-MEC	Shows-how	DL,PT,CBL,CD,SIM
Unit 2 اے ٹی پی کی پیداوار اور کنٹرول ATP Production and Control						

10.2.1 مائٹوکونڈریل تنکسید کے مسارات

Pathways of mitochondrial oxidation

10.2.2 الیکٹران ٹرانسپورٹ سلسلہ

The electron transport chain

10.2.3 مائٹوکونڈریل اے ٹی پی سنتھیسس

Mitochondrial ATP Synthesis

10.2.4 کیمی اوسموٹک میکانزم

The Chemiosmotic Mechanism

References: 26,27,33,34,35,36,49,51,52,53,57

3A	3B	3C	3D	3E	3F	3G
CO3	Describe Pathways of mitochondrial oxidation Describe The electron transport chain Discuss Mitochondrial ATP Synthesis Illustrate The Chemiosmotic Mechanism	1	Lecture	CC	Knows-how	FC,JC,L&GD,PL
CO3	Demonstrate analysis of mitochondrial dysfunction in metabolic disorders	5	Practical10.3	PSY-SET	Shows-how	CD,PSM,PT,DIS,PER

Unit 3 انزائمز Enzymes

10.3.1 حیاتی کیمیائی تعاملات اور انزائمز کے مفاہیم

Concepts of Biochemical Reactions and Enzymes

10.3.2 حیاتی کیمیائی تعاملات کی اقسام: ہائیڈرولیسس، لیگیشن، کنڈینسیشن، گروپ۔ٹرانسفر، ریڈوکس، آئسومیرائزیشن

Classes of biochemical reaction: Hydrolysis, ligation, condensation, group-transfer, redox, isomerisation

10.3.3 انزائمز کس طرح کیمیائی تعاملات کو عموماً متحرک کرتے ہیں

How enzymes catalyse chemical reactions in general terms

10.3.4 انزائمز کی ساخت اور افعال

Structure and Function of Enzymes

10.3.5 تحفیز اور خصوصیت کے لیے فعال مقام کی اہمیت

Importance of active site for catalysis and specificity

10.3.6 انزائمز اور افعال (فنکشنز) و مزاج کے یونانی اصولوں کے درمیان تعلق

Relationship between enzymes and Unani principles of *Af'al* (functions) and *Mizaj*

References: 25,26,33,35,36,51,52,53,54,55,56,57

3A	3B	3C	3D	3E	3F	3G
CO3	Describe Classes of biochemical reaction: Hydrolysis, ligation, condensation, group-transfer, redox, isomerisation Discuss How enzymes catalyse chemical reactions in general terms Describe Structure and Function of Enzymes	1	Lecture	CC	Knows-how	L&PPT ,PL,DIS,PER
CO1,CO2, CO3	Discuss the relationship between enzymes and Unani concepts of Af'al (functions) and Mizaj (temperament)	10	Experiential-Learning10.1	PSY-ADT	Does	BL,SDL,CBL,DIS,BS
CO3	Measure and interpret enzyme kinetics	5	Practical10.4	PSY-MEC	Shows-how	DL,PT,TUT

Unit 4 میٹابولک مسارات Metabolic pathways

10.4.1 اہم میٹابولک مسارات

Major metabolic pathways

10.4.2 کاربوہائیڈریٹس، فیٹس اور پروٹینز کا میٹابولزم

Metabolism of Carbohydrates, Fats and Proteins

10.4.3 میٹابولک تکلیف اور عوارض

Metabolic adaptations and disorders

References: 26,27,29,32,33,35,36,49,51,56,57

3A	3B	3C	3D	3E	3F	3G
CO3,CO4, CO5	Design experiments to study major metabolic pathways	10	Experiential-Learning10.2	PSY-ORG	Does	DIS,SDL,LS,PT,SIM
CO3	Describe major metabolic pathways and their physiological significance.	1	Lecture	CAN	Knows-how	L&PPT ,TUT
CO3	Recognize adaptive shifts in metabolism during stress and fasting	1	Lecture	CS	Knows-how	JC,L&PPT ,TUT,SY
CO1,CO2, CO3,CO4	Discuss Unani metabolic principles in light of modern physiology	6	Experiential-Learning10.3	PSY-ADT	Does	DIS,PER,CBL

Practical Training Activity

Practical Training 10.1 Urine/serum metabolites in various states

Total Duration: 4 **Hours**

1: Introduction & Sample Preparation (30 mins)

- **Mini-lecture by Instructor (15 mins):**
  - Overview of key urine/serum metabolites (glucose, ketones, proteins, bilirubin, urea, creatinine, etc.).
  - Conditions influencing these (e.g., diabetes, starvation, liver/kidney dysfunction, inborn errors).
- **Sample Preparation (15 mins):**
  - Provide pre-prepared anonymized samples (simulated or real, from case studies).
  - Organize students into small lab teams (3–5 students).

2: Biochemical Screening Tests (1 hour 30 mins)

Each group rotates through testing stations:

(Kits or manual methods based on availability)

Test	Sample	Detects	Relevance
Benedict's	Urine	Glucose	Diabetes mellitus
Rothera's Test	Urine	Ketones	Starvation, ketoacidosis
Biuret Test	Urine	Protein	Kidney disease
Jaffe's Reaction	Serum	Creatinine	Renal function
Urease Test	Serum	Urea	Liver/kidney function
Dipstick Panel	Urine	pH, SG, ketones, glucose, bilirubin	General screening

Instructions at each station:

- Write observations (colour change, precipitate, etc.).
- Record and analyze results using worksheet.

3: Data Interpretation and Clinical Correlation (1 hour)

- **Task:** Groups receive a clinical case for each sample (e.g., polyuria, fatigue, fasting state).
- Match lab findings with the correct clinical picture and underlying metabolic issue.
- Groups present interpretations briefly (5 minutes per group).

Example Case	Findings	Likely Diagnosis
Excessive urination + glucose + ketones	Benedict's (+), Rothera's (+)	Diabetes Mellitus
Fatigue + low protein + creatinine ↑	Biuret (-), Jaffe's (+)	Nephrotic syndrome
Fasting + ketonuria	Rothera's (+), glucose (-)	Starvation ketosis

4: Reflection & Wrap-Up (1 hour)

- **Facilitated discussion (30 mins):**

- What tests were most informative and why?
- How do metabolite changes help guide diagnosis?

- **Quick Assessment (15 mins):**
  - Mini-quiz (MCQs + case-based questions) on interpreting test results.
- **Feedback and Summary (15 mins):**
  - Students complete short reflection:

    "One thing I learned about interpreting biochemical tests today is…"

Practical Training 10.2 Assessing Metabolic states through biochemical indicators

Total Duration: 6 Hour

1: Introduction & Overview (30 Minutes)

- **Mini-lecture by Instructor:**
  - What are metabolic states (fed, fasting, exercise, hypoxia)?
  - Key indicators: blood glucose, lactic acid, ATP, pH, ketone bodies
  - Relevance in clinical and athletic performance settings

2: Simulation – ATP-Based Energy Systems (1 Hour)

Demonstration or Virtual Simulation

- **Toolkits:** Use simulation software like *PhysioEx*, *Labster*, or instructor-led demo
- **Focus:**
  - ATP-CP system
  - Glycolytic system
  - Oxidative phosphorylation
  - Recovery time and ATP resynthesis

Task:

- Observe energy production in simulated exercise (short burst vs. endurance)
- Discuss ATP yield and byproduct accumulation in different systems

3: Estimation of Glucose and Lactic Acid (2.5 Hours)

Sample Conditions:

- Simulated states: fasting, exercise, post-prandial (pre-prepared samples)

Tests:

Analyte	Method	Interpretation
Glucose	GOD-POD Colorimetric Assay	Hyper/hypoglycaemia
Lactic Acid	Enzymatic Assay (LDH method) or colorimetric test	Anaerobic metabolism

Protocol Includes:

- Sample preparation
- Use of spectrophotometer or colorimeter
- Standard curve plotting
- Absorbance measurement and concentration calculation

4: Analysis of Metabolic Stress (1 Hour)

Task: Compare glucose and lactate levels in each metabolic condition

- Graph Glucose vs. Condition and Lactate vs. Condition
- Identify metabolic state: e.g., high lactate + low glucose ⟶ intense anaerobic activity
- Determine if the body is in:
    - Fed/Anabolic state
    - Fasting state
    - Anaerobic glycolysis
    - Metabolic acidosis

5: Case Interpretation & Discussion (1 Hour)

Activity: Each group receives a case scenario:

Scenario	Indicators Given	Task
Diabetic ketoacidosis	High glucose, low pH, high ketones	Diagnose & justify
Endurance athlete post-race	Low glucose, high lactate	Assess fatigue level
Fasting state	Low glucose, normal lactate	Predict metabolic switch

Deliverable: Short presentation connecting biochemical data to physiological response

Assessment & Wrap-Up (30 Minutes)

- **Worksheet Submission:**
  - Graphs, calculations, case interpretations
- **Reflection Prompt:**

"Which metabolic indicator gave you the clearest insight into the body's energy status and why?"

Practical Training 10.3 Mitochondrial dysfunction in metabolic disorders

Total Duration: 5 hours

1: Introduction & Background (30 minutes)

- Mitochondrial structure & the role of ETC in energy metabolism
- Key enzymes: Complex I–V, coenzyme Q, cytochrome c
- Mitochondrial disorders: primary (mtDNA mutations) and secondary (diabetes, ischemia)
- Biomarkers: ATP, lactate, oxygen consumption, ROS

2: Demonstration – Electron Transport Chain (ETC) Model (1 hour)

- **Demonstration or Simulation:**
  - Use a physical model or virtual simulation (e.g., *Labster*, *BioRender animation*)
  - Show stepwise flow of electrons (Complex I → IV), proton pumping, and ATP synthesis via Complex V (ATP synthase)

Student Tasks:

- Annotate ETC diagram with sites of drug inhibition (e.g., rotenone, cyanide)
- Predict the metabolic consequences of blockages at each complex

3: Data Analysis – ATP Production & Oxygen Consumption (2 hours)

Activity: Analyze case-based datasets

- Students receive anonymized clinical data from patient cases or simulated experiments:
  - ATP levels (via luciferase assays)
  - Oxygen consumption rate (OCR) from respirometry
  - Lactate and pyruvate levels
  - Enzyme activity assays for ETC complexes

Case	Findings	Interpretation
MELAS anaerobic	↓ ATP, ↑ lactate, ↓ Complex I activity	ETC dysfunction, compensation
Leigh syndrome initially	↓ OCR, normal lactate	Neurodegenerative mitochondrial disease
Drug-induced toxicity or	↓ Complex IV activity, ↑ ROS	Cyanide poisoning antiretroviral toxicity

Student Tasks:

- Calculate percent ATP reduction vs. control
- Compare OCR across different cases
- Plot bar graphs of enzyme activities and ATP production
- Identify the most likely complex affected and the compensatory mechanisms involved

Phase 4: Clinical Correlation & Diagnosis (1 hour)

Problem-Solving Task:

- Each group receives 1–2 case studies with clinical symptoms (e.g., muscle weakness, lactic acidosis, neuro symptoms)
- Use data from Phase 3 to:
    - Diagnose the condition
    - Identify possible ETC complex involved
    - Suggest potential treatments (e.g., CoQ10, antioxidants)

Group Presentation (5–7 mins each):

- Share findings with peer review

5: Wrap-Up & Assessment (30 minutes)

- **Debrief & Discussion:**
    - How mitochondrial dysfunction affects overall metabolism
    - Role of biochemical markers in diagnosis
    - How mitochondrial disorders differ from glycolytic disorders
- **Reflection Prompt:**

"Which ETC complex dysfunction would have the most severe impact and why?"

Practical Training 10.4 Quantify and interpret enzyme Kinetics

Total Duration: 5 Hours

1: Introduction & Preparation (30 minutes)

- Basic concepts of enzyme kinetics: substrate concentration, Vmax, Km
- Factors affecting enzyme activity: pH, temperature
- Overview of the enzyme to be tested (amylase or LDH)

2: Enzyme Assay – Activity Measurement (1.5 hours)

Option A: Amylase Assay

- **Principle:** Amylase breaks down starch; remaining starch detected by iodine (colour change).

- **Protocol:** Incubate enzyme with starch at different time points, stop reaction, add iodine, and read absorbance (colour intensity decreases as starch is degraded).
- **Standard Curve:** Use known starch concentrations.

Option B: LDH Assay

- **Principle:** LDH catalyzes conversion of pyruvate to lactate, measured via NADH oxidation (decrease in absorbance at 340 nm).
- **Protocol:** Mix LDH with pyruvate and NADH; measure absorbance change over time.

3: Effect of Temperature & pH (1 hour)

- **Temperature Variation:** Perform the assay at 20°C, 37°C, and 60°C.
- **pH Variation:** Perform assay using buffers at pH 5, 7, and 9.

Tasks:

- Plot enzyme activity vs. temperature and vs. pH
- Identify optimum conditions
- Interpret changes based on enzyme structure/function

4: Enzyme Kinetics – Substrate Concentration Dependence (1.5 hours)

- Vary substrate concentration (e.g., starch or pyruvate) while keeping enzyme constant.
- Measure initial reaction rate at each concentration.

Tasks:

- Plot Michaelis-Menten curve (Velocity vs. [S])
- Calculate Vmax and Km
- Use reciprocal values to plot Lineweaver-Burk plot (1/V vs. 1/[S])

5: Data Interpretation & Discussion (30 minutes)

- Groups interpret and compare:
    - Optimal pH & temperature
    - Enzyme efficiency (Km, Vmax)

- Deviations or anomalies in kinetic data
- Differences between amylase and LDH (if multiple enzymes are used)

Experiential Learning Activity

Experiential-Learning Learning 10.1: Relationship between enzymes and Unani concepts of Af'al (functions) and Mizaj (temperament)

Total Duration: 10 hours

Activity 1: Foundations (2 hours)

Goal: Lay groundwork for both modern and traditional perspectives.

1.1 *"What Controls the Body?"* (30 mins)

- **Activity:** Brainstorm in groups – what controls digestion, energy, mood?
- **Discussion:** Share thoughts; participants link ideas to enzymes, Af'al, and Mizaj.

1.2 Discussion with Interactive Questions (1.5 hrs)

- **Topic A:** What are enzymes? Structure, function, specificity, and role in metabolism.
- **Topic B:** Unani concepts of Af'al (functions of organs and systems) and Mizaj (temperamental influence on function).

Activity 2: Hands-On Exploration (2.5 hours)

Goal: Direct experience with enzymatic activity and connection with Unani theory.

2.1 Experiment: Enzyme Activity in Real Time (1.5 hrs)

- **Activity:** Measure the breakdown of hydrogen peroxide by catalase in liver or yeast.
- **Variables:** Vary pH and temperature (Mizaj = Hot/Cold, Wet/Dry).
- **Analysis:** Observe how "temperamental" changes affect function, paralleling Unani views.

2.2 Group Synthesis: Temperament & Catalysis (1 hr)

- **Group Work:**
  - Match enzyme conditions to corresponding Mizaj types.
  - Use a chart to describe what happens when conditions (or Mizaj) are imbalanced.

- **Output:** Each group creates a poster or slide connecting enzyme science to Unani perspectives.

Activity 3: Case-Based Integrative Thinking (2.5 hours)

Goal: Apply knowledge in clinical and theoretical contexts.

3.1 Case Study Exploration (1.5 hrs)

- **Case 1:** A patient with indigestion (connect enzyme deficiency and Mizaj imbalance).
- **Case 2:** Hyperacidity or metabolic disorder from both perspectives.
- **Activity:** Mixed-discipline teams develop a diagnosis and integrative management plan.

3.2 Role Play: Unani Hakim Meets Modern Biochemist (1 hr)

- Each group scripts a dialogue between a Unani physician and a modern doctor discussing patient care.
- Aim: Discover common language and conceptual bridges.

Activity 4: Reflection, Discussion & Evaluation (3 hours)

Goal: Consolidate learning and encourage deep thinking.

4.1 Journaling: "What I Discovered" (30 mins)

- Prompts:
    - How did today's learning shift your understanding of Unani medicine?
    - Can scientific findings validate traditional knowledge?

4.2 Group Gallery Walk (1 hr)

- Display posters, diagrams, case solutions.
- Groups rotate, provide feedback using "warm & cool" comment cards.

4.3 Plenary Discussion & Q&A (1 hr)

- Student-led synthesis of themes and insights.
- Open-floor questions and peer exchange.

4.4 Assessment & Feedback (30 mins)

- Short reflection quiz (MCQs + open questions).

- Anonymous workshop feedback forms.

Experiential-Learning Learning 10.2: Major metabolic pathways

Total Duration: 10 hours

Activity 1: Foundations – Literature Review & Conceptual Map (2 Hours)

1.1: Collaborative Metabolic Map Construction (1 hr)

- **Task:** Small groups each research one major pathway (glycolysis, TCA, etc.) and create a simplified diagram.
- **Deliverable:** Visual map with key enzymes, inputs/outputs, regulation points.

1.2: Jigsaw Literature Review (1 hr)

- Each group studies a short research article or textbook excerpt on a specific metabolic control mechanism or disease.
- Regroup into mixed teams to teach their pathway to others.

Activity 2: Experimental Design & Biochemical Techniques (2 Hours)

Goal: Understand how metabolic pathways are studied experimentally.

2.1: Virtual Lab / Wet Lab Demo (1 hr)

- **Option A (Virtual):** Use simulations like LearnBiochem or LabXchange to explore metabolic enzyme assays.
- **Option B (In-Person):** Perform enzyme activity assays (e.g., lactate dehydrogenase, succinate dehydrogenase).

2.2: Experimental Proposal Workshop (1 hr)

- Students design a simple biochemical experiment to investigate a metabolic enzyme or pathway.
- Must include controls, expected outcomes, and rationale.

Activity 3: Data Analysis & Interpretation (2 Hours)

Goal: Handle experimental data related to metabolism.

3.1: Real-World Data Set Exploration (1 hr)

- Use public datasets (e.g., glucose levels, metabolite concentrations from research studies).
- Tools: Excel, GraphPad, or R-based metabolic data analysis templates.

3.2: Data-Driven Diagnosis (1 hr)

- Provide data (e.g., blood lactate, ammonia, ketone levels) for 3 cases.
- Teams diagnose metabolic states (e.g., hypoglycemia, ketoacidosis, inborn error of metabolism).

Activity 4: Metabolic Modelling & Simulation (2 Hours)

Goal: Use technology to simulate pathway dynamics.

4.1: Pathway Simulation (1.5 hrs)

- Tools: CellDesigner, COPASI, or online tools (BioModels, MetExplore).
- Simulate conditions like oxygen deficiency or overfeeding and observe effects on glycolysis, TCA, or ETC.

4.2: Interactive Modelling Challenge (0.5 hr)

- Quick-fire modelling task: simulate and optimize a condition (e.g., increase ATP yield, reduce lactate buildup).

Activity 5: Clinical Case Correlations & Synthesis (2 Hours)

Goal: Apply knowledge to real-world scenarios.

5.1: Case Study Rotation (1 hr)

- 3 stations with clinical cases:
    - Diabetic ketoacidosis
    - Pyruvate dehydrogenase deficiency
    - G6PD deficiency
- Teams analyze symptoms, labs, and map the affected pathway.

5.2: Synthesis & Peer Teaching (1 hr)

- Each group presents their case solution, relating clinical presentation to metabolic disruption.
- Peers ask questions, facilitator ties insights together.

Experiential-Learning Learning 10.3: Unani metabolic principles vs modern physiology

Total Duration: 6 Hours

1: Foundation Review (45 minutes)

- **Activity:**
  - Small groups match Unani terms (e.g., *Af'ā l-e-Tabi'yat*, *Harārat Ghaṙīzīya*) with modern equivalents (e.g., basal metabolism, homeostasis)
- **Recap:**
  - Unani concepts of metabolism:
    - *Af'ā l*: functional capacities like digestion (*hazm*), absorption, and transformation
    - *Mizāj*: individual temperament influencing metabolic rate and disease susceptibility
    - *Hazoom-e-Arba'a* and their relation to nutrients
  - Modern view: Endocrine regulation, cellular respiration, energy metabolism (glucose, lipids, protein pathways)

2: Case-Based Learning – Diabetic Metabolism (2 hours)

Clinical Case Scenario:

"A 50-year-old man presents with increased thirst, fatigue, and weight loss. Labs show elevated fasting glucose, low insulin, and high HbA1c. He has a sanguine-melancholic temperament."

Tasks for each group:

- Interpret the clinical diagnosis and the temperamental predisposition
- Identify relevant Unani concepts (e.g., *Su-e-Mizāj, Zofe Hazm*)
- Map physiological markers (glucose, insulin) to Unani equivalents (e.g., *Harārat Ghaṙīzīya* imbalance)
- Propose an integrative treatment plan combining Unani and allopathic elements

3: Guided Discussion – Unani vs Modern Metabolic Concepts (1 hour)

Key Discussion Points:

- Is *Mizāj* equivalent to metabolic rate?
- How does Unani categorize disorders like diabetes (*Ziabītus*) compared to Type I/II DM?
- Can functional disturbances in Unani be linked to enzyme or hormonal defects?

Interactive method: Think-Pair-Share or Fishbowl format

4: Interpretation of Clinical and Temperament-Based Disorders (1.5 hours)

Activity: Mixed Case Set (3–4 brief cases)

Each group/Student receives one clinical case paired with a temperament profile (e.g., choleric, phlegmatic).

Case	Key Data	Task
Obesity	BMI > 30, low physical activity, phlegmatic temperament	Interpret risk & intervention
Hyperthyroidism	High T3/T4, elevated heart rate, choleric temperament	Relate to *Harārat* elevation
Chronic fatigue	Normal labs, low energy, melancholic temperament	Identify imbalance in *Afʿāl*
PCOS	Insulin resistance, hormonal reproductive	Relate to *Su-e-Mizāj* of imbalance, sanguine temperament system

Task:

- Identify which Unani factors contribute to the disorder
- Suggest diet/lifestyle/herbal regimens based on *Mizāj* and biomedical understanding

5: Integration & Reflection (45 minutes)

Integration Map (Whole-class):

- Create a collaborative visual map linking:
    - Unani terms ⟶ Modern physiology
    - *Mizāj* types ⟶ Metabolic profiles
    - Clinical states ⟶ Conceptual dual interpretations

Reflection Prompt (individual):

“How has this activity changed your understanding of metabolism as a bridge between tradition and science?”

Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (5 Marks): on the topic- the principles of redox reactions and their importance in metabolism. LAQ (10 Marks): Outline major metabolic pathways and their physiological significance. Scenario Based Assessment (10 Marks): on Explore the relationship between enzymes and Unani concepts of Af'al (functions) and Mizaj (temperament). OSPE (25 Marks): Analysis of urine/serum metabolites in various states. OR DOPS (25 Marks): Quantify and interpret enzyme kinetics. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4
Semester No : 4	
Module 11 : جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques	
Module Learning Objectives (At the end of the module, the students should be able to) 1. Describe the principles and applications of spectroscopic and chromatographic techniques. 2. Describe the role of biomarkers in disease diagnosis and treatment monitoring. 3. Perform practical applications of biochemical assays using advanced techniques. 4. Discuss Unani diagnostic frameworks with biochemical markers for integrated patient assessment.	
Unit 1 اسپیکٹروسکوپک تکنیکیں Spectroscopic techniques	

11.1.1 "مختلف اسپیکٹروسکوپک تکنیکوں (یووی-وِس، آئی آر، فلوریسینس، این ایم آر، ماس اسپیکٹرومیٹری) کے اصول اور اطلاقات۔

Principles and applications of various spectroscopic techniques (UV-Vis, IR, Fluorescence, NMR, mass spectrometry).

11.1.2 اسپیکٹروسکوپک آلات کا استعمال کرتے ہوئے انزائم کی تخمینہ کاری کی تکنیکیں

Enzyme estimation techniques using spectroscopic tools.

References: 53,56,208,210

3A	3B	3C	3D	3E	3F	3G
CO3,CO4	Describe the principles and biomedical applications of key spectroscopic techniques.	3	Lecture	CC	Know	DIS,SDL,L_VC,C_L,TUT
CO3,CO4	Perform UV-Vis-based enzyme activity assays and interpret absorbance data	2	Practical11.1	PSY-MEC	Shows-how	D,DL,PT
CO3,CO4	Demonstrate IR spectroscopy to identify functional groups in biomolecules	2	Practical11.2	PSY-SET	Shows-how	D,PT,DL
CO3,CO4	Demonstarte use of fluorescence and NMR spectrometry	3	Practical11.3	PSY-SET	Shows-how	D,SIM,DIS,SDL,PT
CO3,CO4, CO5	Adapt Mass spectrometry in metabolomics	4	Experiential-Learning11.1	PSY-ADT	Does	SDL,PT,DIS,W
CO3,CO4, CO5	Adapt Nuclear magnetic Resonance (NMR) Spectroscopy in drug development	3	Experiential-Learning11.2	PSY-ADT	Does	C_L,LRI,PT,PER,DIS
CO3,CO4, CO5	Merge both Unani and biochemical perspectives.	7	Experiential-Learning11.3	PSY-MEC	Does	SY,DIS,SDL,W,LS

Unit 2 کرومیٹو گرافک تکنیکیں Chromatographic techniques

کرومیٹوگرافک تکنیکوں کے اصول اور اطلاقات 11.2.1

Principles and applications of chromatographic techniques

ایچ پی ایل سی، جی سی اور ٹی ایل سی 11.2.2

HPLC, GC and TLC

References: 209,211

3A	3B	3C	3D	3E	3F	3G
CO3,CO4	Describe the separation principles of chromatographic methods and their clinical applications	3	Lecture	CC	Knows-how	W,L_VC,TUT
CO3,CO4	Perform Thin-layer chromatography and compound Identification	3	Practical11.4	PSY-MEC	Shows-how	PT,D,SIM,D-M,C_L
CO3,CO4, CO5	Demonstrate use of HPLC system and sample analysis interpretation	2	Practical11.5	PSY-SET	Shows-how	LRI,DIS,CBL,D,PT
CO2,CO3, CO4	Perform Paper chromatography with pigment separation	2	Practical11.6	PSY-MEC	Shows-how	PT,SIM,LRI,DIS,D
CO3,CO4, CO5	Demonstrate skills to evaluate chromatographic test reports	6	Experiential-Learning11.4	PSY-SET	Does	LRI,RP,W,SIM,SDL

Unit 3 بائیومارکرز اور یونانی ادغام Biomarkers and Unani Integration

ائیومارکرز کی شناخت 11.3.1

Identification of biomarkers.

11.3.2بائیومارکرز کے اطلاقات

Applications of Biomarkers

11.3.3جدید بائیومارکرز کو یونانی تشخیص کے ساتھ مربوط کرنا

Interfacing modern biomarkers with Unani diagnostics.

References: 192,193,207

3A	3B	3C	3D	3E	3F	3G
CO2,CO3, CO4	Discuss biomarkers and describe its types and uses in diagnostics and therapeutics	2	Lecture	CC	Knows-how	DIS,SDL,L&PPT ,TUT
CO3,CO4, CO5	Demonstrate techniques to identify common biomarkers	3	Practical11.7	PSY-SET	Shows-how	PT,DL,D
CO3,CO4, CO5	Interpret cardiac/liver markers in test samples	3	Practical11.8	CAN	Shows-how	CBL,PT,DL,LRI,SIM
CO3,CO4, CO5	Demonstrate skills to Interpret case scenarios using biomarker profiles	6	Experiential-Learning11.5	PSY-SET	Does	CBL,RLE,C_L,LRI,SDL
CO1,CO3, CO4	Discuss Unani diagnostic elements with biochemical markers	2	Lecture	CAN	Knows-how	DIS,C_L,JC,L&GD,TUT

Practical Training Activity

Practical Training 11.1 Enzyme activity estimation using UV-Vis spectrophotometry

Total Duration: 2 hour

Materials:

- Enzyme solution (e.g., Alkaline Phosphatase, Amylase - specify concentration)
- Substrate solution (e.g., p-Nitrophenyl phosphate for Alkaline Phosphatase, Starch for Amylase - specify concentration)
- Buffer solution (with appropriate pH for the enzyme)
- Distilled water
- Test tubes or cuvettes
- Pipettes (various volumes)
- Micropipettes and tips (if required for precise measurements)
- UV-Vis spectrophotometer
- Timer or stopwatch
- Markers for labeling
- Waste container

1. Introduction and Theory (15 minutes)

- **Instructor-led explanation (5 minutes):**
    - Briefly review the concept of enzyme activity and factors affecting it.
    - Explain how enzymes catalyze reactions and how this can be monitored.
    - Introduce UV-Vis spectrophotometry as a technique to measure changes in absorbance related to product formation or substrate consumption.
- **Explanation of the specific assay (5 minutes):**
    - Describe the specific enzyme and substrate being used in the experiment.
    - Explain the principle of the colorimetric assay (e.g., the product of the reaction absorbs light at a specific wavelength).
    - Mention the importance of choosing the correct wavelength for measurement.
- **Overview of the experimental procedure (5 minutes):**
    - Briefly outline the steps involved in setting up and running the assay.
    - Emphasize the importance of accurate measurements and timing.

2. Experimental Setup and Demonstration (25 minutes)

- **Preparation of reaction mixtures (10 minutes):**
    - **Guided instruction:** Explain how to prepare the reaction mixtures, including the enzyme, substrate, and buffer.
    - **Demonstration:** Prepare a sample reaction mixture, highlighting the correct order of addition and volumes of each component.
    - **Emphasis on Controls:** Explain the need for control reactions (e.g., without enzyme, without substrate) to ensure that any observed absorbance change is due to enzyme activity. Prepare control samples.
- **Operation of the UV-Vis spectrophotometer (10 minutes):**
    - **Instructor demonstration:** Show students how to turn on and calibrate the spectrophotometer.
    - **Wavelength selection:** Demonstrate how to set the appropriate wavelength for the assay.
    - **Blanking the spectrophotometer:** Explain and demonstrate how to blank the instrument using the appropriate solution (usually the buffer or reaction mixture without the substrate/enzyme).
    - **Sample loading:** Show how to properly load the reaction mixture into the cuvette and insert it into the spectrophotometer.
- **Setting up the time course measurement (5 minutes):**
    - Explain how to set up the spectrophotometer to take readings at regular time intervals (e.g., every 30 seconds or 1 minute) for a specified duration.
    - Demonstrate how to start the measurement.

3. Student Experimentation (45 minutes)

- **Group work (recommended):** Divide students into small groups (e.g., 2-3 students per group).
- **Preparation of reaction mixtures (15 minutes):** Students prepare their own reaction mixtures and control samples following the instructions and the instructor's demonstration.
- **Performing the assay and data collection (30 minutes):** Students use the UV-Vis spectrophotometer to measure the absorbance of their reaction mixtures and control samples at the chosen wavelength over time, recording the data in a table.
    - **Instructor supervision:** Circulate among the groups, providing guidance and answering questions. Ensure students are following the procedure correctly and handling the equipment properly.

4. Data Analysis and Interpretation (20 minutes)

- **Data organization (5 minutes):** Guide students on how to organize their collected data in a table or spreadsheet, including time points and corresponding absorbance values for both the experimental and control samples.
- **Plotting the data (10 minutes):** Instruct students to plot their data with time on the x-axis and absorbance on the y-axis for both the reaction mixture and the control samples.
- **Interpreting the results (5 minutes):**
    - Guide students to analyze their graphs.
    - Explain how the rate of enzyme activity can be inferred from the slope of the absorbance vs. time plot (during the initial linear phase).
    - Discuss the expected results for the control samples and why they are important.
    - Facilitate a brief discussion on potential sources of error.

5. Wrap-up and Discussion (15 minutes)

- **Summary of key concepts (5 minutes):** Briefly reiterate the principles of UV-Vis enzyme assays and the information that can be obtained from the data.
- **Open discussion (5 minutes):** Encourage students to ask questions and discuss their findings. You can prompt discussion with questions like:
    - What does the change in absorbance over time indicate?
    - How did the control samples help in interpreting your results?
    - What factors could affect the rate of the enzyme reaction?
    - How could this assay be used to study enzyme kinetics further?

Practical Training 11.2 IR spectral analysis for biomolecular identification

Total Duration (2 hour)

- **Introduction & Principle (15 minutes):** Brief overview of IR spectroscopy and its application to biomolecules.
- **Sample Preparation (45 minutes):**
    - **Known Samples (20 minutes):** Prepare 2-3 pre-selected biomolecule samples (e.g., glucose, glycine, vegetable oil) for IR analysis (KBr pellet or ATR, depending on available equipment and sample type).
    - **Unknown Sample (15 minutes):** Prepare one unknown biomolecule sample.

    - **Instrument Setup (10 minutes):** Familiarize with the FTIR spectrometer and software.
- **Running the FTIR Spectrometer (30 minutes):** Acquire IR spectra for all prepared samples (including background scan).
- **Data Analysis & Interpretation (20 minutes):** Identify key functional group absorption bands in the obtained spectra using a provided reference table.
- **Wrap-up & Discussion (10 minutes):** Briefly discuss the findings and potential identification of the unknown sample.

Procedure (Simplified):

1. **Introduction (15 min):** Understand the basics of IR spectroscopy and its use in identifying functional groups in biomolecules.
2. **Sample Preparation (45 min):**
    - Prepare KBr pellets for solid samples or use ATR for liquids/solids as instructed.
    - Ensure proper labeling of all samples.
3. **Running FTIR (30 min):**
    - Acquire a background spectrum.
    - Run each prepared sample on the FTIR spectrometer following the instrument's guidelines.
    - Save the spectra.
4. **Data Analysis (20 min):**
    - Open the saved spectra.
    - Identify significant peaks and correlate them with functional groups using the provided table (e.g., O-H, N-H, C=O, C-H).
    - Compare the spectrum of the unknown sample to those of the known samples.
5. **Conclusion (10 min):** Briefly discuss the identified functional groups and propose a possible identity for the unknown sample based on the data.

Materials (Concise List):

- Known biomolecule samples (2-3 types).
- Unknown biomolecule sample.
- FTIR spectrometer with software.
- KBr powder (if using pellet method).
- Mortar and pestle (if using pellet method).

- ATR accessory (if available).
- Spatula.
- Gloves, lab coat, safety goggles.
- Reference table of IR absorption frequencies for common functional groups.

Note: This is a condensed version. Detailed steps for sample preparation and instrument operation will depend on the available equipment and should be provided separately or explained during the activity. The number of samples can be adjusted based on time constraints.

Practical Training 11.3 Fluorescence and NMR spectrometry

Total Duration 3 hour

Hour 1: Fluorescence Spectrometry

Introduction to Fluorescence Spectrometry (15 minutes)

- Briefly explain the phenomenon of fluorescence: excitation, emission, Stokes shift.
- Discuss the key components of a fluorescence spectrometer (light source, excitation monochromator, sample holder, emission monochromator, detector).
- Highlight the applications of fluorescence spectrometry in biomolecular studies (e.g., protein labeling, DNA detection, imaging).

Principles of Fluorescence Spectroscopy (15 minutes)

- Explain factors affecting fluorescence intensity (e.g., concentration, pH, temperature, quenching).
- Introduce the concepts of excitation and emission spectra.
- Discuss the information that can be obtained from fluorescence spectra (e.g., identification of fluorophores, studying molecular interactions).

Introduction to the Virtual Fluorescence Lab (15 minutes)

- Guide students on how to access the designated virtual lab simulation platform for fluorescence spectrometry.
- Provide a walkthrough of the virtual lab interface, explaining the function of each component (e.g., selecting light source, setting wavelengths, adjusting parameters, viewing the spectrum).
- Demonstrate a simple experiment within the virtual lab.

Hands-on Simulation: Recording Fluorescence Spectra (15 minutes)

- Students individually or in small groups perform a guided simulation within the virtual lab.
- Task: Record the excitation and emission spectra of a provided known fluorophore (e.g., fluorescein).
- Encourage students to observe how changing excitation wavelengths affects the emission spectrum.

Hour 2: Nuclear Magnetic Resonance (NMR) Spectrometry

Introduction to NMR Spectrometry (15 minutes)

- Briefly explain the basic principles of NMR, focusing on ^{1}H NMR: nuclear spin, magnetic field, resonance.
- Discuss the key components of an NMR spectrometer (magnet, radiofrequency pulse, detector).
- Highlight the applications of NMR spectrometry in biomolecular studies (e.g., structure determination, studying molecular dynamics, metabolite analysis).

Principles of ^{1}H NMR Spectroscopy (15 minutes)

- Introduce the concepts of chemical shift and its relation to the electronic environment of protons.
- Explain spin-spin coupling and the n+1 rule.
- Discuss the concept of integration and its relation to the number of protons.

Introduction to the Virtual NMR Lab (15 minutes)

- Guide students on how to access the designated virtual lab simulation platform for NMR spectrometry.
- Provide a walkthrough of the virtual lab interface, explaining the function of each component (e.g., selecting the molecule, setting the spectrometer frequency, processing parameters, viewing the spectrum).
- Demonstrate a simple experiment within the virtual lab.

Hands-on Simulation: Obtaining ^{1}H NMR Spectra (15 minutes)

- Students individually or in small groups perform a guided simulation within the virtual lab.
- Task: Obtain the ^{1}H NMR spectrum of a provided simple organic molecule (e.g., ethanol).
- Encourage students to identify the different signals and relate them to the protons in the molecule.

Hour 3: Comparative Analysis and Applications

Comparing Fluorescence and NMR Spectrometry (30 minutes)

- Facilitate a discussion comparing and contrasting fluorescence and NMR spectrometry. Consider:

- What type of information does each technique provide about biomolecules?
- What are the strengths and limitations of each technique?
- For which types of biomolecules or studies is each technique most suitable?

- Use examples from the simulations performed in the previous hours to illustrate these points.

Advanced Simulations/Case Studies (20 minutes)

- Present students with more complex scenarios or unknown samples within the virtual labs.
- **Option 1 (Fluorescence):** Analyze the emission spectrum of an unknown sample to identify the fluorophore from a provided database.
- **Option 2 (NMR):** Analyze the ^{1}H NMR spectrum of an unknown simple molecule to deduce its structure.
- Students work individually or in groups to solve the presented case study using the virtual lab tools.

Wrap-up and Q&A (10 minutes)

- Summarize the key concepts and applications of fluorescence and NMR spectrometry demonstrated during the session.
- Address any remaining questions from the students.
- Briefly discuss potential future learning opportunities or real-world applications of these techniques.

Practical Training 11.4 Thin-layer chromatography and compound Identification

Duration: 3 Hours

1: Introduction & Setup (30 minutes)

- **Short briefing (15 mins):**
  - Basic TLC theory: stationary phase, mobile phase, polarity
  - Use in compound identification, purity check, and reaction monitoring
  - Importance of solvent system choice
- **Demonstration (15 mins):**
  - Preparing TLC plate
  - Spotting samples

- Developing chamber preparation
- Visualizing under UV light or iodine chamber

2: Practical Activity – Performing TLC (1.5 hours)

Task:

Students work in pairs to analyze unknown mixtures using reference compounds (e.g., aspirin, caffeine, paracetamol, amino acids, dyes).

Steps:

1. Prepare TLC plate and mark baseline
2. Spot unknown sample and reference standards
3. Develop TLC plate in selected solvent system (e.g., ethyl acetate:hexane)
4. Visualize spots (UV lamp or iodine)
5. Measure distance travelled by each spot and calculate **Rf values**
6. Match unknowns with references using Rf and spot characteristics

Optional Extensions:

- Try 2 different solvent systems to compare resolution
- Analyze a crude extract (e.g., plant pigment or herbal product)

3: Analysis, Identification & Reporting (1 hour)

- **Student Task:**
  - Draw developed TLC plates
  - Report Rf values for each compound
  - Identify unknowns based on comparison with standards
  - Comment on compound purity (if streaks or extra spots present)
- **Discussion prompts:**
  - Why did certain compounds move farther than others?
  - How would you improve the resolution?

Practical Training 11.5 HPLC system and sample analysis interpretation

Total Duration: 2 Hours

1: HPLC System Overview (30 minutes)

- **Brief lecture (15 mins):**
  - Principle of HPLC (polarity, partitioning, retention time)
  - Components: solvent reservoir, pump, injector, column, detector, data system
  - Types of HPLC: Reverse-phase, normal-phase, ion-exchange, size-exclusion
  - Column selection and mobile phase composition
- **Walkthrough or Demonstration (15 mins):**
  - Visual tour of actual HPLC unit (live or video)
  - Steps of preparing, injecting, and running a sample
  - Safety and maintenance tips

Optional visual aid: Animated HPLC flow diagram or interactive simulation

2: Chromatographic Data Analysis (1 hour)

Student Activity:

Interpret provided chromatograms for:

- Retention time (tR)
- Peak identification (via standards)
- Peak purity and area %
- Impurity profiling or degradation studies

Example Samples:

- Standard paracetamol and caffeine mix
- Herbal extract or multivitamin tablet analysis
- Forced degradation profile of a drug

Discussion Points:

- What factors influence retention time and resolution?
- How do you confirm identity or purity using HPLC?

3: Wrap-Up & Q&A (30 minutes)

Topic: Real-Life Applications & Troubleshooting

- **Discussion prompts:**
    - Compare HPLC with TLC and GC in terms of sensitivity and specificity
    - Applications in pharmaceuticals, clinical diagnostics, food safety
    - Common issues in HPLC (e.g., baseline drift, tailing peaks)
- **Mini-quiz or reflection:**

"What does the area under an HPLC peak tell us about the sample?"

Practical Training 11.6 Paper chromatography with pigment separation

Total Duration: 2 Hour

1: Introduction & Setup (30 minutes)

- **Brief explanation (15 mins):**
    - Principle of paper chromatography (capillary action and solubility differences)
    - Importance of mobile vs stationary phase
    - Applications: pigment separation, amino acid analysis, food dyes, etc.
- **Sample preparation (15 mins):**
    - Extract pigments from fresh spinach or other green leaves using mortar and pestle with acetone or ethanol
    - Prepare chromatography strips and mark baseline

2: Chromatography Procedure (45 minutes)

Steps:

1. Spot extracted pigment onto chromatography paper at the baseline
2. Place strip in a beaker containing solvent (e.g., petroleum ether:acetone mix) without submerging the spot
3. Allow the solvent to run up the paper by capillary action
4. Remove paper when solvent front is ~75% up the strip
5. Mark the solvent front and allow the strip to dry

Expected Outcome: Visible separation of green (chlorophyll a & b), yellow (xanthophylls), and orange (carotenes)

Adaptations: If the setup is not available, the procedure can be demonstrated at other Labs where available. Alternatively online simulations or learnings may be adapted.

3: Analysis & Discussion (30 minutes)

- Calculate Rf values for each pigment
- Compare colours and Rf values to standard pigment chart
- Discussion Questions:
    - Why do pigments separate?
    - How do polarity and solubility influence separation?
    - What might happen if the spot was submerged?

Practical Training 11.7 Enzyme-linked assays to measure biomarkers (e.g., ELISA)

Total Duration: 3 Hours

Activity 1: 2 hours

- Conduct a complete ELISA workflow, including:
    - Sample preparation and dilution
    - Plate coating with capture antibodies
    - Addition of standards and samples
    - Enzyme-conjugated detection and substrate incubation

- Plate reading and optical density measurement

Activity 2: Analyze results using a standard curve to quantify unknown samples. (1 hour)

Biomarker Example:

- Demonstration may involve commonly tested biomarkers such as C-reactive protein (CRP), insulin, or cortisol, depending on available reagents and equipment.

Practical Training 11.8 Detection of cardiac/liver markers in test samples

Total duration: 3 Hours

Activity:

- Perform diagnostic assays (e.g., ELISA, lateral flow, or automated immunoassay systems) to detect markers such as:
  - **Cardiac markers:** Troponin I/T, CK-MB
  - **Liver markers:** ALT, AST, ALP, or bilirubin
- Process test samples through:
  - Sample preparation
  - Marker-specific reagent handling
  - Signal detection and result recording
- Use positive and negative controls to assess assay validity.

Adaptation: If facility is not available Videos, simulations, Case studies and simulated lab reports may be used.

Experiential Learning Activity

Experiential-Learning Learning 11.1: Mass spectrometry in metabolomics

Total Duration: 4 Hours

1: Foundation (1 hour)

Topic: Basics of Mass Spectrometry in Metabolomics

- **Recap (30 mins):**
    - What is metabolomics?
    - Principles of mass spectrometry: ionization, mass analyzer, detector
    - Sample preparation for MS (e.g., serum, urine, tissue extracts)
    - GC-MS vs LC-MS: applications and differences
- **live or video:**
    - Sample injection
    - Ion source & spectra generation
    - Interpretation of TIC (Total Ion Chromatogram) and MS spectra

Visual Aids: Animated videos, MS schematic handouts, annotated spectra

2: Hands-On Activity – Spectrum Analysis (1.5 hours)

Topic: Interpretation of MS Data

Activity: Students receive 3 anonymized MS spectra from different biological samples (e.g., fasting serum, diabetic urine, exercise plasma)

- **Group Tasks:**
    - Match peaks to possible metabolites using provided m/z reference sheets
    - Calculate mass-to-charge ratios and infer likely molecular fragments
    - Identify diagnostic biomarkers (e.g., lactic acid, glucose, acylcarnitines)

Outcome: Group prepares a short metabolic summary report per sample.

3: Simulation/Case Correlation (1 hour)

Activity: Virtual Simulation or Clinical Case Correlation

- Use tools like *MetaboAnalyst*, *XCMS Online*, or a custom Excel dataset
- Simulated tasks:
    - Compare control vs diseased states based on metabolite shifts
    - Generate PCA plot or heatmap (pre-prepared or simplified)

- Predict metabolic pathways affected (e.g., TCA, glycolysis)

Case Scenario:

A patient with muscle fatigue and elevated lactate. MS data shows buildup of intermediates suggesting mitochondrial dysfunction.

- **Group task:** Diagnose based on metabolic fingerprint
- Discuss possible interventions and the value of MS in disease monitoring

4: Wrap-Up & Reflection (30 mins)

- Where does MS fit in modern personalized medicine and metabolomics?
- What are the limitations of MS in clinical labs?
- How might MS intersect with traditional diagnostic systems (e.g., Unani, Ayurveda)?

- **Reflection Task (individual or pair):**

"Name one metabolic insight you gained today that could not have been detected without mass spectrometry."

Experiential-Learning Learning 11.2: Application of NMR in drug development

Total Duration: 3 Hours

1: Conceptual Overview (45 minutes)

- **Recap (30 mins):**
  - NMR principles: chemical shifts, coupling constants, spin–spin interactions
  - 1D vs 2D NMR (^{1}H, ^{13}C, COSY, HSQC)
  - Applications in drug development:
    - Structure verification
    - Conformation analysis
    - Ligand–protein interactions (STD-NMR, transferred NOE)
- **Video learning (15 mins):**
  - Walkthrough of NMR spectrum generation

- Real-world sample (e.g., aspirin or paracetamol)

Materials: Annotated NMR spectra, interactive models (e.g., ChemDraw, NMRShiftDB)

2: Hands-On Activity – Structural Analysis (1 hour)

Activity: Analyze real or simulated NMR spectra of 2–3 known drug compounds.

- **Student Tasks:**
  - Identify chemical environments using δ values
  - Assign peaks to specific protons/carbons
  - Compare pre- and post-synthesis spectra for structural verification
  - Evaluate purity and detect impurities

Example Molecules: Aspirin, Ibuprofen, or a synthesized analog

Tools: Paper spectra, NMR software (MNova demo or online viewer), worksheet for assignments

3. Application Case Study – Drug–Target Interaction (1 hour)

Scenario:

A lead molecule binds weakly to an enzyme target. Use STD-NMR data to validate binding and interpret chemical shift changes.

- **Group Tasks:**
  - Analyze chemical shift perturbations from protein-ligand titration
  - Determine binding site residues (hypothetical spectrum)
  - Discuss implications for lead optimization (affinity, solubility)

Extension:

Review a published case or simulated dataset where NMR guided hit-to-lead development.

Output: Each group/Student presents a 3-slide summary of:

1. Spectrum analysis
2. Binding insights
3. Optimization proposal

Wrap-Up & Reflection (15 minutes)

- **Discussion:**
  - Strengths & limitations of NMR vs X-ray or MS in drug development
  - Role of NMR in modern structure-based drug design (SBDD)
- **Reflection Prompt:**

"Which stage of drug development benefits most from NMR and why?"

Experiential-Learning Learning 11.3: Analysis of case reports using both Unani and biochemical perspectives

Total Duration: 7 Hours

1. Panel Discussion: Bridging Mizaj and Biochemical Diagnostics (2 Hours)

- **Activity:** A moderated discussion featuring experts in Unani medicine, clinical biochemistry, and integrative health.
- **Focus:** Explore parallels and distinctions between Mizaj assessment and biochemical profiling.
- **Outcome:** Participants will develop an appreciation for integrative diagnostic perspectives and interdisciplinary communication.

2. Review Article Discussion: Historical Evolution of Biomarker Science in Unani (1.5 Hours)

- **Activity:** Critical review and discussion of scholarly articles tracing biomarker-like concepts in classical Unani texts and their evolution in modern research.
- **Focus:** Identify how traditional concepts foreshadowed modern biomarker science.
- **Outcome:** Enhance skills in literature analysis and foster historical contextualization of diagnostic methods.

3. Seminar: Diagnostic Philosophy – *Tabiat* vs Molecular Indicators (1.5 Hours)

- **Activity:** Learner-led seminar or expert talk examining the philosophical underpinnings of diagnosis in Unani (*Tabiat*, humor balance) versus molecular biology.
- **Focus:** Encourage comparative thinking and conceptual synthesis.
- **Outcome:** Deepen understanding of diagnostic epistemologies and their implications for clinical reasoning.

4. Comparative Analysis Workshop: Alamat (Unani Signs) vs Modern Biomarkers (2 Hours)

- **Activity:** Create detailed comparison charts aligning Unani *alamat* with modern biomarkers for various conditions (e.g., inflammation, metabolic disorders).
- **Focus:** Translate between traditional symptomatology and lab-based evidence.
- **Outcome:** Promote integrative thinking and the ability to contextualize diagnostics across systems of medicine.

Experiential-Learning Learning 11.4: Chromatographic test report evaluation

Total duration: 6 Hours

1. Clinical Report Evaluation (2 hours)

- **Objective:** Develop skills in interpreting chromatography-based diagnostic results.
- **Activity:** Analyze anonymized clinical reports utilizing HPLC data.
- **Outcome:** Participants will identify key chromatographic peaks, correlate retention times with known substances, and draw diagnostic conclusions.

2. Hands-On Data Processing Workshop (2 hours)

- **Objective:** Gain practical experience in processing and analyzing HPLC readouts.
- **Activity:** Use real or simulated HPLC data to perform baseline correction, peak integration, and quantitative analysis using software tools.
- **Outcome:** Participants will be able to transform raw data into interpretable results, enhancing technical competency in chromatographic data handling.

3. Role Play Simulation: Lab Technician Scenario (2 hours)

- **Objective:** Strengthen communication and decision-making skills in a lab environment.
- **Activity:** Role-play scenarios involving a lab technician tasked with interpreting HPLC results for drug testing (e.g., in clinical toxicology or anti-doping contexts).
- **Outcome:** Participants will practice articulating findings, handling uncertain results, and communicating with clinicians or stakeholders.

Experiential-Learning Learning 11.5: Interpretation of case scenarios using biomarker profiles

Total Duration: 6 Hours

1. Clinical Correlation Workshop: Troponin Levels in Myocardial Infarction (2 Hours)

- **Activity:** Review and interpret case scenarios involving patients with suspected myocardial infarction (MI).
- **Focus:** Understand dynamic changes in troponin levels, differentiate between types of MI, and correlate lab data with ECG findings and patient history.
- **Outcome:** Develop competence in recognizing biomarker patterns indicative of acute cardiac events.

2. Small Group Activity: Biomarker-Based Decision Tree (2 Hours)

- **Activity:** Collaboratively construct diagnostic decision trees using biomarker profiles for various clinical conditions (e.g., liver disease, sepsis, endocrine disorders).
- **Focus:** Encourage structured diagnostic thinking and logical interpretation of lab data.
- **Outcome:** Strengthen team-based problem-solving and decision-making skills using biomarker-driven workflows.

3. Problem-Based Learning (PBL): Biomarkers in Personalized Medicine (2 Hours)

- **Activity:** Explore case studies where biomarker profiles guide personalized treatment plans (e.g., HER2 in breast cancer, EGFR in lung cancer, pharmacogenomic markers).
- **Focus:** Link biomarkers to therapeutic strategies and precision diagnostics.
- **Outcome:** Foster a deeper understanding of how biomarkers inform personalized medical approaches and patient-centred care.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. DOAP: (25 marks): Detection of cardiac/liver markers in test samples. DOPS (25 marks): UV-Vis-based enzyme activity assays and interpret absorbance data. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 12 :طبی حیاتی کیمیا Medical Biochemistry

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the clinical significance of enzymes, ions, and metabolites in various pathological states.
2. Perform and interpret common diagnostic biochemical assays.
3. Relate biochemical abnormalities with patient symptoms and clinical manifestations.
4. Evaluate Unani diagnostic concepts using clinical biochemistry tools.

Unit 1 کلینیکل بائیوکیمسٹری clinical biochemistry

12.1.1 امراض کی تشخیص میں کلینیکل بائیوکیمسٹری

Clinical biochemistry in the diagnosis of diseases.

12.1.2 تشخیص میں گیسیں آئنز، پی ایچ، میٹابولک سبسٹریٹس، ہارمونز، اور انزائم کی سطح

Gases, ions, pH, metabolic substrates, hormones, and enzyme levels in diagnosis.

12.1.3۔ تلف الأنسجۃ کے انزائم مارکرز (مثلاً، اے ایس ٹی، اے ایل ٹی، ایل ڈی ایچ، سی کے۔ایم بی، ٹروپونن)

Enzyme markers of tissue damage (e.g., AST, ALT, LDH, CK-MB, troponin).

12.1.4۔ انزائم پر مبنی مقایسہ: گلوکوز، یوریا، کریٹینین

Enzyme-based assays: Glucose, urea, creatinine.

References: 51,52,53,54,55,56,57

3A	3B	3C	3D	3E	3F	3G
CO3,CO4	Describe biochemical basis of disease diagnostics	2	Lecture	CC	Knows-how	L&GD,FC,TUT,ML
CO3,CO4	Perform enzyme-based tests and interpret results	3	Practical12.1	PSY-MEC	Shows-how	DL,PT

CO3,CO4	Perform and document measurement of Liver enzymes and interpret the results	3	Practical12.2	PSY-MEC	Shows-how	PT,D
CO3,CO4	Measure pH and ion concentration in biological fluids	3	Practical12.3	PSY-MEC	Shows-how	D,DL,PT
CO3,CO4	Relate clinical manifestations with underlying biochemical abnormalities to explain disease mechanisms	10	Experiential-Learning12.1	CAN	Does	PrBL,DIS,BS,SDL,CBL

Unit 2 حیاتی کیمیائی تجزیہ biochemical Analysis

12.2.1۔ کلینیکل بائیوکیمسٹری ٹیسٹ (مثلاً، خون کی بائیوکیمسٹری، جگر کے افعال کے ٹیسٹ گردے کے افعال کے ٹیسٹ، لیپڈ پروفائل اور پیشاب کی بائیوکیمسٹری)۔

Clinical biochemistry tests (e.g., blood biochemistry, liver function tests, kidney function tests, lipid profile and urine biochemistry).

12.2.2 حیاتی کیمیائی بے ضابطگیوں اور کلینیکل مظاہر کے درمیان باہمی تعلق

Correlation between biochemical abnormalities and clinical manifestations.

12.2.3 یونانی اصولوں کی توثیق میں حیاتی کیمیائی تکنیکوں کا کردار

Role of biochemical techniques in validation of Unani principles.

References: 22,25,51,52,53,54,55,56,57

3A	3B	3C	3D	3E	3F	3G
CO2,CO3, CO4	Interpret major clinical biochemical profiles (Blood biochemistry, LFT, KFT, lipid profile, urine biochemistry)	5	Lecture	CC	Knows-how	DIS,LRI,L&PPT ,PER
CO1,CO2, CO3,CO4	Estimate the role of biochemistry in validating Unani concepts	3	Lecture	CC	Knows-how	L,TUT,Mnt,SDL,IBL
CO2,CO3, CO4	Perform analysis of test reports and correlate findings	8	Practical12.4	PSY-MEC	Shows-how	DIS,SIM,W,LRI,CBL

CO2,CO3, CO4	Evaluate diagnostic reasoning using biochemical data	6	Experiential-Learning12.2	CE	Does	CBL,DIS,LRI,PSM,SIM
CO1,CO2, CO3,CO4, CO5	Design validation of Akhlat using biochemical states	10	Experiential-Learning12.3	PSY-ORG	Does	SDL,PER,W,PrBL,C_L
CO1,CO2, CO3,CO4	Measure *Mizaj* and compare with biochemical findings	3	Practical12.5	PSY-MEC	Does	LRI,RLE,PrBL,PT,CBL

Practical Training Activity

Practical Training 12.1 Glucose and urea estimation assays

Total Duration: 3 Hours

1. **Glucose Estimation: (1.5 Hours)**
    - Perform the glucose oxidase-peroxidase (GOD-POD) method.
    - Prepare standards and test samples.
    - Measure absorbance using a spectrophotometer.
    - Plot a standard curve and calculate glucose concentrations.
2. **Urea Estimation: (1.5 Hours)**
    - Perform the Urease–Berthelot method or diacetyl monoxime method.
    - Follow similar steps: reagent handling, incubation, absorbance measurement, and data interpretation.

Practical Training 12.2 Liver enzyme profile measurement

Total Duration: 3 Hours

Activity

- Perform spectrophotometric assays for the following enzymes:
    - **Alanine aminotransferase (ALT)**
    - **Aspartate aminotransferase (AST)**
    - **Alkaline phosphatase (ALP)**
    - (Optional: Gamma-glutamyl transferase, GGT)
- Follow standard protocols for reagent preparation, sample handling, and incubation conditions.
- Measure enzyme activity using a spectrophotometer based on NADH consumption or chromogenic substrates.
- Interpret results in relation to reference ranges and possible pathological states.

Practical Training 12.3 pH and ion concentration measurement in biological fluids

Total Duration: 3 hours

1. pH Measurement: (1 Hour)

- Use a calibrated digital pH meter to measure the pH of simulated biological fluids (e.g., saliva, urine, plasma substitutes).
    - Understand proper sample handling and calibration procedures.
    - Discuss the physiological significance of pH variations.

2. Ion Concentration Estimation: (2 Hours)

- Measure concentrations of key electrolytes such as:
    - **Sodium (Na^+)**
    - **Potassium (K^+)**
    - **Chloride (Cl^-)**
    - **Calcium (Ca^{2+})**
- Methods may include:
    - **Ion-selective electrodes (ISE)**
    - **Colorimetric methods** (e.g., flame photometry, titration kits if ISE not available)

- Compare measured values with normal reference ranges.

Practical Training 12.4 Interpreting liver, kidney and lipid test reports

Total Duration: 8 Hours

1. Report Interpretation Workshop (3 Hours)

- **Activity:** Analyze a range of real or simulated laboratory reports covering:
  - **Liver Function Tests (LFTs):** ALT, AST, ALP, bilirubin, albumin
  - **Renal Function Tests (RFTs):** Urea, creatinine, eGFR, electrolytes
  - **Lipid Profile:** Total cholesterol, HDL, LDL, triglycerides
- **Focus:** Identify normal and abnormal values, patterns suggestive of specific conditions (e.g., obstructive jaundice, nephrotic syndrome, dyslipidemia).
- **Outcome:** Build proficiency in clinical-laboratory correlation.

2. Diagnostic Summary Preparation (2 Hours)

- **Activity:** Based on interpreted reports, students prepare concise diagnostic summaries highlighting:
  - Key abnormal findings
  - Possible diagnoses or differential diagnoses
  - Recommended follow-up or additional investigations
- **Outcome:** Enhance clarity and precision in clinical communication.

3. Simulated Practice: Patient Case Report Writing (3 Hours)

- **Activity:** Create complete case reports integrating:
  - Patient history and symptoms
  - Lab report interpretations
  - Final diagnostic impression and clinical recommendations
- **Format:** Simulated electronic health record (EHR) format or narrative case sheet.
- **Outcome:** Develop documentation skills essential for clinical and academic settings.

Practical Training 12.5 Document *Mizaj* and compare with biomarker findings

Total Duration: 3 Hours

1. **Mizaj Assessment (1 Hour)**
    - **Activity:** Use standardized Unani *Mizaj* assessment tools or questionnaires (e.g., temperament scoring based on physical, psychological, and functional traits).
    - **Outcome:** Determine the dominant *Mizaj* type (e.g., Damwi, Safrawi, Balghami, Saudawi) for each participant or provided case.
2. **Biomarker Data Analysis (1 Hour)**
    - **Activity:** Review corresponding biochemical test data (e.g., lipid profile, glucose level, inflammatory markers, LFTs).
    - **Task:** Identify patterns or markers that may relate to traits associated with specific *Mizaj* types.
    - **Example:** Compare *Safrawi* individuals with lipid and liver enzyme levels; examine *Balghami* types for glucose metabolism.
3. **Comparison and Documentation (1 Hour)**
    - **Activity:** Create a structured comparative report including:
        - Documented *Mizaj* profile
        - Relevant biochemical findings
        - Observations on any congruence or contrast
    - **Optional:** Group discussion on interpretive challenges and hypotheses.

Experiential Learning Activity

Experiential-Learning Learning 12.1: Biochemical abnormalities to Clinical findings

Total Duration: 10 Hours

1. Case-Based Correlation Sessions (4 Hours)

- **Activity:** Analyze detailed clinical case scenarios representing various organ systems (e.g., hepatic, renal, endocrine, cardiac).

- **Focus:** Match clinical signs (e.g., jaundice, edema, polyuria) with corresponding biochemical abnormalities (e.g., elevated bilirubin, hypoalbuminemia, hyperglycemia).
- **Outcome:** Strengthen the ability to interpret lab results in a clinical context.

2. Clinical Simulation Exercises (2 Hours)

- **Activity:** Simulated patient encounters or role-play where students interpret provided lab panels and propose possible diagnoses or next steps.
- **Focus:** Enhance decision-making under realistic conditions.
- **Outcome:** Improve diagnostic confidence and teamwork.

3. Interdisciplinary Group Discussions (2 Hours)

- **Activity:** Collaborative discussions with inputs from biochemistry, pathology, and clinical medicine.
- **Focus:** Explore the pathophysiological basis of laboratory abnormalities.
- **Outcome:** Foster integrative thinking across disciplines.

4. Mini-Project: Diagnostic Summary Presentation (2 Hours)

- **Activity:** Students select a clinical condition (e.g., diabetic ketoacidosis, nephrotic syndrome, myocardial infarction) and prepare a short presentation linking symptoms, biochemical findings, and diagnostic rationale.
- **Outcome:** Consolidate knowledge and enhance communication skills.

Experiential-Learning Learning 12.2: Diagnostic reasoning using biochemical data

Total Duration: 6 Hours

1. Clinical Scenario Simulation: Jaundice vs Nephropathy (3 Hours)

- **Activity:** Students engage with detailed case simulations involving:
  - A patient presenting with jaundice (evaluate LFTs: bilirubin, ALT, AST, ALP)
  - A patient with signs of nephropathy (analyze RFTs: creatinine, urea, electrolytes, eGFR)
- **Task:** Identify biochemical abnormalities, correlate with symptoms, and determine possible etiologies (e.g., obstructive vs hepatic jaundice, acute vs chronic kidney disease).

- **Outcome:** Strengthen pattern recognition and differential diagnosis skills.

2. Problem-Solving Workshop: Mixed Clinical-Lab Correlation (3 Hours)

- **Activity:** Participants solve integrated clinical problems that combine symptoms, physical exam findings, and mixed lab results (e.g., altered LFTs and RFTs, or comorbidities such as diabetes with nephropathy).
- **Format:** Small groups work through cases using guided diagnostic flowcharts and justify clinical decisions.
- **Outcome:** Develop critical thinking and team-based diagnostic approaches.

Experiential-Learning Learning 12.3: Unani validation workshop: Akhlat and biochemical states

Total Duration: 10 Hours

1. Theoretical Foundation Session (2 Hours)

- **Activity:** Recap on:
  - The four *Akhlat* (Dam, Balgham, Safra, Sauda) in Unani physiology
  - Corresponding modern biochemical functions (e.g., blood composition, inflammatory markers, metabolic indicators)
- **Outcome:** Establish a conceptual bridge between Unani and biomedical frameworks.

2. Comparative Case Studies (2 Hours)

- **Activity:** Analyze clinical cases from both Unani and modern perspectives.
  - Identify traditional signs of *humoral imbalance*
  - Match with biochemical markers (e.g., lipid profile, anemia profile, urea/creatinine)
- **Outcome:** Demonstrate practical correlations and develop integrative diagnostic thinking.

3. Data Mapping and Charting Activity (2 Hours)

- **Activity:** Small group exercise to:
  - Create cross-referenced charts linking Unani *Akhlat* characteristics (colour, consistency, qualities) with specific biochemical parameters
  - Highlight overlaps and conceptual differences
- **Outcome:** Visualize relationships and support hypothesis generation for integrative models.

4. Mini-Research Proposal Development (2 Hours)

- **Activity:** Participants design brief research outlines to investigate specific *Akhlat*-biomarker relationships (e.g., *Balgham* and insulin resistance)
- **Focus:** Include hypothesis, biomarkers of interest, and proposed validation methods.
- **Outcome:** Encourage evidence-based exploration of Unani diagnostics.

5. Group Presentation & Expert Feedback (2 Hours)

- **Activity:** Each group presents their case analysis, chart, or mini-research proposal.
- **Feedback:** Provided by a panel of Unani scholars and biomedical experts.
- **Outcome:** Encourage critical discussion and refine interdisciplinary understanding.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Open Book Test (10 marks): The students may be given an open book test on Role of biochemistry in validating Unani concepts. Structured LAQ (10 Marks): on Interpret major clinical biochemical profiles. (Blood biochemistry, LFT, KFT, lipid profile, urine biochemistry. Log Book (15 Marks): Log Book entry of Practical on pH and ion concentration measurement in biological fluids may be taken as assessment. Practical Viva (15 Marks): Analyze test reports and correlate findings. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 5

Module 13 : اساس جینیاتFoundations of Genetics

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Analyze the historical development of genetics and its philosophical relevance to Unani concepts.
2. Describe the structure and function of DNA, RNA, and genes and their physiological roles.
3. Discuss the principles of inheritance and apply them to human traits and disease susceptibility.
4. Outline the molecular mechanisms of replication, transcription, translation, and gene expression.
5. Identify the physiological consequences of genetic mutations and chromosomal abnormalities.
6. Analyze gene-environment interactions and their impact on health and disease.
7. Evaluate the relevance of genetic tools in public health and Unani research.

Unit 1 تاریخی اور مالیکیولر بنیادیںHistorical and Molecular Foundations

13.1.1 مینڈل کے تجربات اور وراثت کے قوانین

Mendel's experiments and laws of inheritance

13.1.2 طبی جینیات کے ماخذ اور اثرات

Origins and impact of medical genetics

13.1.3 ڈی این اے کی موروثی مواد کے طور پر دریافت

Discovery of DNA as hereditary material

13.1.4 ڈی این اے کی ساخت، تکرار، اور افعال

DNA structure, replication, and function

13.1.5 جین کا اظہار (ٹرانسکرپشن، ٹرانسلیشن)

Gene expression (transcription, translation)

13.1.6 میوٹیشنز کی اقسام اور اثرات

Types and effects of mutations

13.1.7 "آر این اے (ایم آر این اے، ٹی آر این اے، آر آر این اے) کی ساخت اور اقسام اور جین کے اظہار میں ان کے کردار

Structure and types of RNA (mRNA, tRNA, rRNA) and their roles in gene expression

13.1.8 یونانی مفاہیم سے فلسفیانہ مطابقت

Philosophical relevance to Unani concepts

13.1.9 "طبی مثالوں کا استعمال کرتے ہوئے یونانی موروثی اصولوں کا جدید وراثتی نمونوں کے ساتھ ادغام

Integration of Unani hereditary principles with modern inheritance patterns using clinical examples

References: 1,11,15,18,19,20,21,22,45,58,59,60,61,62,63,64,65,179

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe historical milestones in human genetics, including Mendel's laws and human genome project	1	Lecture	CC	Knows-how	SDL,TUT,L&PPT ,LS
CO3,CO4	Discuss the molecular structure of human DNA and its organization in the genome and analyze the structural-functional relationships of DNA and genes	1	Lecture	CC	Knows-how	L&PPT ,FC,TUT,SDL
CO1,CO3, CO4	Analyze the impact of medical genetics on human healthcare and reflect on Unani concepts of inheritance (e.g., *Moroosiyat*, *Quwat-e-Muallidah*, *Musawwirah*, *Mizaj*, *Tabi'at*) with principles of modern genetics	1	Lecture	CAN	Knows-how	LS,L&GD,TUT,JC
CO2,CO3	Demonstrate understanding of the societal impact of genetics in medicine through structured presentations	3	Practical13.1	CAP	Shows-how	BS,PrBL,Mnt,DIS,PER
CO1,CO2, CO3,CO4	Adapt integration of molecular genetics in Unani medical concepts	3	Experiential-Learning13.1	PSY-ADT	Does	SY,PL,Mnt,JC,DIS

CO3	Analyze the structure, function, and regulatory roles of mRNA, tRNA, rRNA, and ncRNA in gene expression	1	Lecture	CAN	Knows-how	L&PPT ,TUT,SDL
CO3	Prepare and interpret a 3D paper-based DNA model to analyze structure-function relationships and their relevance to genetic regulation and expression	3	Practical13.2	PSY-SET	Shows-how	TBL,BL,CBL,PER,D-M
CO3,CO4	Demonstrate RNA's role in clinical disorders through integrated case analysis	3	Experiential-Learning13.2	PSY-SET	Does	TBL,JC,DIS,PBL,SDL
CO3,CO5, CO6	Appraise the ethical implications of genetic discoveries	3	Experiential-Learning13.3	AFT-RES	Does	CBL,SDL,BS,C_L,DIS
CO1,CO2, CO3,CO4, CO5	Analyze Unani interpretations of hereditary abnormalities in relation to modern genetic disorders to develop an integrative understanding with clinical relevance	6	Experiential-Learning13.4	CAN	Knows-how	DIS,LS,BS,PAL,PER

Unit 2 انسانی کروموسومل ساخت اور جینیاتی تغیر Human Chromosomal Structure and Genetic Variation

13.2.1 انسانوں میں می اوسس اور گیمیٹو جینسس کے عمل

Meiosis and gametogenesis processes in humans

13.2.2 انسانی کروموسوم کی ساخت اور تنظیم

Human chromosome structure and organization

13.2.3 انسانی کروموسومل بے ضابطگیوں کی اقسام (این یوپلائیڈی، ٹرانسلوکیشنز)

Types of human chromosome abnormalities

(aneuploidy, translocations) -

13.2.4 انسانوں میں جینیاتی تغیر کے ماخذ (میوٹیشنز، پولیمارفزمز، سی این ویز)

Origins of genetic variation in humans (mutations,

polymorphisms, CNVs) -

13.2.5انسانی جینیاتی تغیر کے کھوج کے طریقے (این جی ایس، ارے سی جی ایچ)

Detection methods for human genetic variation (NGS,

array CGH) -

13.2.6انسانی طِرَازٌ مَظْہرِیؒ اور امراض پر جینیاتی تغیر کا اثر

Impact of genetic variation on human phenotypes and disease

References: 58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO3	Evaluate chromosome structure, meiosis, and gametogenesis in the context of genomic instability	1	Lecture	CE	Knows-how	TUT,EDU,L&PPT ,DIS
CO3	Analyze types and mechanisms of human chromosomal abnormalities	1	Lecture	CAN	Knows-how	PER,TUT,DIS,SDL,L &PPT
CO3	Discuss RNA-mediated regulatory mechanisms using creative tools and teamwork	3	Practical13.3	CC	Shows-how	SIM,DIS,PL,C_L,BL
CO3,CO4	Analyze human karyotypes to identify common chromosomal abnormalities and interpret pedigree charts to determine inheritance patterns of genetic traits	3	Practical13.4	CAN	Shows-how	BS,SIM,CBL,DIS,LR I
CO3,CO4, CO5	Perform analysis of human chromosomal disorders through case-based learning	3	Experiential-Learning13.5	PSY-MEC	Does	BL,SDL,CBL,BS
CO2,CO3, CO5	Formulate approaches to explain genetic variation concepts to patients using Unani frameworks	4	Experiential-Learning13.6	PSY-ORG	Does	DIS,BS,BL,RP,PAL

CO3,CO4	Demonstrate skills to differentiate between mutation and polymorphism and interpret their clinical relevance	1	Practical13.5	PSY-SET	Shows-how	Mnt,TUT,C_L,CBL,BL

Unit 3 انسانی آبادی کی جینیات اور وراثتی نمونے Human Population Genetics and Inheritance Patterns

13.3.1 انسانی آبادیوں میں ایلیل اور جینوٹائپ کی فریکوئنسیز

Allele and genotype frequencies in human populations

13.3.2 انسانی جینیات میں ہارڈی-وائنبرگ توازن کے اصول

Hardy-Weinberg equilibrium principles in human genetics

13.3.3 انسانوں میں جینیاتی لنکیج، ریکمبینیشن، اور لنکیج عدم توازن

Genetic linkage, recombination, and linkage disequilibrium in humans

13.3.4 انسانی خصوصیات میں وراثت پذیری کے مفاہیم اور مقداری جینیات

Heritability concepts and quantitative genetics in human traits

13.3.5 انسانی امراض میں آٹوسومل ڈومینینٹ/ریسیسو وراثت

Autosomal dominant/recessive inheritance in human disorders

13.3.6 انسانوں میں ایکس-لنکڈ، وائی-لنکڈ، مائٹوکونڈریل وراثت

X-linked, Y-linked, mitochondrial inheritance in humans

13.3.7 انسانوں میں غیر روایتی وراثت (موزیکزم، امپرنٹنگ، ٹرائی نیوکلیوٹائیڈ ریپیٹس)

Nontraditional inheritance in humans (mosaicism, imprinting, trinucleotide repeats)

13.3.8 انسانی جینیاتی امراض کے لیے ایمپیرک خطرات اور دوبارہ ہونے کے خطرات

Empiric risks and recurrence risks for human genetic disorders

13.3.9 انسانی جینیاتی خطرے کے حساب کتاب کے لیے پروبیبلٹی اور بے کا تھیورم

Probability and Bayes' theorem for human genetic risk calculation

References: 15,18,45,58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G

CO3,CO4	Differentiate allele, allele frequencies and Hardy-Weinberg equilibrium in human populations	1	Lecture	CAN	Knows-how	L&PPT ,TUT,DIS,LS
CO3,CO4	Analyze different patterns of inheritance in human genetic disorders	1	Lecture	CAN	Knows-how	TUT,SDL,L&PPT
CO3,CO4	Evaluate risk calculation methods for genetic counseling in human disorders	1	Lecture	CE	Shows-how	TUT,DIS,JC,L&GD
CO2,CO3, CO4	Evaluate human pedigrees analysis to identify modes of inheritance and assess genetic risks in family scenarios	4	Practical13.6	CE	Shows-how	BL,D,PT,PAL,PER
CO3,CO4, CO5	Perform analysis of complex human genetic disorders through case-based learning and apply genetic principles to risk assessment and clinical decision-making	4	Experiential-Learning13.7	PSY-MEC	Does	SDL,TPW,CBL,C_L, DIS
CO3,CO4, CO6	Apply probability principles and Bayes' theorem to calculate genetic risks and communicate them effectively in clinical scenarios	3	Practical13.7	PSY-SET	Shows-how	RLE,CBL,DIS,PSM, BL
CO3	Discuss polygenic and mitochondrial inheritance with disease correlation	1	Lecture	CC	Knows-how	DIS,SDL,PER,L&GD

Practical Training Activity

Practical Training 13.1 Societal impact of genetics in medicine

Total Duration 3 hours

1. Introduction & Group Formation (30 min)

Teacher introduces key societal issues in genetics (e.g., ethical concerns, genetic testing, public perception). Students are divided into small groups and assigned/choose a topic.

2. Group Work: Research & Slide Preparation (45 min)

Students prepare a 5–7 minute presentation on their topic, including Unani concepts (e.g., *Warasat*, *Miza*j).

Teacher guides and mentors groups as needed.

3. Group Presentations & Peer Interaction (60 min)

Each group presents, followed by brief Q&A and peer feedback.

Teacher moderates, asks reflective questions, and assesses communication.

4. Debrief & Reflection (30 min)

Open discussion linking presentations to clinical practice and Unani perspectives.

Teacher facilitates and highlights key takeaways.

5. Feedback & Assessment (15 min)

Presentations assessed formatively on content, communication, teamwork, and Unani integration.

Students submit slides and receive feedback.

Practical Training 13.2 DNA model to analyze structure-function relationships

Total duration 3 hours

1. Task Briefing & Challenge Assignment (15 min)

Teacher will give instructions to not only build the DNA model but also highlight regions relevant to transcription, mutation hotspots, and gene expression control.

Students will receive guiding questions and challenge prompts (e.g., “Mark a promoter region,” “Show where mutations could alter function”).

2. Advanced Model Building (90 min)

Students work in pairs or small groups to build the DNA model and annotate it with features like promoter sites, coding regions, introns/exons, and mutation-prone areas.

3. Group Presentation & Peer Review (30 min)

Each group presents their model, explains the significance of marked regions (e.g., why a mutation in this spot matters), and receives peer feedback.

4. Reflection & Submission (45 min)

Students submit a short written summary explaining how their model illustrates genetic structure and function, and where regulation or mutations might occur.

At the end, the teacher provides feedback on clarity, accuracy, and application of genetic principles.

Practical Training 13.3 RNA-mediated regulatory mechanisms

Total duration 3 hours

1. Task Briefing & Idea Kickoff (30 min)

Students get a quick intro to RNA regulation (e.g., miRNA, siRNA, lncRNA).

Teacher shares 1–2 simple examples, then asks students to create a hands-on or visual simulation (e.g., skit, flow model, storyboard).

2. Simulation Development (90 min)

Students form small groups and design their simulation using simple materials—paper cutouts, markers, role-play, or digital tools.

They must show how RNA regulates gene expression, inhibits translation, or degrades mRNA.

3. Group Performances & Peer Feedback (30 min)

Each group presents their simulation. Others watch, ask questions, and give feedback on clarity and creativity.

4. Debrief & Reflection (30 min)

Students reflect (written or oral) on what they learned about RNA-based regulation.

Teacher shares 2–3 wrap-up points, and gives brief feedback to each group.

Practical Training 13.4 Human Inheritance: Karyotype and Pedigree Studies

Total duration 3 hours

1. Karyotype Analysis (60 min)

Students will find printed or digital karyotype images (e.g., Down syndrome, Turner syndrome, Klinefelter syndrome).

They work individually or in pairs to identify abnormalities (e.g., trisomy, monosomy, structural changes).

Each student completes a worksheet noting findings and clinical relevance.

2. Pedigree Interpretation (60 min)

Groups are given different pedigree charts representing autosomal dominant, autosomal recessive, X-linked, and mitochondrial inheritance.

They analyze and annotate patterns, identifying affected individuals and predicting genotypes.

Each group summarizes their interpretation and justifies the mode of inheritance.

3. Group Presentations & Peer Discussion (30 min)

Each group presents one pedigree chart and explains their reasoning.

Peer questions and alternate interpretations are encouraged for deeper understanding.

4. Reflection & Instructor Feedback (30 min)

Students write a brief reflection on how karyotype and pedigree analysis can aid diagnosis and genetic counseling.

Instructor provides feedback on accuracy, logic, and interpretation quality.

Practical Training 13.5 Genetic Variation – Mutation and Polymorphism

Total Duration:1 hour

Materials Needed:

- DNA sequence comparison sheets
- Mutation vs. polymorphism flowchart
- Case snippets involving known mutations and polymorphisms

1. Concept Review & Group Task (20 min)

Brief review of definitions and differences between mutation and polymorphism (e.g., frequency, impact, inheritance).

Groups receive DNA sequence pairs—identify changes and classify them as mutation or polymorphism using a flowchart.

2. Clinical Case Interpretation (25 min)

Groups analyze short clinical cases (e.g., sickle cell disease vs. benign SNP in CYP450 gene).

Identify type of variation involved and its impact on phenotype or drug response.

Document reasoning using a structured template.

3. Summary & Feedback (15 min)

Each group shares one finding.

Instructor clarifies common misunderstandings and summarizes key distinctions.

Practical Training 13.6 Pedigree analysis

Total duration 4 hours

Materials Needed:

- Pedigree symbols guide
- Blank pedigree charts
- Case scenario sheets
- Colored pencils
- Inheritance pattern reference templates

1. Introduction to Pedigree Symbols (30 min)

Review standardized symbols and notation for constructing human pedigrees.

Quick individual practice with sample family structures.

2. Pedigree Construction (60 min)

Groups receive different family case scenarios.

Construct detailed pedigrees using correct symbols and relationships.

Use colored pencils to highlight affected individuals, carriers, and generations.

3. Inheritance Pattern Analysis (60 min)

Analyze each pedigree to determine the most likely inheritance pattern:

- Autosomal dominant
- Autosomal recessive
- X-linked dominant

- X-linked recessive
- Mitochondrial
- Complex/multifactorial

Identify carriers and individuals at risk.

Document rationale for each determination.

4. Peer Presentation & Discussion (45 min)

Each group presents one case analysis and explains their interpretation.

Peers verify accuracy, ask questions, and offer alternative explanations.

5. Reference Guide Creation (30 min)

Groups summarize key features of each inheritance type.

Compile findings into a **quick-reference guide** for future use.

6. Reflection & Wrap-Up (15 min)

Brief written reflection on the clinical relevance of pedigree analysis.

Instructor provides overall feedback and highlights common pitfalls.

Practical Training 13.7 Genetic Risk Calculation

Total Duration 3 hours

Materials Needed:

- Probability concept worksheets
- Calculators
- Bayes' theorem formula sheets
- Case scenario handouts
- Decision tree templates

1. Concept Review (30 min)

Quick revision of basic probability rules and Bayes' theorem.

Discuss relevance to genetic counseling and risk estimation.

2. Risk Calculation Practice (60 min)

Students solve structured case scenarios involving:

- Autosomal recessive/dominant inheritance
- Carrier risk estimation from pedigree data
- Conditional probabilities based on genetic test results

  Each student completes a worksheet showing step-by-step calculations.

3. Decision Tree Construction (30 min)

Groups create decision trees to map out logic for complex cases (e.g., multiple family members with varied test results).

Helps visualize how risk estimates change with new information.

4. Real-World Application (30 min)

Apply learned methods to real or simulated genetic counseling cases.

Calculate recurrence risk and interpret results in a clinical context.

5. Communication Strategy Development (30 min)

Groups develop a simple, patient-friendly guide on how to explain calculated risks.

Discuss tone, clarity, and ethical considerations in risk communication.

Experiential Learning Activity

Experiential-Learning Learning 13.1: Integration of molecular genetics with Unani medical concepts

Total duration: 3 hours

1. Concept Exploration (45 min)

Students are divided into groups.

Each group reviews traditional Unani texts (e.g., *Mizaj*,,takwin janeen hereditary traits) and modern genetics sources (e.g., genes, DNA, inheritance).

They extract key concepts from both systems.

2. Comparative Analysis & Integration (75 min)

Groups create comparison charts showing parallels and differences (e.g., *Mizaj* vs genotype, trait transmission).

They identify points of convergence/divergence and collaboratively design an integrated clinical framework.

Each group develops one short clinical case applying the integrated model.

3. Group Presentations (30 min)

Each group presents their comparison chart, integrated framework, and clinical case.

Peer questions and brief discussion follow to enhance conceptual clarity.

4. Reflection & Documentation (30 min)

Students reflect individually on how the integrated approach can enhance patient understanding and care.

Instructor gives targeted feedback and compiles group outputs into a reference document for future use.

Experiential-Learning Learning 13.2: RNA's role in clinical disorders

Total Duration: 3 hours

1. Case Introduction & Independent Review (45 min)

Students are given 2 short clinical cases involving RNA-linked disorders (e.g., thalassemia, miRNA in cancer).

They read individually and highlight key genetic features and RNA-related mechanisms.

2. Group Analysis & Discussion (75 min)

In small groups, students discuss the cases, map out the RNA involvement (e.g., splicing errors, regulatory RNAs), and predict clinical outcomes.

They complete a worksheet with their findings and reasoning.

3. Case Presentations (30 min)

Each group shares one case summary and explains how RNA mechanisms contributed to the disorder.

Peers ask clarifying questions or offer alternate views.

4. Reflection & Feedback (30 min)

Students write a short reflection on how the session changed or deepened their understanding of RNA in disease.

Teacher gives brief, focused feedback on the worksheets and group reasoning.

Experiential-Learning Learning 13.3: Ethical implications of genetic discoveries

Total Duration: 3 hours

1. Watch & Reflect (75 min)

Students watch a short video or read a case story about a real-life ethical issue in genetics (e.g., gene editing, genetic privacy). Each student writes a short reflection about what they felt, understood, and questioned.

2. Group Sharing (45 min)

Students form small groups and share their reflections. They listen to each other, discuss different viewpoints, and connect the issues with Unani values and principles of ethics.

3. Class Wrap-Up (30 min)

Students share key insights from their group discussions. The class reflects on what was learned and the ethical relevance to clinical and Unani practice.

4. Submission & Feedback (30 min)

Students submit their written reflections. The teacher provides brief feedback (written or oral) on their understanding of the ethical issues.

Experiential-Learning Learning 13.4: Integrative Mapping of Unani and Modern Genetic Perspectives

Total Duration: 6 Hours

1. Literature Review & Thematic Mapping (90 min)

Groups explore Unani descriptions of hereditary traits and abnormalities (e.g., *'Awarith*, *Taqreeb Mizaj*, *Isti'dad*, *Suar-e-Nau'iyah*) and identify corresponding themes in modern genetics (e.g., mutations, inheritance patterns, gene-environment interaction).

2. Selection of Disorders & Comparative Analysis (90 min)

Each group selects 2–3 modern genetic disorders (e.g., hemophilia, thalassemia, albinism).

They map these disorders to relevant Unani interpretations based on symptom patterns, etiological concepts, and familial tendencies.

Complete a structured analysis template comparing:

- Terminology and conceptual basis
- Understanding of transmission and causation
- Clinical manifestations and approaches

3. Case Study Development (60 min)

Develop hybrid case studies showing both Unani and modern views of selected disorders.

Include diagnostic interpretation, explanation of pathogenesis, and management strategies from both systems.

4. Group Presentations & Peer Review (60 min)

Present comparative findings and case studies.

Engage peers in discussion on areas of convergence/divergence and clinical implications.

5. Framework Compilation & Reflection (60 min)

Groups compile their insights into a **Unani-modern mapping framework** document for clinical education and application.

Students reflect on the potential benefits and challenges of integrative interpretation in patient care.

Experiential-Learning Learning 13.5: Chromosomal disorders

Total duration 3 hour

1. Case Assignment & Group Research (60 min)

Students are divided into small groups.

Each group receives a different clinical case involving a chromosomal disorder (e.g., Down syndrome, Turner syndrome, Cri-du-chat).

They research the genetic mechanism, clinical features, diagnostic methods, and management options.

2. Case Analysis & Reasoning Map Development (60 min)

Groups create a detailed case analysis covering:

- Chromosomal abnormality and genetic mechanism
- Clinical presentation and disease progression
- Diagnostic criteria and tools
- Management strategies and genetic counseling points

Each group also designs a **clinical reasoning map** outlining their stepwise diagnostic and decision-making process.

3. Presentations & Peer Feedback (30 min)

Groups present their cases, clinical reasoning maps, and management plans.

Peer feedback and guided discussion follow each presentation to promote collaborative learning.

4. Reflection & Compilation (30 min)

Instructor facilitates a short reflection session.

All group outputs (case reports + maps) are compiled into a lpgbook for future academic or clinical use.

Experiential-Learning Learning 13.6: Patient communication framework

Total Duration: 4 Hours

1. Research & Concept Mapping (45 min)

Students explore effective methods for patient-friendly communication of genetic concepts.

They identify relevant Unani concepts (e.g., *Mizaj*, *Isti'dad*, *Taqreeb*) that can explain variation.

2. Integration & Material Development (60 min)

Groups create analogies, diagrams, and sample content integrating Unani and modern genetics.

Develop patient education materials for common genetic traits/disorders (e.g., thalassemia, skin color variation).

3. Role-Play Communication Practice (60 min)

Groups perform simulated patient interactions using their developed materials.

Scenarios include different cultural and literacy backgrounds.

Peers observe and give structured feedback on clarity and cultural sensitivity.

4. Refinement & Framework Creation (45 min)

Based on feedback, students refine their materials and communication approach.

They compile best practices into a unified patient communication framework.

5. Reflection & Wrap-Up (30 min)

Students write a brief reflection on the importance of integrating traditional frameworks for effective patient education.

Instructor provides general feedback and summarizes takeaways.

Experiential-Learning Learning 13.7: Human Genetic Disorders Case Analysis

Total duration 4 hours

Materials Needed:

- Clinical case files
- Family history data
- Reference materials (textbooks, online databases)
- Pedigree and risk analysis templates

1. Case Assignment & Research (60 min)

Students are divided into small groups, each assigned a different genetic disorder (e.g., cystic fibrosis, Duchenne muscular dystrophy, Marfan syndrome).

They research the molecular and genetic basis of the disorder and its mode of inheritance.

2. Family History Analysis & Risk Calculation (60 min)

Groups analyze provided pedigree data to confirm inheritance patterns.

They calculate recurrence risks for affected, carrier, and unaffected family members using appropriate tools and methods.

3. Case Analysis Development (30 min)

Each group prepares a comprehensive case report including:

- Genetic basis and inheritance pattern
- Pedigree interpretation and risk calculations
- Diagnostic testing options and their limitations
- Management strategies, genetic counseling, and prevention possibilities

4. Case Presentations & Peer Discussion (45 min)

Groups present their case analyses in a case conference format.

Peers provide feedback, ask questions, and discuss alternative approaches.

5. Reference Guide Compilation (45 min)

Groups consolidate their findings into a concise **reference guide** for clinical application, summarizing inheritance, diagnosis, risk, and management strategies for each disorder.

6. Reflection & Wrap-Up (30 min)

Students reflect on how genetic case analysis informs clinical decision-making and patient care.

Instructor provides feedback on group performance and key learning points.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.	4

Viva (20 marks): shall be conducted on topics like structural-functional relationships of DNA and genes, mutations and their consequences on protein structure and physiology, Mendelian and non-Mendelian inheritance and their physiological relevance and Interpret pedigree charts and inheritance patterns. Log Book (15 marks): Log book entry of Practical on - Simulate RNA-mediated regulatory mechanisms using creative tools and teamwork shall be evaluated. Creative Writing (15 marks): on the topic- RNA's role in clinical disorders through integrated case analysis. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Module 14 : Human Genetic Disorders and Diagnostic Approaches

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Analyze chromosomal and biochemical disorders in humans and their diagnostic approaches
2. Evaluate monogenic and developmental disorders in humans and their molecular basis
3. Describe the genetic architecture of human complex disorders and pharmacogenetic principles
4. Demonstrate practical skills in genetic diagnostic techniques using low-tech approaches
5. Apply genetic diagnostic principles to clinical scenarios from a Unani perspective
6. Design patient-centered approaches for genetic testing and counseling
7. Develop integrated frameworks for understanding genetic disorders in Unani medicine

Unit 1 انسانی کروموسومل اور حیاتی کیمیائی امراض Human Chromosomal and Biochemical Disorders

14.1.1 انسانی تشخیص میں کروموسوم بینڈنگ تکنیکیں

Chromosome banding techniques in human diagnostics

14.1.2 انسانی جینیاتی ٹیسٹنگ میں مالیکیولر سائٹوجنیٹکس (فش، ارے سی جی ایچ)

Molecular cytogenetics in human genetic testing (FISH, array CGH)

14.1.3 انسانی آٹوسومز اور جنسی کروموسومز کے امراض

Disorders of human autosomes and sex chromosomes

14.1.4 انسانوں میں میٹابولزم کی پیدائشی خرابیاں

Inborn errors of metabolism in humans

14.1.5 انسانی مائٹوکونڈریل امراض اور ان کی جینیات

Human mitochondrial disorders and their genetics

14.1.6 انسانی جینیاتی امراض میں انزائم القا یسے اور میٹابولومکس کے اصول

Principles of enzyme assays and metabolomics in human genetic disorders

References: 15,20,22,45,58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO3	Describe cytogenetic techniques for human chromosome analysis	1	Lecture	CC	Knows-how	L&PPT ,TUT
CO2,CO3	Describe the genetic basis of human chromosomal disorders	1	Lecture	CC	Knows-how	TUT,L&PPT ,C_L,DIS
CO2,CO3	Analyze inborn errors of metabolism and mitochondrial disorders in humans	1	Lecture	CAN	Knows-how	FC,L&PPT
CO3,CO4	Demonstrate cytogenetic analysis techniques using simulated approaches	3	Practical14.1	PSY-GUD	Shows-how	D,SIM,BL,EDU
CO1,CO3, CO4,CO5	Analyze complex chromosomal and metabolic disorder cases through clinical reasoning	5	Experiential-Learning14.1	PSY-SET	Does	CBL,SDL,DIS,SIM,PER
CO3,CO4, CO5	Design diagnostic algorithms for identifying and managing human metabolic disorders	3	Practical14.2	PSY-SET	Shows-how	TBL,BL,C_L,CBL,SIM

CO3,CO5, CO6	Develop patient education materials for chromosomal and metabolic disorders	4	Experiential-Learning14.2	CS	Does	PrBL,TBL,JC,BL,CBL

Unit 2 انسانی مونوجینک اور نشوونما کے امراض Human Monogenic and Developmental Disorders

14.2.1 انسانوں میں مرض۔جین کی شناخت (پوزیشنل کلوننگ، ڈبلیو ای ایس)

Disease-gene identification in humans (positional cloning, WES)

14.2.2 انسانی مونوجینک امراض اور ان کی مالیکیولر بنیاد

Human monogenic disorders and their molecular basis

14.2.3 انسانی ابتدائی جنینی نشوونما میں جینز

Genes in human early embryonic development

14.2.4 انسانی پیٹرننگ جینز اور مورفوجینسس

Human patterning genes and morphogenesis

14.2.5 انسانی نشوونما پر ٹیراٹوجنز اور ماحولیاتی اثرات

Teratogens and environmental effects on human development

14.2.6 انسانی ڈسمورفک سنڈرومز اور ان کی جینیاتی بنیاد

Human dysmorphic syndromes and their genetic basis

References: 15,18,19,20,22,45,58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO3	Describe disease-gene identification methods in human genetics	1	Lecture	CC	Knows-how	L,DIS,C_L,BS,BL
CO3	Describe the molecular basis of human monogenic disorders	1	Lecture	CC	Knows-how	DIS,L&GD,TUT
CO2,CO3	Analyze genes involved in human embryonic development and morphogenesis	1	Lecture	CAN	Knows-how	FC,PER,C_L,L
CO2,CO3	Evaluate the genetic basis of human dysmorphic syndromes	1	Lecture	CE	Knows-how	DIS,BS,SY,L&GD,JC

CO3,CO4, CO5	Demonstrate molecular diagnostic techniques for monogenic disorders using virtual simulations	3	Practical14.3	PSY-SET	Shows-how	PT,D,BS,CBL,DIS
CO1,CO3, CO4,CO5	Develop practical approaches to integrate molecular diagnostic concepts with Unani principles like mizāj, tabīʻat, and warāthat in clinical reasoning.	8	Experiential-Learning14.3	CS	Does	SIM,C_L,SY,PL,BL
CO2,CO3, CO4	Design developmental timeline models for selected human genetic syndromes and relate them to underlying gene defects.	3	Practical14.4	PSY-GUD	Shows-how	LRI,D,W,BL,SIM

Unit 3 انسانی پیچیدہ امراض اور فارماکو جینیٹکس Human Complex Disorders and Pharmacogenetics

14.3.1 انسانی پیچیدہ امراض کی جینیاتی ساخت

Genetic architecture of human complex disorders

14.3.2 انسانی امراض میں جینوم-وائیڈ ایسوسی ایشن اسٹڈیز (جی ڈبلیو اے ایس)

Genome-wide association studies (GWAS) in human disease

14.3.3 انسانی امراض کی پیش گوئی میں پولی جینک رسک اسکورز

Polygenic risk scores in human disease prediction

14.3.4 انسانی صحت اور امراض میں اپی جینیٹک میکانزمز

Epigenetic mechanisms in human health and disease

14.3.5 انسانوں میں فارماکو جینیٹکس اور طبِ شخصی

Pharmacogenetics and personalized medicine in humans

14.3.6 انسانی پیچیدہ امراض میں جین-ماحول کے تعاملات

Gene-environment interactions in human complex disorders

References: 45,58,59,60,61,62,63,65

3A	3B	3C	3D	3E	3F	3G
CO3	Describe the genetic architecture of human complex disorders	1	Lecture	CC	Knows-how	DIS,TUT,L&GD

CO2,CO3, CO4	Analyze genome-wide association studies and polygenic risk scores to understand genetic susceptibility to human diseases.	1	Lecture	CAN	Knows-how	C_L,SDL,LS,L&PPT
CO2,CO3, CO4	Demonstrate how to assess risk for complex genetic disorders by combining genetic, lifestyle, and environmental factors using simulation tools.	4	Practical14.5	PSY-GUD	Shows-how	CBL,DIS,D-M,TBL,SDL
CO1,CO3, CO5,CO6	Develop personalized treatment strategies by integrating pharmacogenetic insights with Unani principles.	5	Experiential-Learning14.4	CC	Does	BS,BL,SDL,C_L,DIS
CO1,CO3	Evaluate pharmacogenetic principles and their application in personalized medicine, with special reference to Mizāj Shakhṣī	1	Lecture	CE	Knows-how	L&GD,LS,JC
CO1,CO3, CO4,CO5	Design decision-making algorithms for selecting medications based on pharmacogenetic data, including interpretation of drug-gene interactions and integration with Unani concepts of drug response.	4	Practical14.6	PSY-SET	Shows-how	CBL,BS,Mnt,LS,BL
CO1,CO3, CO5	Discuss the potential parallels between epigenetics and Unani medicine, including gene regulation, prevention strategies, and the role of environmental factors (Asbāb) in development and disease.	4	Experiential-Learning14.5	CAN	Shows-how	LS,DIS,Mnt,BS,C_L

Practical Training Activity

Practical Training 14.1 cytogenetic analysis using visual tools to identify chromosomal abnormalities

Total Duration: 3 Hours

Materials Needed: Printed chromosome images, microscope diagrams, banding pattern templates, case cards, colored markers.

1. Orientation & Task Setup (30 min)

Students review basics of karyotyping, banding techniques, and FISH.

They receive printed chromosome sets and brief clinical case scenarios.

Teacher provides minimal guidance, just enough to start the activity.

2. Hands-On Simulation (90 min)

Students work in pairs to:

– Assemble a simulated chromosome spread

– Match chromosomes by size, centromere, and bands

– Use colored markers to simulate FISH and highlight affected regions

– Analyze real-life genetic disorder cases (e.g., Down syndrome, Turner syndrome, Philadelphia chromosome)

– Fill in a simplified cytogenetic report with interpretation.

3. Group Discussion & Technique Review (30 min)

Groups share findings briefly, comparing clinical interpretations.

They reflect on technique limitations and discuss how molecular tools (e.g., array CGH, PCR) differ from classical cytogenetics.

4. Submission & Wrap-Up (30 min)

Students submit completed karyotypes and case reports using correct cytogenetic terminology.

Teacher gives brief collective feedback and clarifies any doubts raised during analysis.

Practical Training 14.2 Diagnostic algorithms for identifying and managing human metabolic disorders

Total Duration: 3 Hours

1. Introduction & Problem Briefing (30 min)

Students receive a short intro on what diagnostic algorithms are and why they're useful in metabolic disorder diagnosis (e.g., diabetes, PKU, maple syrup urine disease).

Each group is given 1–2 clinical scenarios with lab values, symptoms, and family history.

2. Group Work: Algorithm Design (90 min)

Working in teams, students use flowcharts or decision trees to build a diagnostic pathway.

They identify key signs, tests (e.g., enzyme assays, blood sugar, urine tests), and decision points.

Students must also suggest when to refer, investigate further, or start treatment.

3. Peer Presentation & Critique (30 min)

Each group presents their algorithm and explains the rationale for their clinical pathway.

Peers offer feedback on clarity, logic, and clinical utility.

4. Reflection & Finalization (30 min)

Students refine their algorithm based on feedback and submit the final version.

Teacher gives brief feedback highlighting clinical reasoning, scientific accuracy, and structure.

Practical Training 14.3 molecular diagnostic techniques for monogenic disorders using virtual simulations

Total Duration: 3 Hour

1. Intro Brief & Setup (30 min)

Students join the virtual session.

The teacher briefly introduces:

– The concept of molecular diagnosis in monogenic disorders (e.g., cystic fibrosis, sickle cell anemia)

– What they will simulate: PCR, RFLP, and gel electrophoresis

– Case scenarios are shared (PDF or Google Doc)

???? Students receive links to the following free simulation tools:

- PCR Virtual Lab – Learn Genetics (Utah)
- Gel Electrophoresis Virtual Lab – Learn Genetics
- DNA Sequencing Virtual Lab – HHMI Biointeractive
- PCR Simulation – LearnBio
- PCR & DNA Fingerprinting – Amrita Virtual Labs

Teacher role: Minimal—just explains expectations, provides the links, and resolves any tech issues.

2. Virtual Simulation Activity (90 min)

In pairs or small groups (breakout rooms), students:

– Use the simulation websites to perform PCR or RFLP analysis

– Run virtual gel electrophoresis and screenshot their results

– Apply these to diagnose the genetic condition in their assigned case

– Record findings and interpretations on a shared Google worksheet

???? Students are encouraged to note:

– The mutated gene

– Observed band patterns (normal vs. mutant)

– Steps they followed in the simulation

They are free to choose any one or combine tools from multiple websites.

3. Group Sharing & Interpretation (30 min)

Each group returns to the main room and presents:

– Their virtual gel result

– Final diagnosis (e.g., affected, carrier, normal)

– Brief reasoning

Peer questions encouraged. Teacher only moderates and provides summary points.

4. Reflection & Submission (30 min)

Students submit:

– Their completed diagnostic worksheet

– A short reflection (3–4 sentences) on what they learned and how these techniques help diagnosis

The teacher gives written or audio feedback on interpretation and application of diagnostic logic.

Practical Training 14.4 Developmental Timeline Models for Human Genetic Syndromes

Total Duration: 3 hours

1. Task Orientation & Syndrome Assignment (30 min)

Students are introduced to the concept of developmental timelines—how clinical features of genetic syndromes appear across life stages (prenatal, infancy, childhood, adolescence, adulthood).

Each group selects or is assigned one syndrome (e.g., Down syndrome, Turner syndrome, Marfan syndrome, Duchenne muscular dystrophy).

Students are encouraged to integrate both genetic mechanisms and physiological changes in their timelines.

2. Model Development (90 min)

In small groups, students:

– Research gene defect and its effects at each developmental stage

– Identify key clinical features with age of onset (e.g., hypotonia in infancy, cardiac issues in adolescence)

– Build a **visual timeline** (paper/chart/digital tool like Canva or Miro) showing age-wise progression of symptoms

– Optionally include Unani views (e.g., role of mizaj, taba'i quwā, early signs)

Teacher provides prompts only when students are stuck or need clarity.

3. Group Display & Discussion (30 min)

Each group presents their timeline to the class, briefly explaining:

– The gene involved and how its mutation disrupts development

– Stage-wise clinical presentation

– Any Unani insights or parallels

Peer questions and clarifications encouraged.

4. Reflection & Submission (30 min)

Students write a short summary (1–2 paragraphs) reflecting on:

– How gene mutations affect development over time

– How this exercise helps in understanding clinical progression and prognosis

Groups submit their timeline and reflection. Teacher gives short written or audio feedback on scientific clarity, staging, and integration.
Practical Training 14.5 Complex Genetic Disorder Risk Assessment Using Simulations
Total Duration: 4 hours **1. Risk Factor Exploration (45 min)** Students review how complex disorders like diabetes, heart disease, and cancer are influenced by both genes and environment. They study basic principles of multifactorial inheritance and how risk is calculated in clinical settings. Teacher shares simple reference charts or online visuals. Students form small teams. **2. Simulation Activity (90 min)** Each team is given a case (e.g., a 45-year-old man with a family history of heart disease). They use simulation tools (risk cards, worksheets, or online tools like CDC Risk Assessment Tool or YourDiseaseRisk) to: – Identify genetic and environmental risk factors – Calculate relative and absolute risk scores – Create a risk profile (low/moderate/high) Teams organize findings using templates or visual formats. **3. Strategy Design (45 min)** Based on the risk profile, students design personalized prevention strategies: – Lifestyle advice (diet, exercise, screening) – Monitoring plans – Unani-based suggestions (e.g., mizāj balancing, regimens) Students should connect preventive thinking from both Unani and modern approaches. **4. Presentation & Debrief (60 min)**

Teams present their case, risk summary, and prevention plan.

Peers give quick feedback; teacher highlights effective reasoning and balance between models.

Discussion wraps up with how such tools can support early intervention and patient education.

Final submission: Risk assessment worksheet + prevention strategy summary.

Practical Training 14.6 Pharmacogenetic Algorithm Design for Medication Selection

Total Duration: 4 hours

1. Explore & Select (30 min)

Students review basic pharmacogenetic concepts—how genes affect drug metabolism and response (e.g., CYP2C19 with clopidogrel).

They pick 2–3 common drugs with known gene interactions from a shared list.

Each student group is given quick-start cards, reference charts, or links to tools like:

– PharmGKB Drug-Gene Table

– FDA Pharmacogenomic Biomarkers

2. Algorithm Creation (90 min)

In teams, students build decision trees showing:

– Which genetic variant is relevant (e.g., poor vs normal metabolizer)

– What to prescribe or avoid

– Possible dose adjustments

– Patient-specific alternatives

Teams also add Unani ideas (e.g., how mizāj might affect drug response or tolerance).

3. Case Application & Explanation (60 min)

Teams apply their algorithm to 1–2 given clinical scenarios and write:

– A short medication recommendation

– The rationale based on gene-drug data

– A patient-friendly note explaining the reason in simple terms

4. Sharing & Feedback (60 min)

Groups present their algorithm and how it was used.

Peers give quick suggestions.

Teacher highlights clarity, logic, and integration of modern + Unani rationale.

Final submission: Algorithm chart + case recommendation sheet + patient explanation draft.

Experiential Learning Activity

Experiential-Learning Learning 14.1: Chromosomal and metabolic disorder cases through clinical reasoning

Total Duration: 5 Hours

Materials Needed: Detailed case files, lab reports, imaging data, reference books, internet access, case analysis templates.

1. Case Assignment & Planning (45 min)

Students are grouped and assigned a real-world complex disorder case (e.g., MELAS, Gaucher disease, or Trisomy 13 with metabolic defects).

They review patient data—clinical history, family background, labs, and imaging—and plan how to approach the analysis.

2. In-Depth Case Work (120 min)

Each group investigates:

– Genetic and biochemical mechanisms

– Symptoms and disease course

– Relevant tests and their interpretation

– Diagnosis, treatment options, prognosis

They begin building a **clinical reasoning map**—a flow showing how they reached conclusions step-by-step.

3. Simulated Clinical Rounds (60 min)

Groups present their cases like clinical teams:

– Overview of the patient

– Key reasoning steps

– Diagnostic conclusions and management plan

Peers ask questions; teacher acts as a consultant, offering short feedback only when needed.

4. Final Compilation & Submission (45 min)

Students finalize and submit:

– Written case report

– Clinical reasoning map

– Summary handout (to build a class reference library)

5. Group Reflection & Wrap-Up (30 min)

Each group reflects on what they learned, mistakes made, and how this process helped sharpen clinical thinking.

Teacher shares major takeaways and encourages students to compare modern and Unani diagnostic reasoning styles .

Experiential-Learning Learning 14.2: Pharmacogenetic Algorithm Design for Medication Selection

Total Duration: 4 Hours

Materials Needed: Reference handouts, drawing/chart paper, sample leaflets, digital tools (optional), colored pens, peer review templates.

1. Research & Planning (45 min)

Students work in pairs to explore how to explain complex disorders (e.g., Down syndrome, PKU) in simple, respectful language.

They review cultural and ethical considerations, and note how Unani concepts (like *Warasat*, *Mizaj*) could be included meaningfully.

2. Material Design (60 min)

Each group creates draft educational tools—posters, leaflets, or short videos—explaining the disorder, symptoms, inheritance, management tips, and support resources.

Visual aids and simple illustrations are encouraged.

3. Peer Review & Role Play (45 min)

Students pair up with another group, exchange materials, and act out a short “patient education session.”

Peers give feedback on clarity, tone, and usefulness.

4. Revision & Final Presentation (60 min)

Groups refine their material based on feedback and compile it into a “Patient Education Toolkit.”

Each group presents their final version and explains how they adapted content for patient understanding and cultural relevance.

5. Reflection (30 min)

Brief group discussion: What was challenging? What worked well? How can these materials be used in real settings?

Teacher highlights creativity and emphasizes communication ethics.

Experiential-Learning Learning 14.3: Integrating Molecular Diagnosis with Unani Principles

Total Duration: 8 hours

1. Concept Exploration & Mapping (2 hours)

Students read brief curated content on molecular diagnosis (e.g., PCR, mutation analysis) and Unani principles (mizāj, quwwat-e-muallidah, warāthat).

In small groups, they map similarities and differences—e.g., how genetic inheritance (warāthat) may align with mizāj transmission.

Output: Concept map linking Unani terms with molecular equivalents.

2. Case Analysis & Parallel Reasoning (2 hours)

Each group receives 2–3 clinical case summaries (e.g., β-thalassemia, cystic fibrosis).

Students analyze:

– Molecular diagnosis findings (e.g., mutation type)

– Unani interpretation: what mizāj or quwwat might be involved

– How both approaches can inform early diagnosis or preventive advice

Output: Short written comparison of both models per case.

3. Creative Integration Task (2 hours)

Groups design a small diagnostic framework/tool or flowchart that blends:

– Genetic screening data

– Unani parameters like mizāj assessment, lineage evaluation

They must explain:

– Where modern diagnosis and Unani views support each other

– How they would guide patient education or intervention

Output: Integration model with explanatory notes.

4. Presentation & Feedback (2 hours)

Each group presents their integrated model.

Peers give feedback on clarity, creativity, and feasibility.

The teacher highlights good examples, suggests refinements, and encourages clinical application.

Final submission: integration model + reflection note (1 paragraph per student).

Experiential-Learning Learning 14.4: Personalized Medicine Approaches through Pharmacogenetics & Unani Integration

Total Duration: 5 hours

1. Case Exploration & Group Assignment (30 min)

Students are introduced to complex cases (e.g., treatment-resistant epilepsy, hypertension, or depression).

Each group receives one case file with genetic data (e.g., CYP polymorphisms), lifestyle info, and mizāj background.

They plan how to analyze both genetic and Unani aspects.

Teacher shares minimal guidance—just framing questions like:

“What gene-drug clues are important here?”

“How might mizāj affect drug response or choice?”

2. Pharmacogenetic & Environmental Mapping (90 min)

Groups identify relevant pharmacogenetic markers (e.g., poor metabolizer status) and map them to drug responses.

They add environmental/lifestyle triggers and Unani interpretations (e.g., imbalance of akhlāṭ, tabīʻat response).

Output: A personalized treatment flowchart showing:

– Drug choices based on genotype

– Possible Unani interventions (Ilāj bil-Ghidhā, Ilāj bil-Tadbīr)

– Risk factors and preventive tips

3. Treatment Strategy Design (60 min)

Each group develops a personalized treatment plan, including:

– Modern drug regimen (dose/type adjustments via PGx)

– Unani modifications (based on mizāj, sa'ada, tabīʻat)

– Lifestyle and prevention plan

They create a simple explanation sheet for patients (plain language, visual elements).

4. Peer Simulation & Review (60 min)

Groups simulate explaining the plan to a "patient" from another group.

They take turns role-playing: clinician and patient.

Peer group gives feedback on clarity, empathy, and logic.

5. Expert Discussion & Refinement (30 min)

After all simulations, the class shares common themes and dilemmas.

The teacher helps clarify uncertainties, correct misconceptions, and offers professional insights.

6. Final Submission & Reflection (30 min)

Each group submits:

– Final treatment flowchart

– Patient summary sheet

– Brief reflection on how combining Unani and modern tools shaped their thinking

Teacher gives brief written feedback on integration, creativity, and reasoning.

Experiential-Learning Learning 14.5: Parallels between Epigenetics and Unani Concepts

Total Duration: 4 hours

Domain: CAN (Clinical Application & Analysis)

1. Concept Warm-Up & Brainstorming (45 min)

Students review key epigenetic concepts (e.g., DNA methylation, histone modification) and compare with Unani ideas of Asbāb-e-Sitta Zarūriyya and Mizāj.

In small groups, they brainstorm how lifestyle, diet, air, emotions, and sleep (asbāb) could parallel environmental influences on gene expression.

Teacher shares guiding prompts but does not lecture.

2. Comparative Mapping Activity (75 min)

Each group creates a visual concept map connecting modern epigenetic regulation with Unani frameworks:

– Environmental triggers → gene regulation

– Asbāb → modulation of tabī‘at and disease

– Preventive approaches in both systems

They note overlaps, differences, and potential integrative insights.

3. Group Discussion & Integration (60 min)

Groups present their maps and key points. Class discusses emerging patterns and the relevance of integrative understanding for prevention and chronic disease.

Teacher facilitates but limits input, encouraging peer-driven discussion.

4. Reflection & Submission (60 min)

Students write a short reflective summary on how the Unani view of health and environment might align with modern epigenetics and what this means for their clinical thinking.

They submit both the concept map and reflection.

Teacher provides brief written feedback.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. LAQ (10 Marks): LAQ shall be prepared on any of the Topics covered through lectures (Cognitive domain). Practical Viva (15 Marks): for the practical - Charting epigenetic mechanisms and feedback control models. DOAP (25 Marks): Simulation models to explain the process of protein synthesis and analyze case studies of post-translational defects, such as cystic fibrosis, to understand how errors in protein modification and folding can lead to disease. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 6

Module 15 : Medical Genetics, Genomic Applications, and Population Genetics

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Interpret the clinical implications of chromosomal and single-gene disorders using classical and molecular genetic tools.
2. Analyze genetic disorders based on principles of inheritance and predict risk using population genetics tools.
3. Relate Unani concepts of inheritance and temperament with genetic susceptibility and disease expression.
4. Evaluate ethical, social, and clinical dimensions of genetic counseling, diagnostics, and screening.

Unit 1 آبادی کی جینیات اور وراثتی خطرات Population Genetics and Inheritance Risks

15.1.1 ہارڈی-وائنبرگ توازن

Hardy-Weinberg equilibrium

15.1.2 تزاوُج مُتلائق، جینیاتی اِنجراف، طفرۃ، اور انتخاب

Assortative mating, genetic drift, mutation, and selection

15.1.3 تعدُّدُ الاشکال اور ہیٹروزیگوس فائدہ

Polymorphism and heterozygote advantage

15.1.4 مراض کی فریکوئنسیز میں نسلی اختلافات

Ethnic differences in disease frequencies

15.1.5 انسانی جینوم کا جائزہ

Human genome overview

15.1.6 یونانی تناظر: وراثت

Unani perspective: *Wirasiyyaat*

References: 58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the principles of Hardy-Weinberg equilibrium and its application in studying population-level gene frequencies	1	Lecture	CC	Knows-how	L&PPT ,SY,DIS
CO1,CO2, CO3	Describe the effects of mating patterns, mutation, selection, and drift on genetic variation and disease frequency, and relate these to Unani concepts of inheritance and reproductive capacity	2	Lecture	CC	Knows-how	L&GD,TUT,BS,JC,C_L
CO1,CO2, CO3	Apply Hardy-Weinberg equation to case studies and simulate effects of mating patterns and drift using worksheet-based tools	6	Practical15.1	CAP	Shows-how	C_L,SIM,DIS,BS
CO1,CO2, CO3,CO5	Perform analysis of population-based gene frequency changes in consanguineous vs non-consanguineous populations and relate to Unani understanding of hereditary tendencies	8	Experiential-Learning15.1	PSY-MEC	Does	SIM,SDL,DIS,BS,BL

CO2,CO5, CO6	Design a basic genetic counseling protocol for a given condition	3	Practical15.2	PSY-ORG	Shows-how	SDL,PER,DIS,BS,C_L

Unit 2 جینی خلل Gene disorder

15.2.1 واحد جینی خلل

Single gene disorders

15.2.2 آٹوسومل ڈومینینٹ اور ریسیسو وراثت

Autosomal dominant and recessive inheritance

15.2.3 پینیٹرنس، ایکسپریسوٹی، اور اولاد کو خطرہ

Penetrance, expressivity, and risk to offspring

15.2.4 مائٹوکونڈریل وراثت

Mitochondrial inheritance

15.2.5 پولی جینک مرض، جڑواں ہم آہنگی، حساسیت کے جینز

Polygenic disease, twin concordance, susceptibility genes

15.2.6 خون کے رشتوں میں شادی کے اثرات

Impact of consanguinity

References: 58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Differentiate between autosomal dominant, autosomal recessive, and mitochondrial patterns of inheritance	2	Lecture	CC	Knows-how	L&PPT ,PL,FC
CO2,CO3	Describe the concept of polygenic inheritance and factors influencing expression such as penetrance and expressivity	1	Lecture	CC	Knows-how	L&PPT ,PER,C_L,LS

CO2,CO3	Perform pedigree analysis and calculate risk probabilities in given family histories, including mitochondrial patterns	7	Practical15.3	PSY-MEC	Shows-how	CBL,DIS,TBL
CO1,CO2, CO3,CO4	Perform Case-based discussions on consanguinity, genetic counseling, and risk stratification, with integration of Unani principles of familial constitution	9	Experiential-Learning15.2	PSY-MEC	Does	SIM,CBL,C_L,LRI,W

Unit 3 جینیاتی نقشہ سازی اور امراض کی مالیکیولر بنیاد Genetic Mapping and Molecular Basis of Disorders

15.3.1 جینیاتی لنکیج اور جینیاتی نقشہ سازی کا اصول

Genetic linkage and principle of genetic mapping

15.3.2 طفرات: پوائنٹ طفرات، ڈیلیشنز، ریپیٹ ایکسپینشنز

Mutations: point mutations, deletions, repeat expansions

15.3.3 تشخیصی پروبز کا استعمال کرتے ہوئے ڈی این اے پر مبنی تشخیص

DNA-based diagnosis using diagnostic probes

15.3.4 میوٹنٹ فینوٹائپس کی مالیکیولر بنیاد

Molecular basis of mutant phenotypes

15.3.5 سیکوینسنگ اور نقلی مالیکیولر تشخیص کا جائزہ (مثلاً، پی سی آر، آر ایف ایل پی)

Overview of sequencing and simulated molecular diagnostics (e.g., PCR, RFLP)

15.3.6 یونانی تشخیص اور پیشن مرض میں اطلاقات

Applications in Unani diagnosis and prognosis

References: 58,59,60,61,62,63,64,65

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the principles of genetic linkage and gene mapping, and how they are used to locate disease-causing genes	1	Lecture	CC	Knows-how	L&GD,FC,DIS

CO2,CO3, CO5	Discuss the molecular basis of mutant phenotypes and the diagnostic use of DNA-based tools like sequencing and probes	1	Lecture	CC	Knows-how	ML,L&PPT ,REC
CO2,CO3, CO4,CO5	Demonstrate how gene mutations and markers are analyzed using tools like simulated linkage analysis, sequencing, and PCR (Polymerase Chain Reaction)	4	Practical15.4	PSY-SET	Shows-how	CBL,SIM,D,SDL,PT
CO2,CO3	Perform simulated lab walk-through or video-based activity to visualize molecular diagnosis and engage in interpretation of mutation impact	5	Experiential-Learning15.3	PSY-MEC	Does	SIM,SDL,RLE,CBL,LRI

Unit 4 مشاورت اور عوامی صحت کے اطلاقات Counseling & Public Health Applications

15.4.1 ڈی این اے پر مبنی تشخیص اور جینیاتی پروبز کے اصول

Principles of DNA-based diagnostics and genetic probes

15.4.2 قبل از پیدائش اور بعد از پیدائش تشخیص (اسکریننگ کے طریقے)

Prenatal and postnatal diagnosis (screening methods)

15.4.3 جینیاتی مشاورت–بنیادی پروٹوکولز

Genetic counseling – basic protocols

15.4.4 جینیات میں اخلاقی/قانونی/معاشرتی مسائل

Ethical/legal/social issues in genetics

15.4.5 عوامی صحت اور کمیونٹی اسکریننگ میں اطلاق

Application in public health and community screening

15.4.6 یونانی مفاہیم—بالخصوص تکوینِ جنین (ایمبریو جینسس) اور قوتِ تناسلیہ (ری پروڈکٹو فیکلٹی)

Unani concepts—particularly *Takwin-i-Janin* (embryogenesis) and *Quwa Tanasuliyya* (reproductive faculty)

References: 1,15,58,59,60,61,62,63,64

3A	3B	3C	3D	3E	3F	3G

CO2,CO3	Describe the principles and methods used in DNA-based diagnosis and genetic screening, including prenatal and postnatal applications	1	Lecture	CC	Knows-how	LS,DIS,TUT,L&PPT
CO1,CO2, CO3,CO5	Integrate Unani embryological principles (*Takwin-i-Janin*) into modern reproductive genetics scenarios	1	Lecture	CAP	Knows-how	PL,L&GD,BS,PER,LS
CO1,CO2, CO3,CO5	Adapt Unani embryological principles (*Takwin-i-Janin*) into modern reproductive genetics scenarios	4	Experiential-Learning15.4	PSY-ADT	Does	PL,DIS,C_L,LS,JC

Practical Training Activity

Practical Training 15.1 Hardy-Weinberg equation

Total Duration: 6 hours

Hour 1: Introduction & Fundamentals

Activities:

- **Short lecture/recap** (15 mins): Hardy-Weinberg equilibrium (HWE), assumptions, and equation:
- **Discussion** (10 mins): Conditions for HWE – no mutation, random mating, no gene flow, infinite population size, no selection.
- **Worksheet 1** (35 mins): Practice calculating allele frequencies using sample data.

Hour 2: Case Studies – Real or Simulated Populations

- **Case study review** (15 mins): Example – sickle-cell allele frequency in African populations.
- **Worksheet 2** (45 mins): Students analyze real/simulated data to:
    - Calculate allele/genotype frequencies.
    - Check if the population is in HWE.

Hour 3: Simulating Random and Non-Random Mating

- **Simulation setup** (15 mins): Use coins/beads/cards to represent alleles.
- **Worksheet 3 – Simulation A** (45 mins):

- Randomly pair alleles to simulate mating.
- Tally genotypes and compare to expected HWE ratios.
- Repeat with **non-random mating** (e.g., preferential AA mating).

Hour 4: Genetic Drift Simulation

- **Discussion** (10 mins): What is genetic drift? Importance in small populations.
- **Worksheet 4 – Simulation B** (50 mins):
  - Start with known allele frequencies.
  - Simulate successive generations in small (N=20) and large (N=200) populations.
  - Track how allele frequencies fluctuate over generations.

Hour 5: Group Work and Analysis

- **Group work** (30 mins): Analyze results from simulations.
  - Discuss: Were populations in HWE? Why or why not?
  - Identify factors that disrupted equilibrium.
- **Worksheet 5** (30 mins): Summary questions and graphing allele frequency changes.

Hour 6: Wrap-Up and Presentation

- **Mini-presentations** (30 mins): Each group presents key findings.
- **Class discussion** (15 mins): Broader implications for evolution and conservation biology.
- **Quiz/Worksheet 6** (15 mins): Short assessment on HWE applications.

Practical Training 15.2 Basic genetic counseling protocol for a given condition

Total Duration: 3 hours

Hour 1: Introduction to Genetic Counselling Protocols

- **Mini-lecture** (20 mins):
  - Goals and steps of genetic counselling

    - Key elements of a protocol:
        - Case assessment (clinical and family history)
        - Genetic risk explanation
        - Communication of test results
        - Reproductive options and management plans
        - Psychosocial support and informed consent
- **Condition selection** (10 mins):
    - Assign or allow groups to choose 1 condition (e.g., thalassemia, cystic fibrosis, Duchenne muscular dystrophy, BRCA mutation, etc.)
- **Protocol template review** (30 mins):
    - Go through a sample protocol format:
        - Section 1: Background of the condition
        - Section 2: Risk calculation methods
        - Section 3: Counselling content outline
        - Section 4: Ethical/cultural considerations
        - Section 5: Documentation and follow-up

Hour 2: Group Activity – Protocol Design

- **Group work** (60 mins):
    - Using a provided template, each group designs a counselling protocol for their assigned condition.
    - Elements to include:
        - Brief clinical overview of the condition
        - Family history and pedigree drawing (simulated or hypothetical)
        - Calculation of recurrence risk
        - Communication strategies (how to explain risks and options)
        - Decision-support tools (e.g., testing, reproductive choices)

- Ethical considerations (e.g., prenatal diagnosis, consanguinity, stigma)
- Suggested Unani interpretations (e.g., familial constitution, *Warasat*, *Mizaj*)

Hour 3: Presentations and Peer Review

- **Group presentations** (30 mins):
  - Each group presents their protocol (7–8 mins each).
  - Include rationale, flow of session, and cultural sensitivity approaches.
- **Peer feedback & instructor comments** (15 mins):
  - Encourage constructive critique and suggestions.
- **Reflection worksheet or wrap-up quiz** (15 mins):
  - What were the hardest parts to explain or plan for?
  - How would you adapt the protocol for a community setting?

Practical Training 15.3 Pedigree chart construction and analysis for different inheritance patterns

Duration: 7 hours

Hour 1: Introduction to Pedigree Analysis

- **Short lecture** (20 mins):
  - Symbols and standard pedigree conventions
  - Types of inheritance: autosomal dominant, autosomal recessive, X-linked dominant, X-linked recessive, mitochondrial
- **Quick quiz** (10 mins): Match symbols and label patterns.
- **Worksheet 1** (30 mins): Practice reading and constructing pedigrees from simple narratives.

Hour 2: Analyzing Inheritance Patterns

- **Group activity** (15 mins): Assign groups 1–2 complex pedigrees with varied inheritance types.
- **Worksheet 2** (45 mins): Identify inheritance modes using clues such as:
  - Sex ratio among affected individuals

- Vertical vs. horizontal transmission
- Skipped generations
- Male-to-male transmission (or lack thereof)

Hour 3: Calculating Risk Probabilities (Autosomal and X-linked)

- **Mini-lecture/demo** (20 mins): How to calculate carrier risk and recurrence risk.
- **Worksheet 3** (40 mins): Case-based problems:
  - Carrier mother + normal father = risk to child?
  - Affected father + carrier daughter = risk to grandchildren?
  - Calculate using Punnett squares and probability trees.

Hour 4: Mitochondrial Inheritance Patterns

- **Lecture with visuals** (20 mins):
  - Mitochondrial DNA transmission
  - Hallmarks in pedigrees: only maternal transmission, both sexes affected, no paternal transmission
- **Worksheet 4** (40 mins): Analyze 2 pedigrees showing mitochondrial vs. autosomal dominant patterns. Identify affected individuals and calculate probabilities of transmission.

Hour 5: Simulated Family History Analysis

- **Case studies (group work)** (60 mins):
  - Each group receives a family history with one or more genetic conditions.
  - Tasks:
    - Draw pedigree
    - Identify pattern
    - Calculate risk for next child
    - Consider implications for genetic counselling

Hour 6: Real-World Application & Counselling Context

- **Lecture/discussion** (30 mins):
    - Role of pedigree analysis in genetic counselling
    - Ethical considerations (e.g., confidentiality, stigma)
- **Worksheet 5** (30 mins): Counselling scenarios:
    - How would you communicate recurrence risk to a family?
    - What if there's consanguinity or uncertainty in family history?

Hour 7: Wrap-Up, Presentations, and Assessment

- **Group presentations** (30 mins):
    - Share one analyzed pedigree with inheritance pattern and calculated risks.
- **Class discussion** (15 mins):
    - Challenges in interpreting complex pedigrees.
- **Short quiz or reflection** (15 mins):
    - Mixed MCQs and short answers on inheritance patterns, risk calculations, and mitochondrial inheritance.

Practical Training 15.4 Simulated linkage analysis, sequencing, and PCR (Polymerase Chain Reaction)

Total Duration: 4 hours

Hour 1: Introduction and Simulated Linkage Analysis

- **Mini-lecture** (15 mins):
    - What is linkage analysis?
    - Principles: recombination frequency, LOD scores, genetic markers.
    - Applications in identifying genes related to hereditary diseases.
- **Worksheet-based simulation** (45 mins):
    - Given pedigree + genotype data for a family with an inherited disorder.
    - Calculate recombination frequencies between marker and disease gene.

- Determine likely location of gene using LOD score table.
- Identify linked vs unlinked markers.

Hour 2: PCR (Polymerase Chain Reaction) Simulation

- **Mini-lecture/demo** (15 mins):
  - PCR process: denaturation, annealing, extension
  - Primer design basics and common applications (e.g., mutation detection, pathogen ID)
- **Hands-on simulation** (30 mins):
  - Use virtual or paper model: simulate template DNA, add primers, replicate rounds.
  - Identify amplified regions (e.g., exon with mutation).
- **Worksheet** (15 mins):
  - Label PCR components, steps, and calculate expected product sizes from given sequences.

Hour 3: DNA Sequencing and Mutation Detection

- **Lecture** (15 mins):
  - Sanger sequencing principle
  - Chromatogram interpretation
  - Basic overview of next-generation sequencing (NGS)
- **Simulation** (45 mins):
  - Given a DNA chromatogram or sequence readout from Sanger sequencing.
  - Identify point mutations, insertions, deletions.
  - Compare normal vs. mutant alleles and annotate mutation type (missense, nonsense, frameshift).

Hour 4: Case-Based Integration

- **Case study** (30 mins): A family with a known inherited condition.
  - Step 1: Use linkage data to narrow down candidate gene.
  - Step 2: Apply PCR strategy to amplify exon.

- Step 3: Use sequence to identify mutation.
- Step 4: Annotate mutation and predict effect (e.g., truncated protein, loss of function).

- **Wrap-up discussion** (15 mins):
  - Applications in diagnostics, prenatal screening, and targeted therapy.
  - Future directions in genomics (e.g., CRISPR, whole-genome sequencing).
- **Quick quiz or reflection** (15 mins):
  - Test key concepts or ask students to outline a mutation analysis pipeline.

Experiential Learning Activity

Experiential-Learning Learning 15.1: Gene frequency trends in populations with high consanguinity vs low consanguinity

Total Duration: 8 hours

Hour 1: Introduction to Concepts

- **Recap** (20 mins):
  - Genetic consequences of consanguinity (e.g., increased homozygosity, recessive disorder expression).
  - Overview of allele frequency and Hardy-Weinberg deviations in consanguineous populations.
- **Unani Perspective** (20 mins):
  - Explain *Warasat* (inheritance) and *Quwa Tanasuliyyah* (reproductive/hereditary strength).
  - Discuss historical views on family lineage, traits, and disease predisposition.
- **Q&A and recap** (20 mins)

Hour 2: Data Familiarization and Hypothesis Building

- **Group formation** (5 mins): Students divided into small groups.
- **Dataset review** (20 mins): Provide gene frequency data for at least two populations:
  - High consanguinity population (e.g., rural Middle Eastern or South Asian group).
  - Low consanguinity population (e.g., urban Western population).

- **Hypothesis framing** (35 mins): Each group drafts hypotheses about expected genetic trends (e.g., increased recessive disorder alleles, reduced heterozygosity).

Hour 3–4: Group Data Analysis

- **Analysis (Hands-on)**:
    - Calculate allele and genotype frequencies.
    - Compare observed vs. expected frequencies under Hardy-Weinberg Equilibrium.
    - Identify deviations and discuss causes.
- **Focus questions**:
    - Are certain alleles more common in consanguineous groups?
    - How does heterozygosity differ?
    - Are disease-linked alleles more prevalent?

Hour 5: Interpretation with Unani Concepts

- **Group Discussion (30 mins)**:
    - Relate biological findings to Unani terms.
        - *Warasat* as transmission of not just traits, but imbalances (e.g., increased risk of disease in same bloodlines).
        - *Quwa Tanasuliyyah* as the population's collective reproductive health – possibly reduced in inbred populations.
- **Worksheet** (30 mins): Students reflect on:
    - Genetic risk in consanguineous marriages.
    - Unani interpretations of “hereditary strength” in light of population trends.

Hour 6–7: Case Study and Role Play

- **Case Study** (30 mins): Present a real-world or hypothetical case involving a family with high consanguinity and inherited disorder. Ask groups to analyze and respond with both biomedical and Unani insights.
- **Role Play Activity** (60 mins): Students act as:
    - Genetic counselors

- Unani physicians
- Family elders
- Public health officers

  Each role must argue perspectives on genetic counseling, marriage traditions, and disease prevention.

Hour 8: Group Presentations & Wrap-Up Discussion

- **Group presentations** (30 mins): Each group summarizes:
  - Key differences in gene frequency.
  - Connections to *Warasat* and *Quwa Tanasuliyyah*.
  - Suggested genetic and cultural interventions.
- **Whole-class discussion** (20 mins): Reflect on:
  - Balancing cultural practices with genetic awareness.
  - How modern science and Unani medicine can inform each other.
- **Quiz** (10 mins): Short reflection or MCQ quiz on key concepts.

Experiential-Learning Learning 15.2: Consanguinity, genetic counseling, and risk stratification, with integration of Unani principles of familial constitution

Total Duration: 9 hours

Hour 1: Orientation and Background Concepts

- **Recap** (20 mins):
  - Medical genetics of consanguinity: Increased homozygosity, recessive inheritance, and common disorders.
  - Role of genetic counselling and risk stratification.
- **Unani concepts** (25 mins):
  - *Mizaj* (temperament), *Warasat*, *Mizaj*, and *Quwa Tanasuliyyah*.
  - *Naks wa Kamal* (imperfections and strengths passed through generations).
- **Discussion** (15 mins):

- How traditional and modern systems approach familial risk and constitution.

Hour 2: Case Study 1 – Recessive Disorder in a Consanguineous Marriage

- **Presentation of case** (10 mins): A couple from a closely related family with history of thalassemia.
- **Group activity** (50 mins):
  - Draw pedigree.
  - Identify inheritance pattern.
  - Calculate risk of recurrence.
  - Discuss Unani interpretation of familial *Mizaj* and *Quwa*.
- **Integration reflection** (10 mins): How would a Unani physician and a geneticist counsel this family?

Hour 3: Case Study 2 – Carrier Couple Seeking Counselling

- **Present case**: Couple both carriers of a metabolic disorder, seeking risk assessment before pregnancy.
- **Tasks** (60 mins):
  - Construct pedigree and assign genotypes.
  - Calculate fetal risk.
  - Recommend genetic testing.
  - Analyze compatibility (*Mizaj*) and hereditary strength (*Quwa Tanasuliyyah*) from a Unani lens.
  - Explore cultural and ethical dimensions of counselling.

Hour 4: Role-Playing Genetic Counselling Session

- **Setup** (10 mins): Assign roles (genetic counsellor, Unani physician, patient couple, family elder).
- **Simulation** (25 mins): Role-play counselling with integrated advice.
- **Debrief** (10 mins): Discuss tone, accuracy, empathy, and cultural sensitivity.
- **Worksheet** (15 mins): Key takeaways and feedback on each role.

Hour 5: Mini-Lecture and Workshop – Risk Stratification Models

- **Lecture** (25 mins): Risk scoring tools, stratification based on family history, ethnic background, consanguinity.

- **Workshop** (35 mins):
    - Apply models to hypothetical families.
    - Create risk tiers (low, medium, high).
    - Add Unani observations (e.g., *Mizaj* balance, family vitality trends).

Hour 6: Case Study 3 – Complex Pedigree with Mixed Marriages

- **Case scenario** (10 mins): Three generations with a mix of consanguineous and non-consanguineous unions. Some disorders expressed sporadically.
- **Group task** (50 mins):
    - Pedigree analysis.
    - Discuss genetic complexity and unknown modifiers.
    - Discuss possible *Naks* transmitted over generations.
    - Recommend modern and traditional diagnostic approaches.

Hour 7: Ethical Roundtable – When Traditions and Medicine Intersect

- **Debate setup** (10 mins): Pose questions:
    - Should consanguineous marriages be discouraged?
    - How to balance respect for tradition with risk awareness?
- **Structured discussion** (40 mins): Encourage students to cite both genetic facts and Unani ethics (e.g., moderation, individualized care).
- **Consensus building** (10 mins): What unified counselling strategy works?

Hour 8: Group Presentations

- **Group work** (30 mins): Prepare short presentations summarizing one case with:
    - Genetic findings and risk.
    - Unani interpretation.
    - Counselling plan.
- **Presentations** (30 mins): 5–7 minutes per group.
- **Q&A** (15 mins): Class discussion and feedback.

Hour 9: Reflection, Feedback, and Assessment

- **Worksheet** (20 mins): Reflection on learnings, integration of knowledge, areas for improvement.
- **Quiz** (20 mins): Inheritance patterns, Unani concepts, counselling ethics.
- **Wrap-up discussion** (20 mins): Future applications in clinical practice and community health.

Experiential-Learning Learning 15.3: Simulated lab walk-through to visualize molecular diagnosis

Total Duration: 5 hours

Hour 1: Orientation and Diagnostic Workflow Overview

- **Recap** (20 mins):
    - Overview of molecular diagnostic lab workflow:
        - Sample collection → DNA extraction → PCR → Sequencing → Analysis
    - Common tools: gel electrophoresis, thermal cycler, sequencers, bioinformatics software.
- **Video or Virtual Lab Tour** (30–40 mins):
    - Use pre-recorded or narrated walk-throughs of:
        - PCR amplification process
        - Gel electrophoresis visualization
        - Sanger sequencing steps and readout generation
        - Bioinformatics pipeline (alignment, variant calling, annotation)

Discussion (10 mins): Student impressions and what they learned visually.

Hour 2: Case File Introduction and Diagnostic Strategy

- **Presentation of real-life/clinical-style case file** (15 mins):
    - Example: A child with suspected cystic fibrosis or beta-thalassemia.
    - Includes: clinical symptoms, family history, and raw test data (e.g., gel image or chromatogram).
- **Group task** (45 mins):

- Review case data
- Identify the gene under investigation
- Hypothesize diagnostic approach (what tests to use, what regions to amplify)

Materials:

- Simplified case files with annotated symptoms
- PCR primer sets or gene maps
- DNA sequences or chromatograms

Hour 3: Mutation Analysis and Interpretation

- **Hands-on Simulation or Worksheet-Based Exercise** (60 mins):
  - Given a DNA sequence or Sanger chromatogram:
    - Identify the mutation (e.g., G>A substitution, frameshift insertion)
    - Determine its type: missense, nonsense, silent, or splicing
    - Annotate the predicted protein effect (e.g., premature stop, amino acid change)
- **Tools provided**:
  - Codon table
  - Reference DNA and protein sequences
  - Mutation annotation sheet

Hour 4: Clinical Impact and Case Discussion

- **Group interpretation** (30 mins):
  - Discuss: How does this mutation explain the phenotype?
  - What is the inheritance pattern?
  - What is the risk to siblings/future children?
- **Worksheet reflection** (15 mins):
  - Students note:

- Gene affected
- Mutation found
- Predicted functional consequence
- Genetic counselling message

Hour 5: Presentation, Feedback & Wrap-Up

- **Group Presentations** (30 mins): Each group shares:
  - Summary of case
  - Mutation identified and its interpretation
  - Clinical implications and counselling suggestions
- **Class Discussion** (30 mins):
  - How visuals and simulations improved understanding
  - Challenges in interpreting variants of unknown significance

Experiential-Learning Learning 15.4: Unani embryological principles (*Takwin-i-Janin*) and modern reproductive genetics scenarios

Total duration : 4 hours

Session 1: Introduction and Foundational Knowledge (60 minutes)

- **(0-15 minutes) Introduction to Takwin-i-Janin:**
  - Brief overview of Unani medicine and its holistic approach to health and disease.
  - Introduction to the core principles of Takwin-i-Janin (Formation of the Fetus):
    - The concept of *Mizaj* (temperament) and its influence on development.
    - The role of *Arwah* (spirits/energies) in fetal animation and growth.
    - The stages of fetal development as described in classical Unani texts (e.g., *Nutfa*, *Alaqa*, *Mudgha*, etc.).
    - Emphasis on the influence of maternal health, diet, and environment on fetal development.
  - Briefly discuss the historical context and sources of Takwin-i-Janin knowledge.

- **(15-30 minutes) Recap of Modern Reproductive Genetics:**
    - A concise review of key concepts in modern reproductive genetics relevant to the activity:
        - Fertilization and early embryonic development (zygote, blastocyst).
        - Genetic influences on development (genes, chromosomes, inheritance).
        - Common genetic disorders affecting reproduction and development.
        - Modern diagnostic tools (e.g., genetic testing, karyotyping, ultrasound).
    - Highlight the molecular and cellular mechanisms involved.
- **(30-60 minutes) Setting the Stage for Integration:**
    - Facilitated discussion on the potential for integrating traditional and modern knowledge systems in medicine.
    - Introduce the concept of "complementary perspectives" – how different frameworks can offer unique insights into complex biological processes.
    - Outline the activity's structure and the scenarios students will be working with.
    - Divide students into small groups (4-5 students each).

Session 2: Scenario Presentation and Initial Analysis (60 minutes)

- **(0-30 minutes) Presentation of Reproductive Genetics Scenarios:**
    - Present 2-3 diverse case scenarios related to modern reproductive genetics. These scenarios should be carefully chosen to allow for potential interpretation through Takwin-i-Janin principles. Examples include:
        - **Scenario 1: Recurrent Miscarriage:** A couple experiences multiple unexplained miscarriages in the first trimester. Modern investigation reveals no clear genetic or anatomical cause.
        - **Scenario 2: Intrauterine Growth Restriction (IUGR):** A fetus is diagnosed with significantly lower than expected growth in the uterus. Modern genetics might identify some potential factors, but the exact cause remains unclear.
        - **Scenario 3: Infertility with Low Sperm Count:** A male partner has significantly low sperm count and motility. Modern analysis might point to some genetic predispositions or lifestyle factors.
        - **Scenario 4: Pre-eclampsia in Pregnancy:** A pregnant woman develops high blood pressure and protein in her urine during the later stages of pregnancy. Modern understanding involves placental factors and maternal health.

- Provide each group with detailed written descriptions of the scenarios, including relevant medical history and any available modern diagnostic information.

- **(30-60 minutes) Initial Group Brainstorming and Analysis:**
  - Each group will focus on one or two assigned scenarios.
  - Instruct groups to brainstorm potential explanations for the scenario from both a modern reproductive genetics perspective (based on their prior knowledge) and a Takwin-i-Janin perspective (based on the principles discussed in Hour 1).
  - Encourage them to consider:
    - What might be the underlying imbalances in *Mizaj* (temperament) in Takwin-i-Janin that could contribute to the scenario?
    - How might the concept of *Arwah* be relevant?
    - Are there any stages of *Takwin* (formation) that might be disrupted according to Unani principles?
    - What maternal factors (diet, lifestyle, emotional state) might be considered significant in Takwin-i-Janin?
    - How do these explanations compare with the modern genetic understanding of the scenario?

Session 3: Deep Dive and Comparative Analysis (60 minutes)

- **(30 minutes) Group Sharing and Facilitated Discussion:**
  - Each group will briefly share their initial analyses of their assigned scenarios, focusing on the Takwin-i-Janin interpretations.
  - Facilitate a class discussion, prompting students to:
    - Identify potential areas of overlap or resonance between the two perspectives.
    - Highlight any contrasting explanations or areas where one system might offer insights that the other doesn't readily provide.
    - Consider the limitations of applying ancient principles to modern medical scenarios.
- **(10 minutes) Focused Application of Takwin-i-Janin Principles:**
  - Provide groups with supplementary material or guide them to specific resources (brief excerpts from Unani texts or summaries of key Takwin-i-Janin concepts related to the scenarios).
  - Instruct groups to revisit their scenarios and refine their Takwin-i-Janin-based explanations using the new information.

- Encourage them to think critically about how the holistic approach of Unani medicine, considering the individual's overall constitution and environmental factors, might offer a broader understanding compared to a purely genetic focus in some cases.

Session 4: Synthesis, Presentation, and Conclusion (60 minutes)

- **(30 minutes) Group Synthesis and Presentation Preparation:**
  - Each group will synthesize their findings and prepare a short presentation (5-7 minutes) summarizing their analysis of their assigned scenario(s).
  - The presentation should clearly articulate:
    - The modern reproductive genetics explanation of the scenario.
    - The interpretation of the scenario through the principles of Takwin-i-Janin.
    - A comparative analysis highlighting points of convergence, divergence, and any unique insights gained from considering both perspectives.
- **(20 minutes) Group Presentations:**
  - Each group will present their analysis to the class.
  - Encourage questions and brief discussions after each presentation.
- **(10 minutes) Conclusion and Reflection:**
  - Facilitate a final class discussion to summarize the key takeaways from the activity.
  - Encourage students to reflect on:
    - The potential value of integrating traditional and modern medical knowledge.
    - The limitations and challenges of such integration.
    - Areas where further research or exploration might be beneficial.
    - How this exercise has broadened their understanding of reproductive biology.

Modular Assessment

Assessment	Hour

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. SAQ (5 Marks each)- 02 SAQs: Two SAQs on any topics from cognitive domain of this module shall be given for assessment- Trainers Report (15 Marks): on experiential learning topic- Case-based discussions on consanguinity, genetic counselling, and risk stratification, with integration of Unani principles of familial constitution. DOAP (25 Marks): Pedigree analysis and calculate risk probabilities in given family histories, including mitochondrial patterns. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 16 : طبی معلومیات Bioinformatics

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the fundamental principles of bioinformatics and its relevance in Unani Medicine.
2. Apply bioinformatics techniques in drug discovery and personalized medicine.
3. Conduct research by leveraging bioinformatics tools for genomic and proteomic data analysis.
4. Translate bioinformatics findings into practical applications in Unani-based clinical research.

Unit 1 طبی معلومیات کا تعارف Introduction to Bioinformatics

16.1.1 طبی معلومیات کی تعریف، دائرہ کار، اہمیت

(Definition, scope, and significance of bioinformatics)

16.1.2 طب یونانی میں طبی معلومیات کے اطلاقات

(Overview of bioinformatics applications in Unani Medicine)

16.1.3 اعشاب طبیہ اور فارماکوجینومکس میں طبی معلومیات کا کردار

(Role of bioinformatics in herbal medicine and pharmacogenomics)

References: 212,213,214,215

3A	3B	3C	3D	3E	3F	3G
CO5	Describe the foundational concepts of bioinformatics, including its definition, scope of application, and relevance in health sciences.	1	Lecture	CC	Knows-how	L&PPT ,TUT
CO5	Illustrate Overview of bioinformatics applications in Unani Medicine	2	Lecture	CC	Knows-how	SY,SDL,L&GD
CO5	Relate the role of bioinformatics in herbal medicine and pharmacogenomics	2	Lecture	CAN	Knows-how	SDL,L_VC,FC
CO5	Apply Bioinformatics for Personalized Medicine in Unani Medicine	6	Experiential-Learning16.1	CAP	Does	TUT,CBL,DIS,C_L,SY

Unit 2 حیاتیاتی ڈیٹا بیسز اور معلومات کی بازیافت Biological Databases and Information Retrieval

16.2.1 حیاتیاتی ڈیٹا بیس کی اقسام: ترتیب ڈیٹا بیس (جین بینک، ای ایم بی ایل)، ساخت ڈیٹا بیس (پی ڈی بی)، اور خصوصی ڈیٹا بیس (مثلاً، آیوش سے متعلقہ ڈیٹا بیس)

(Types of biological databases: Sequence databases (GenBank, EMBL), structure databases (PDB), and specialized databases (e.g., AYUSH-specific databases)

16.2.2 ترتیب، ساخت، اور فعالیاتی ڈیٹا کی بازیافت اور تجزیہ کے طریقے

(Methods to retrieve and analyze sequence, structure, and functional data)

16.2.3 طبی معلومیات ٹولز کا تعارف

(Introduction to bioinformatics tools like BLAST, FASTA, and PubMed)

References: 214,215,216,217,218,219

3A	3B	3C	3D	3E	3F	3G
CO5	Identify methods to retrieve and analyze sequence, structure and functional data	1	Lecture	CAN	Knows-how	PL,DIS,L&GD
CO5	Distinguish Bioinformatics tools like BLAST, FASTA, PubMed	1	Lecture	CAN	Knows-how	ML,C_L,L&PPT

CO5	Demonstrate the use of biological databases: Sequence databases (GenBank, EMBL), structure databases (PDB), and specialized databases (e.g., AYUSH-specific databases)	6	Practical16.1	PSY-SET	Shows-how	PER,DIS,D,Mnt
CO5	Demonstrate methods to retrieve and analyze medicinal plant related genomic and proteomic data relevant to Unani/AYUSH	6	Practical16.2	PSY-SET	Shows-how	DIS,D,W,SDL,BL
CO5	Apply Bioinformatics tools and techniques in analysis of Unani drugs	6	Experiential-Learning16.2	CAP	Does	D,W,DIS

Unit 3 جینو مکس اور پروٹیومکس Genomics and Proteomics

16.3.1 جینو مکس کا جائزہ: جین کی ساخت، فعل، تشریح

(Overview of genomics: Gene structure, function, and annotation)

16.3.2 پروٹیومکس کا تعارف: پروٹین کی ساخت، تہہ بندی، فعل

(Introduction to proteomics: Protein structure, folding, and function)

16.3.3 طب شخصی اور اعشاب کی فارماکولوجی میں جینو مکس/پروٹیومکس کے اطلاقات

(Applications of genomics and proteomics in personalized medicine and herbal pharmacology)

16.3.4 دوا کی دریافت میں طبی معلومیات کا کردار

(Role of bioinformatics in traditional drug discovery)

References: 178,214,215,216,217,218,219

3A	3B	3C	3D	3E	3F	3G
CO5	Describe Gene structure, function and annotation	1	Lecture	CC	Knows-how	L&GD,SDL
CO5	Describe Protein structure, folding and function	1	Lecture	CC	Knows-how	FC,TUT,L&PPT ,DIS
CO5	Apply bioinformatics tools for gene prediction and annotation	2	Practical16.3	CAP	Shows-how	DIS,CBL,D,PSM,PT

CO5	Apply bioinformatics tools for analysis of Protein structure	3	Practical16.4	CAP	Shows-how	BL,D,TUT,DIS,PT
CO5	Adapt Genomics and Proteomics and apply to Medicinal Plants	8	Experiential-Learning16.3	PSY-ADT	Does	SDL,BL,TPW,PER,PrBL

Unit 4 مالیکیولر ماڈلنگ اور دوا کی دریافت Molecular Modelling and Drug Discovery

16.4.1 دوا کی دریافت میں مالیکیولر ماڈلنگ کی اہمیت

(Molecular modelling and its significance in drug discovery)

16.4.2 ساخت کی پیشین گوئی، ہومولوجی ماڈلنگ، مالیکیولر ڈاکنگ

(Structure prediction, homology modelling, and molecular docking)

16.4.3 یونانی ادویات کی دریافت و ترقی میں طبی معلومیات کا اطلاق

(Bioinformatics application in Unani drug discovery and development)

References: 216,217,218,219

3A	3B	3C	3D	3E	3F	3G
CO5	Illustrate Molecular modelling and its significance in drug discovery	1	Lecture	CC	Knows-how	FC,SDL,TUT,L&PPT
CO5	Perform Molecular docking simulations using Autodock and related software	3	Practical16.5	PSY-MEC	Shows-how	CBL,DIS,SDL,DA,PT
CO5	Discuss the role of bioinformatics in advancing research in Unani system of Medicine	6	Experiential-Learning16.4	CC	Does	Mnt,DIS,LS,BL,C_L

Practical Training Activity

Practical Training 16.1 Biological databases: Sequence databases (GenBank, EMBL), structure databases (PDB), and specialized databases (e.g., AYUSH-specific databases)

Total Duration: 6 Hours

Activity 1: Introduction & Overview (1 Hour)

Teacher will explain:

- Importance of Biological Databases in Research.
- Classification of Databases:
    - Sequence Databases: GenBank, EMBL, DDBJ
    - Structure Databases: PDB (Protein Data Bank)
    - Specialized Databases: AYUSH Research Portal, TKDL (Traditional Knowledge Digital Library)

Activity 2: Demonstration by Teacher (1 Hour)

Live demonstration of:

- Searching sequence data in GenBank & EMBL.
- Retrieving protein structure from PDB.
- Exploring AYUSH-specific databases for Unani or herbal medicine-related information.

Activity 3: Hands-on Practice by Students (2 Hours)

Students will:

- Search and retrieve gene/protein sequences from GenBank or EMBL.
- Search and visualize protein structures from PDB.
- Explore AYUSH databases like:
    - AYUSH Research Portal
    - TKDL (Traditional Knowledge Digital Library)
    - IMPCL database (for herbal medicines)

Students will take 2-3 examples from each database.

Activity 4: Data Compilation & Analysis (1 Hour)

Students will prepare a brief report including:

- Database used
- Type of data retrieved
- Application in Unani Medicine or Herbal Research
- Any Challenges faced during search

Activity 5: Presentation & Discussion (1 Hour)

- Group-wise presentation of findings.
- Discussion on practical utility in Unani Medicine.
- Feedback from Mentor.

Practical Training 16.2 Medicinal plant related genomic and proteomic data relevant to Unani/AYUSH

Total Duration: 6 Hours

Activity 1: Introduction to Genomics & Proteomics of Medicinal Plants (1 Hour)

Teacher will explain:

- Importance of Genomic & Proteomic Data in Medicinal Plant Research.
- Role of Genomics in Validation of Unani Medicine.
- Types of Data:
    - DNA sequences
    - RNA/Transcriptome data
    - Protein sequences and structure data.

Activity 2: Demonstration of Tools & Databases (1 Hour)

Demonstration of Searching and Retrieving Data from:

- NCBI (https://www.ncbi.nlm.nih.gov/)
- GenBank (DNA Sequences)
- UniProt (Protein Sequences)

- PDB (Protein Structures)
- Medicinal Plant Genomics Resources (e.g., MPGR, PlantGDB)
- AYUSH or TKDL Databases (if available for plants)

Example Plants:

→ *Glycyrrhiza glabra* (Mulathi)

→ *Withania somnifera* (Asgandh)

→ *Nigella sativa* (Kalonji)

Activity 3: Hands-on Practice by Students (2 Hours)

Students will:

- Search for genomic sequences of a selected medicinal plant.
- Retrieve its protein sequence from UniProt.
- Visualize protein structure using PDB.
- Analyze:
    - Sequence Similarity using BLAST
    - Phylogenetic relation (basic analysis)
    - Gene or Protein function prediction

Activity 4: Data Analysis & Interpretation (1 Hour)

Students will:

- Analyze the significance of retrieved data.
- Relate findings to the medicinal use of plants in Unani Medicine.
- Discuss possible pharmacological or therapeutic correlations.

Activity 5: Report Preparation & Group Presentation (1 Hour)

Students will prepare a report including:

- Name of Medicinal Plant

- Genomic Data Retrieved
- Proteomic Data Retrieved
- Tools/Databases Used
- Analysis Performed
- Relevance to Unani Medicine

Group Presentation of their findings and interaction with peers.

Practical Training 16.3 Gene prediction and annotation

Total Duration: 2 Hours

Activity 1: Introduction to Gene Prediction and Annotation (30 Minutes)

Teacher will explain:

- What is Gene Prediction?
- What is Gene Annotation?
- Importance in Medicinal Plant Research.
- Relevance to AYUSH/Unani Medicinal Plants.

Tools Overview:

- GENSCAN
- FGENESH
- ORF Finder
- NCBI Gene Database
- Basic Sequence Formats: FASTA

Activity 2: Demonstration & Hands-on Practice (1 Hour)

Students will:

- Retrieve a DNA sequence of a medicinal plant from NCBI or other databases.

Example: *Withania somnifera* or *Glycyrrhiza glabra*

- Use Gene Prediction Tools:
    - Upload sequence to GENSCAN/FGENESH/ORF Finder
    - Identify possible genes, coding regions, exons, introns.
- Perform Gene Annotation:
    - Search for known gene features.
    - Annotate gene functions using NCBI Gene or UniProt.

Activity 3: Result Analysis & Discussion (30 Minutes)

Students will:

- Interpret gene prediction results.
- Identify possible gene products and functions.
- Discuss the relevance of these genes in the medicinal properties of the plant.

Practical Training 16.4 Protein structure analysis using bioinformatics tools (e.g. RASMOL, PyMOL)

Total Duration: 3 Hours

Activity 1: Introduction to Protein Structure & Tools (30 Minutes)

Teacher will explain:

- Protein structure levels.
- Importance of protein structure analysis in drug design and Unani medicine research.
- Overview of Tools:
    - RASMOL (Simple visualization)
    - PyMOL (Advanced visualization & analysis)

Sources of Protein Structure:

- Protein Data Bank (PDB)

Activity 2: Demonstration of Tools (30 Minutes)

Teacher will demonstrate:

- How to download a PDB file of a selected protein (e.g., Human Hemoglobin, Enzyme Targets, Herbal Protein Structures).
- Loading and visualizing the protein structure in RASMOL and PyMOL.
- Visualizing:
    - Chains
    - Helices
    - Sheets
    - Ligand Binding Sites
    - Active Sites

Activity 3: Hands-on Activity by Students (1 Hour 30 Minutes)

Students will:

- Select any protein related to medicinal research (Herbal enzymes, drug targets, receptor proteins, etc.).
- Download the PDB structure.
- Visualize and analyze:
    - Different structural features.
    - Active binding sites.
    - Ligands or inhibitors (if present).

Tools for Practice:

- RASMOL
- PyMOL

Activity 4: Result Interpretation and Report Preparation (30 Minutes)

Students will prepare a report containing:

- Name of selected protein.

- Source database and PDB ID.
- Screenshots of structure analysis.
- Important structural observations.
- Relevance of structure to Unani/AYUSH research or medicinal importance.

Practical Training 16.5 Molecular docking using Autodock

Total Duration: 3 Hours

Activity 1: Introduction to Molecular Docking (30 Minutes)

Teacher will explain:

- What is Molecular Docking?
- Importance in drug discovery & validation of Unani formulations.
- Docking Software:
    - AutoDock Tools (for ligand & receptor preparation)
    - AutoDock Vina (for docking run)
- Types of Interactions:
    - Hydrogen Bonding
    - Hydrophobic Interactions
    - Electrostatic Interactions

Activity 2: Demonstration of Docking Workflow (30 Minutes)

Teacher will demonstrate stepwise procedure:

Tools Required:

- AutoDock Tools
- AutoDock Vina
- PyMOL (Optional for visualization)

Steps:

1. Selection of receptor (Target Protein from PDB).
2. Selection of ligand (Drug molecule or phytochemical from Unani medicine).
3. Preparation of receptor and ligand structures.
4. Setting Grid box around active site.
5. Running docking simulation.
6. Visualization of docking poses and binding energy.

Activity 3: Hands-on Docking Simulation by Students (1 Hour 30 Minutes)

Students will:

- Select a phytochemical from Unani medicinal plants.
- Select a target protein.
- Prepare ligand and receptor files.
- Perform docking simulation using AutoDock Vina.
- Analyze docking poses.
- Record Binding Energy & Interactions.

Example:

- Ligand: Thymoquinone (from Nigella sativa)
- Receptor: Cyclooxygenase-2 (PDB ID: 5IKQ)

Activity 4: Result Analysis and Report Preparation (30 Minutes)

Students will prepare a brief report mentioning:

- Selected Ligand and its Source.
- Target Protein and its Role.
- Docking Methodology.
- Docking Score (Binding Energy).

- Observed Interactions.
- Visualization (with screenshots).
- Potential Relevance in Unani Medicine.

Experiential Learning Activity

Experiential-Learning Learning 16.1: Bioinformatics for Personalized Medicine in Unani Medicine

Total Duration: 6 Hours

Activity 1: Introduction to Personalized Medicine & Bioinformatics (1 Hour)

Discussion on:

- What is Personalized Medicine?
- Role of Genetic Variation in Disease & Treatment.
- Temperament (Mizaj)-based treatment in Unani Medicine.
- Bioinformatics Tools in Personalized Medicine:
    - Genomic Sequencing
    - Pharmacogenomics
    - Proteomics
    - Databases of Genetic Variants
- Case Examples from Modern Medicine.

Activity 2: Exploring Bioinformatics Tools Relevant to Personalized Medicine (1 Hour)

Demonstration of:

- NCBI Gene & SNP Database
- 1000 Genomes Project
- PharmGKB (Pharmacogenomics Knowledge Base)
- Unani-specific Databases (if available)

Students will learn how to search for:

- Gene variants
- Drug-gene interactions
- Population-based genetic data

Activity 3: Group Work — Mapping Unani Concepts with Bioinformatics (2 Hours)

Students (in small groups) will:

1. Identify Unani concepts suitable for personalized approach (e.g., Mizaj, temperament-specific drug response, lifestyle management).
2. Identify possible genetic markers or bioinformatics tools to support this approach.
3. Prepare a small case study or framework:
    - Example: *Mizaj* assessment → Gene Analysis → Personalized Regimen

Activity 4: Presentation & Discussion (1 Hour)

Each group will present:

- Unani Concept selected.
- Bioinformatics Tool used.
- Proposed Methodology.
- Application in Personalized Unani Healthcare.

Interactive Discussion on:

- Challenges
- Feasibility
- Future Prospects

Activity 5: Report Writing & Submission (1 Hour)

Students will compile a report including:

- Introduction to Personalized Medicine
- Role of Bioinformatics

- Integration with Unani Concepts
- Case Study/Proposed Framework
- Conclusion

Experiential-Learning Learning 16.2: Workshop on Bioinformatics Tools for AYUSH

Total Duration: 6 Hours

- Students will participate in an expert-led workshop on the latest bioinformatics tools and techniques used in the analysis of medicinal plants and traditional drugs.
- Hands-on exercises in the workshop to apply learned techniques.
- The workshop may be organised by the Department/Institute or students may attend an external workshop organised by any other Institute.

Experiential-Learning Learning 16.3: Project Work – Genomics and Proteomics of Medicinal Plants

Total Duration: 8 Hours

Suggested Medicinal Plants (Examples):

- *Nigella sativa* (Kalonji)
- *Withania somnifera* (Asgandh)
- *Glycyrrhiza glabra* (Liquorice)
- *Azadirachta indica* (Neem)
- *Curcuma longa* (Turmeric)

(Students can select any other medicinal plant from AYUSH systems.)

Activity 1: Selection of Medicinal Plant & Literature Review (1 Hour)

- Students will select a medicinal plant commonly used in Unani, Ayurveda, or Siddha medicine.
- Conduct a literature review for:
    - Traditional uses

- Active phytoconstituents
- Reported therapeutic properties
- Available genetic/protein data

Activity 2: Retrieval of Genetic/Protein Sequence Data (1 Hour)

- Use bioinformatics databases:
  - NCBI GenBank
  - UniProt
  - Phytochemical Databases
- Retrieve nucleotide or protein sequences related to:
  - Specific genes/proteins
  - Active enzymes
  - Target molecules

Activity 3: Sequence Analysis (2 Hours)

Use tools like:

- BLAST (Basic Local Alignment Search Tool)
- Multiple Sequence Alignment (Clustal Omega)
- Phylogenetic Analysis (MEGA software)

Objectives:

- Identify conserved regions
- Compare genetic diversity
- Build phylogenetic trees (if applicable)

Activity 4: Molecular Docking Studies (3 Hours)

Steps:

1. Retrieve 3D structure of protein targets (PDB Database).

2. Retrieve or draw ligand structures of plant-based compounds (PubChem / ChemSketch).
3. Perform docking using:
    - AutoDock
    - PyRx
    - SwissDock or other online docking servers.

Objectives:

- Analyze binding affinity
- Identify binding sites
- Evaluate interactions (Hydrogen bonds, Hydrophobic interactions)

Activity 5: Report Preparation & Presentation (1 Hour)

Report should include:

- Introduction of selected medicinal plant.
- Traditional uses and therapeutic relevance.
- Sequence analysis findings.
- Molecular docking results (with images).
- Conclusion on therapeutic potential.
- Future scope of bioinformatics in AYUSH research.

Resources/Tools Suggested:

- NCBI GenBank
- UniProt Database
- PDB Database
- AutoDock
- PyRx
- MEGA Software

- SwissDock

Experiential-Learning Learning 16.4: Bioinformatics in advancing research in Unani system

Total Duration: 6 Hours

Activity 1: Orientation & Briefing (1 Hour)

Mentor will discuss:

- Introduction to Bioinformatics and its tools.
- Scope of Bioinformatics in Herbal Research, Drug Discovery, Genomics, Metabolomics related to Unani Medicine.
- Identification of keywords and search strategies for literature review.

Activity 2: Literature Search & Review (2 Hours)

Students (Individually or in Groups) will:

- Search scientific databases (PubMed, Google Scholar, AYUSH Research Portal, etc.).
- Review latest research articles, review papers, and case studies.
- Focus on:
    - Application of Bioinformatics in herbal drug research.
    - Genomic studies related to medicinal plants used in Unani Medicine.
    - Database development for Unani formulations.
    - Integration challenges and opportunities.

Activity 3: Preparation of Presentations (1 Hour)

Students will prepare a presentation covering:

- Introduction to Bioinformatics.
- Applications in Unani Medicine.
- Recent Case Studies or Research Examples.
- Scope for Future Research.

- Challenges & Suggestions.

Activity 4: Presentations & Discussion (1.5 Hours)

Each group/student will present their findings (10-15 min each) followed by:

- Peer Interaction
- Discussion on Innovative Ideas
- Clarification of Concepts by Mentor.

Activity 5: Feedback & Conclusion (0.5 Hour)

- Mentor will provide feedback on content, analysis, and presentation skills.
- Summary of key learning points.
- Future directions of bioinformatics in Unani research.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. PRN (10 Marks): Distinguish Bioinformatics tools like BLAST, FASTA, PubMed. 360 Evaluation (15 marks): Based on the activity performed on the topic- Use Bioinformatics for Personalized Medicine in Unani Medicine, the candidate shall be evaluated based on 360-degree performance. DOPS (25 Marks): Demonstrate methods to retrieve and analyze medicinal plant related genomic and proteomic data relevant to Unani/AYUSH. OR Portfolio (25 Marks): Connect the role of bioinformatics in advancing research in Unani system of Medicine. Or Any practical in converted form can be taken for assessment (25 marks).	4

and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Paper No : 3(معالیجاتی منافع الاعضاءClinical Physiology)

Semester No : 3

Module 17 : طبی تغذیہClinical Nutrition

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe fundamental concepts of nutrition from both contemporary and Unani viewpoints, including *Mizaj*-based dietary understanding.
2. Discuss clinical nutrition principles and design therapeutic diets for various populations and disorders.
3. Evaluate nutritional assessments using dietary, anthropometric, clinical, and biochemical methods.
4. Analyze energy metabolism and interpret caloric needs in health, disease, and recovery.
5. Integrate Unani dietary recommendations such as *Tadeel-e-Ghiza* and *Ilaj bil Ghiza* with modern nutritional practices.

Unit 1 غذیہ کے بنیادی اُصول: جدید و یونانی نقطہ نظرFundamentals of Nutrition – Current and Unani Perspectives

17.1.1 طب یونانی و جدید سائنس میں تغذیہ کے تصورات

(Nutrition Concepts in Unani and Contemporary Sciences)

17.1.2 مِزاج پر مبنی غذائی تفہیم

(Mizaj-based Nutritional Understanding in Unani Medicine)

17.1.3 غذائی اجزاء کی درجہ بندی و افعال

(Classification and Function of Nutrients)

17.1.4 Nutrition in Health, Growth and Performance

17.1.5 اغذیہ وظیفیہ اور مغذیات

(Functional Foods and Nutraceuticals)

References: 1,7,8,18,23,220,221,222,223,224,225,226

3A	3B	3C	3D	3E	3F	3G

CO2,CO3	Describe Unani and contemporary concepts of nutrition and health maintenance	1	Lecture	CC	Knows-how	L&PPT ,PER,TUT
CO2,CO3	Discuss classification, function, and physiological role of macro- and micronutrients	2	Lecture	CC	Knows-how	SDL,DIS,L&GD
CO1,CO2,CO3	Prepare Mizaj-based food categorizations with WHO dietary guidelines	4	Practical17.1	CS	Shows-how	BS,DIS,PBL,CBL
CO1,CO3	Prepare dietary plans for different *Amzija* (temperaments)	4	Experiential-Learning17.1	CS	Does	CBL,SDL,IBL,DIS

Unit 2 طبی تغذیہ اور غذائی منصوبہ بندی Clinical Nutrition and Dietary Planning

17.2.1 طبی تغذیہ اور غذاے ءدوائیہ کے اُصول

(Principles of Clinical Nutrition and Therapeutic Diets)

17.2.2 مخصوص آبادیوں کے لیے غذائی ہدایات (بزرگ، حاملہ، کھلاڑی، بچے)

(Dietary Guidelines for Specific Populations (Elderly, Pregnant, Athletes, Children)

17.2.3 عام عوارض میں غذائی اِنتظام: ذیابیطس، سمن، ضغط الدم قوی

(Nutritional Management in Common Disorders: Diabetes, Obesity, Hypertension)

17.2.4 ہسپتال کی ترتیب میں تغذیہ: اینٹرل اور پیرنٹرل فیڈنگ

(Nutrition in Hospital Settings: Enteral and Parenteral Feeding)

17.2.5 یونانی تجاویز: تعدیلِ غذا، عِلاج بالغذا

(Unani Recommendations for *Tadeel-e-Ghiza*, *Ilaj bil Ghiza)*

References: 1,3,7,8,204,205,221,222,223,224,225,226

3A	3B	3C	3D	3E	3F	3G

CO2,CO3	Identify clinical conditions requiring nutritional interventions	1	Lecture	CAN	Knows-how	L&PPT ,TUT,DIS
CO1,CO3	Formulate diet plans based on clinical and Unani guidelines	2	Lecture	CS	Knows-how	L&GD,TUT,C_L,DIS,JC
CO2,CO3,CO4	Create therapeutic diet charts for case studies (diabetic, hypertensive, obese)	4	Practical17.2	CS	Does	PSM,CBL,SDL,BL,Mnt
CO2,CO3	Participate in dietary counselling and clinical nutrition clinics	6	Experiential-Learning17.2	AFT-RES	Does	C_L,SIM,RP,DIS,ML
CO1,CO2,CO3,CO4	Formulate dietary correction strategies and personalized nutrition by exploring Unani texts	4	Experiential-Learning17.3	CS	Does	LS,IBL,CBL,BS,DIS

Unit 3 غذائی جائزہ اور جسمانی ترکیب Nutritional Assessment and Body Composition

17.3.1 غذائی تجزیہ تکنیکات اور غذائی جائزہ ٹولز

(Nutrient Analysis Techniques and Dietary Assessment Tools)

17.3.2 جسمانی ساخت کا تجزیہ: بی ایم آئی، خصر ورک تناسب، جلد کی تہ کی موٹائی

(Body Composition Analysis: BMI, Waist-Hip Ratio, Skinfold Thickness)

17.3.3 تغذیاتی حالت کا جائزہ: طبی، حیاتی کیمیائی، انسانی پیمائشی اشاریے

(Nutritional Status Assessment: Clinical, Biochemical, Anthropometric Indicators)

17.3.4 غذائی قلت (کم/زیادہ غذائیت): شناخت و انتظام

(Malnutrition (Undernutrition & Overnutrition): Detection and Management)

References: 221,222,223,224,225,226

3A	3B	3C	3D	3E	3F	3G

CO2,CO3	Describe assessment methods for body composition and nutritional status	1	Lecture	CC	Knows-how	FC,L&PPT ,PER
CO2,CO3	Evaluate patients for malnutrition using multiple modalities	1	Lecture	CE	Knows-how	DIS,L_VC,TUT,PL
CO2,CO3,CO4	Demonstrate anthropometric tools to assess nutrition status in patients	4	Practical17.3	CAP	Shows-how	CBL,SIM,RP,DIS,PT
CO2,CO3,CO4	Analyze dietary surveys in clinical or community settings	6	Experiential-Learning17.4	CAN	Does	DIS,SDL,FV,RLE,D

Unit 4 توانائی کا استحالہ اور مزاج پر مبنی تدبیر Energy Metabolism and Mizaj-Based Modulation

17.4.1 توانائی کا خرچ اور کل توانائی کی ضرورت کے اجزاء

(Energy Expenditure and Components of Total Energy Requirement)

17.4.2 بنیادی میٹابولک شرح (بی ایم آر): تعین کنندہ عوامل اور حسابات

(Basal Metabolic Rate (BMR): Determinants and Calculations)

17.4.3 بنیادی میٹابولک شرح اور مزاج: میٹابولزم و مزاج کی یونانی تشریح

(BMR and Mizaj: Unani Interpretation of Metabolism and Temperament)

17.4.4 بیماری و استرداد میں کیلوری کی ضروریات

(Caloric Needs in Disease and Recovery States)

References: 15,18,21,23,25,26,29,32,33,223,224,225,226

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe energy metabolism and factors influencing energy expenditure	1	Lecture	CC	Knows-how	SY,PL,L&GD

CO1,CO2,CO3	Discuss corelation of BMR with Mizaj types and Unani metabolic concepts	1	Lecture	CC	Knows-how	L&GD,C_L
CO2,CO3,CO4	Measure BMR, caloric requirements, and analyze case data	4	Practical17.4	PSY-MEC	Shows-how	DIS,D,CBL,PT
CO2,CO3,CO4	Prepare nutrition counselling summaries; Observe metabolic and nutrition clinics	4	Practical17.5	PSY-SET	Shows-how	FV,Mnt,RLE,DIS,CBL
CO1,CO2,CO3,CO4	Design diet modification based on metabolic and *Mizaj* assessment	6	Experiential-Learning17.5	PSY-ORG	Does	CBL,BS,DIS,SDL,C_L

Practical Training Activity

Practical Training 17.1 Mizaj-based food categorizations with WHO dietary guidelines

Total Duration: 4 hours

1. Foundations of Unani & WHO Nutrition (1 hour)

Lecture (40 min)

- *Ghiza* (food) as *Mizaj*-specific therapy (*Sauda, Safra, Balgham, Dam*)
- Macronutrient ratios, food pyramids, and chronic disease prevention

Interactive Quiz (20 min):

- Match Unani foods (e.g., *Asl-us-Soos*/licorice) to WHO categories (e.g., "low-glycemic")

2. Food Categorization Lab (2 hours)

Station 1: *Mizaj* Analysis (1 hour)

- **Task:** Classify 10 common foods (e.g., honey, yogurt, lentils) by:
  - Unani: *Hararat/Yubusat* (heat/dryness)
  - WHO: Fiber/protein content

- **Case Study:**
    - *Safarawi Mizaj* (choleric) patient: Compare Unani cooling foods (*Kadu*/pumpkin) vs. WHO anti-inflammatory diet

Station 2: Conflicting Recommendations (1 hour)

- **Debate Scenarios:**
    - **Dairy:** Unani (*Barid Ratab*/cold-moist) vs. WHO (calcium-rich)
    - **Red Meat:** Unani (*Harr Yabis*/hot-dry) vs. WHO (limit processed meats)
- **Group Task:** Draft a hybrid diet for a diabetic patient

3. Clinical Application (1 hour)

Case Challenges (45 min)

- **Case 1:** Hypertensive *Damawi* (sanguine) patient
    - Unani diet
    - WHO: DASH diet (low-sodium, high-potassium)
- **Case 2:** Obese patient
    - Unani diet
    - WHO: Caloric restriction + exercise

Protocol Presentations (15 min)

- Teams present integrative plans, highlighting synergies/gaps

Practical Training 17.2 Therapeutic diet charts for case studies (diabetic, hypertensive, obese)

Total Duration: 4 hours

1. Foundations of Unani Diet Therapy (45 min)

Lecture (30 min)

- **Unani Concepts:**
    - *Ilaj-bil-Ghiza* (Diet Therapy) for chronic diseases

- *Mizaj*-based adjustments (e.g., *Saudawi* diabetics need moistening foods)

- **Modern Parallels:**
  - Glycemic index (GI)
  - DASH diet

Quick Quiz (15 min):

- "Which *Mizaj* is most prone to insulin resistance? *Balghami* or *Safrawi*?"

2. Case-Based Diet Design Lab (2.5 hours)

Station 1: Diabetes (*Ziabetes*) (50 min)

- **Case:** *Saudawi* diabetic with fatigue and slow digestion
- **Task:** Prepare Unani and Modern Diet Plan

Station 2: Hypertension (50 min)

- **Case:** *Damawi* hypertensive with heat (*Hararat*) symptoms
- **Task:** Prepare Unani and Modern Diet Plan

Station 3: Obesity (*Siman-e-Mufrat*) (50 min)

- **Case:** *Balghami* obese patient with constipation
- **Task:** Prepare Unani and Modern Diet Plan

3. Meal Plan Formulation & Presentation (1 hour)

Group Task (45 min):

- Design a **7-day diet chart** for an assigned case.

Peer Review (15 min):

- Groups exchange charts and critique *Mizaj* alignment + nutritional adequacy

4. Debate & Clinical Pearls (15 min)

- **Topic:** "Can Unani dietary therapy replace pharmaceuticals in early-stage metabolic diseases?"

Practical Training 17.3 Anthropometric tools to assess nutrition status in patients

Total Duration: 4 Hours

Hour 1 – Introduction and Demonstration

- **Faculty briefing (20 min):**
  - Overview of anthropometric parameters and their relevance in endocrine/nutritional disorders.
  - Unani perspective on body proportions and constitutional assessment.
- **Demonstration (40 min):**
  - Correct use of:
    - **Stadiometer** (height)
    - **Weighing scale** (weight)
    - **Measuring tape** (waist, hip, MUAC)
    - **Skinfold callipers** (triceps, biceps, subscapular, suprailiac sites)
  - Use of BMI and body fat percentage charts.

Hour 2 – Hands-on Skill Practice (Peer-to-Peer)

- Learners work in pairs or trios and rotate roles (examiner, subject, recorder).
- Perform full anthropometric assessments on peers:
  - Height and weight (calculate BMI).
  - Waist and hip circumference (calculate WHR).
  - MUAC and skinfold thickness (use reference norms).
- Complete a **recording sheet** for each participant.

Hour 3 – Data Interpretation and Clinical Application

- Faculty-guided discussion:
  - Use of WHO and Indian reference standards for nutritional classification.
  - Identification of patterns (e.g., central obesity, low muscle mass).
- Clinical correlation exercises:

- Interpreting findings in the context of PCOS, metabolic syndrome, hypothyroidism, etc.
- Mapping findings with *Mizāj* types and dietary recommendations in Unani medicine.

Hour 4 – Integration and Case Application

- **Mini-case activity (30 min):**
  - Each learner is assigned a hypothetical patient profile with anthropometric data.
  - Task: Analyze data, determine nutritional status, and suggest initial dietary and lifestyle corrections.
- **Discussion and debrief (30 min):**
  - Learners present brief summaries of their assessments and insights.
  - Faculty provides corrective feedback and links back to Unani diagnostic frameworks.

Practical Training 17.4 BMR, caloric requirements, and analyze case data

Total Duration: 4 hours

1. **Introduction to BMR and Caloric Calculations (30 minutes)**
   - Brief faculty-led explanation of concepts:
     - Basal Metabolic Rate (BMR)
     - Total Energy Expenditure (TEE)
     - Activity and stress factors
   - Introduction to commonly used formulas: Harris-Benedict, Mifflin-St Jeor, and WHO/FAO equations.
2. **Hands-on BMR and TEE Calculation (45 minutes)**
   - Students perform manual calculations using provided anthropometric data (weight, height, age, gender).
   - Activity multipliers and clinical adjustment factors are applied to determine individual caloric needs.
   - Students may also use online calculators or software tools to cross-validate results.
3. **Case Data Analysis – Individual Nutritional Profiles (1.5 hours)**
   - Students are given 2–3 anonymized case scenarios including clinical history, dietary habits, physical activity level, and body measurements.

- They calculate BMR and TEE for each case.
- Students assess whether caloric intake matches requirements and suggest adjustments for undernutrition, obesity, or illness.
- Where appropriate, correlations with Unani parameters such as *Mizaj*, or *Af'al-e-Aza* are discussed.

4. **Discussion and Review (45 minutes)**
    - Group-wise presentation of selected cases.
    - Faculty provides critical feedback and guidance.
    - Discussion includes practical relevance in clinical diet planning, public health, and Unani diagnostics.
    - Brief correlation with Unani classification of food and temperament-based dietary planning.

Practical Training 17.5 Nutrition counselling summaries

Total Duration: 4 hours

1. **Pre-Observation Briefing (30 minutes)**
    - Faculty explains the goals of the visit: observing clinical interactions, counselling styles, patient engagement, and individualized dietary planning.
    - Students are oriented on what to observe: communication techniques, dietary advice given, lifestyle modifications suggested, and any use of personalized or culturally adapted recommendations.
    - Key Unani concepts of nutrition and temperament-based advice are reviewed briefly to help students interpret observations in an integrative way.
2. **Clinic Observation (2 hours)**
    - Students are assigned in small groups to observe sessions at a nutrition or metabolic clinic (hospital outpatient department, community health centre, or specialized private clinic).
    - They silently observe dietitians or clinicians providing nutritional counselling to patients with conditions like diabetes, obesity, metabolic syndrome, PCOS, or malnutrition.
    - Students take structured notes during observation using a provided template (non-identifiable patient data only).
    - If permitted, they may ask brief clarifying questions post-session.
3. **Summary Preparation and Analysis (1 hour)**

- Each student prepares 1–2 counselling summaries based on observed sessions.
- Summaries should include: patient condition, key dietary recommendations, lifestyle changes advised, and how the counselling was personalized.
- Students analyze the interaction and reflect on:
    - Was the advice appropriate and understandable?
    - How did the patient respond?
    - Could Unani dietary principles have complemented the counselling?

4. **Group Reflection and Faculty Feedback (30 minutes)**
    - In small groups, students present one case summary each.
    - Faculty leads a discussion to highlight good practices, challenges, and cultural or temperamental adaptations in dietary counselling.
    - Feedback is given on summary quality, clinical relevance, and the integration of Unani thought where applicable.

Experiential Learning Activity

Experiential-Learning Learning 17.1: Dietary planning for different *Amzija* (temperaments)

Total Duration: 4 hours

1. Introduction to *Amzija* & Diet in Unani Medicine (45 min)

Lecture (30 min)

- The four temperaments (*Damawi, Safrawi, Balghami, Saudawi*) and their dietary needs
- *Mizaj*-based food properties (*Har-Yabis, Barid-Ratab*, etc.)
- Role of digestion (*Quwwat-e-Hadima*) in nutrient absorption

Interactive Discussion (15 min)

- "How does your own perceived *Mizaj* influence your food preferences?"

2. Case Study Analysis (2 hours)

Station 1: Damawi (Sanguine) Temperament (30 min)

- **Case:** A *Damawi* patient with hypertension and excessive heat (*Hararat*)
    - **Dietary Plan:** Cooling foods (*Kheera*/cucumber, *Saunf*/fennel)
    - **Modern Parallel:** Low-sodium, high-potassium (WHO guidelines)

Station 2: Safrawi (Choleric) Temperament (30 min)

- **Case:** A *Safrawi* patient with acid reflux (*Safarawi Ishāl*)
    - **Dietary Plan:** Moistening foods (*Mulethi*/licorice, *Banafsha*/violet)
    - **Modern Parallel:** Alkaline diet (avoiding spicy/acidic foods)

Station 3: Balghami (Phlegmatic) Temperament (30 min)

- **Case:** A *Balghami* patient with obesity and lethargy
    - **Dietary Plan:** Drying and warming foods (*Zanjabeel*/ginger, *Darcheeni*/cinnamon)
    - **Modern Parallel:** High-protein, low-carb (metabolic boost)

Station 4: Saudawi (Melancholic) Temperament (30 min)

- **Case:** A *Saudawi* patient with constipation and dryness (*Yubusat*)
    - **Dietary Plan:** Moistening and purifying foods (*Badaam*/almonds, *Roghan-e-Zaitoon*/olive oil)
    - **Modern Parallel:** High-fiber, omega-3-rich diet

3. Practical Diet Formulation (1 hour)

Group Activity (45 min)

- **Task:** Design a 3-day meal plan for a given *Mizaj* case, integrating:
    - Unani principles (*Mizaj*-specific foods)
    - Modern nutritional guidelines (macronutrient balance)
- **Example:**
    - *Balghami* patient → Breakfast: Ginger tea + whole grain roti with honey

Presentation & Feedback (15 min)

- Groups present meal plans, receive peer and instructor feedback

4. Reflection & Integration (15 min)

Debrief Discussion

- "What challenges arise when merging Unani and modern dietary advice?"
- "How can Unani dietary principles enhance conventional nutrition therapy?"

Experiential-Learning Learning 17.2: Dietary counselling

Total Duration: 6 hours

1. Introduction to Unani Dietary Counselling (1 hour)

Lecture & Demo (40 min)

- **Key Concepts:**
  - *Ilaj-bil-Ghiza* (Diet Therapy) in chronic diseases
  - *Mizaj* assessment for personalized nutrition
  - Modern tools: BMI, glycemic load, lipid profiles
- **Live Demo (20 min):**
  - Instructor conducts a mock counselling session for a diabetic *Balghami* patient

Discussion (20 min):

- "How does Unani dietary advice differ from standard clinical nutrition?"

2. Clinical Nutrition Stations (3 hours)

Station 1: Diabetes Clinic (1 hour)

- **Case:** *Saudawi* diabetic with neuropathy
  - **Tasks:**
    - Take dietary history
    - Recommend *Mizaj*-specific foods
    - Compare with ADA (American Diabetes Association) guidelines

Station 2: Hypertension Clinic (1 hour)

- **Case:** *Damawi* hypertensive with stress
    - **Tasks:**
        - Design a DASH-Unani hybrid diet
        - Role-play breaking dietary myths (e.g., "Salt causes all hypertension")

Station 3: Obesity Clinic (1 hour)

- **Case:** *Balghami* obese patient with slow metabolism
    - **Tasks:**
        - Prescribe *Tadbeer* (regimen)
        - Debate: "Is caloric restriction enough for *Balghami* obesity?"

3. Live Patient Simulations (1.5 hours)

Role-Play Scenarios (45 min):

- **Scenario 1:** A *Safrawi* IBS patient rejecting dietary changes
    - Skills: Motivational interviewing + *Mizaj* education
- **Scenario 2:** An elderly *Saudawi* with polypharmacy needing nutrient-drug interaction advice

Peer Feedback (45 min):

- Groups critique counselling techniques using rubrics:
    - Empathy
    - *Mizaj* accuracy
    - Scientific rigor

4. Clinic Integration & Reflection (30 min)

Panel Discussion (20 min):

- **Topic:** "Can Unani dietary therapy replace pharmaceuticals in early metabolic syndrome?"
    - Panelists: Unani physician, nutritionist, pharmacologist

Takeaway Plans (10 min):

- Each participant drafts **one actionable change** for their practice (e.g., adding *Nabz*-based diet screening)

Experiential-Learning Learning 17.3: Dietary correction strategies and personalized nutrition

Duration: 4 Hours

Hour 1 – Orientation and Textual Immersion

- **Faculty briefing (30 min):**
  - Overview of Unani nutrition principles:
    - *Asbāb-e-Sittah Zarūriyah* and dietary correction.
    - Food classification in Unani
    - Key sources: *Al-Qānūn fī al-Ṭibb*, *Kāmil al-Ṣanā'ah*, *Kitāb al-Aghdhiyah*.
  - Importance of personalized nutrition in Unani and its clinical application today.
- **Group assignment (30 min):**
  - Students divided into groups; each receives:
    - Excerpts from Unani texts related to dietary guidelines for certain *Amzaja* or conditions (e.g., diabetes, obesity, melancholic temperament, hepatic weakness, etc.).
    - Guiding questions for textual analysis.

Hour 2 – Deep Dive into Texts and Thematic Analysis

- **Group task:**
  - Extract dietary recommendations based on:
    - *Mizāj* of the patient.
    - *Mizāj* and *Qiwām* of food.
    - Seasonal and diurnal adaptations.
    - Digestive strength (*Quwwat-e-Hāḍima*) and organ-specific functions.

- Identify:
    - Foods to be recommended and avoided.
    - Preparation methods (e.g., boiled, roasted, soaked, mixed).
    - Use of adjuncts and correctives (*Muslih̤āt*).

Hour 3 – Application to Clinical Scenarios

- **Case-based application:**
    - Each group is given a clinical scenario (e.g., obese patient with cold-moist temperament and weak digestion).
    - Develop a personalized nutrition plan using:
        - Unani dietary principles from the texts.
        - Consideration of age, season, digestive capacity, and comorbidities.
    - Prepare a summary table or chart:
        - Recommended foods (with reasons).
        - Prohibited foods (with rationale).
        - Correctives and food preparation styles.
        - Integration with modern dietary principles where applicable.

Hour 4 – Presentation, Peer Review, and Reflection

- **Group presentations (10 min each):**
    - Present the personalized diet plan.
    - Reference classical texts used.
    - Justify choices based on Unani rationale and clinical reasoning.
- **Peer review and faculty feedback:**
    - Appropriateness of interpretation.
    - Clinical coherence and personalization.
    - Depth of text engagement.

- **Reflection (individual task, 15 min):**
    - *"What distinguishes Unani personalized nutrition from modern dietary guidelines in managing endocrine disorders?"*

Experiential-Learning Learning 17.4: Dietary surveys in clinical or community settings

Total Duration: 6 hours

1. **Pre-Field Orientation (1 hour)**
    - Brief session by the faculty on the objectives and methods of dietary surveys.
    - Introduction to tools such as the 24-hour dietary recall and food frequency questionnaire (FFQ).
    - Instructions on ethical data collection, informed consent, and cultural sensitivity.
    - Brief discussion on Unani dietary concepts, including *Ghidha*, *Mizaj*, and *Asbaab-e-Sitta Zarooriya*.
2. **Fieldwork – Data Collection (3 hours)**
    - Students are assigned to a clinical or community site in pairs or small groups.
    - Each student collects dietary data from at least two individuals.
    - Data includes food intake, meal timing, frequency, and basic anthropometric information (if feasible).
    - Faculty supervisors monitor the process to ensure proper technique and behavior.
3. **Data Organization and Reflection (1 hour)**
    - Students organize their collected data using structured templates.
    - Preliminary analysis of dietary patterns is conducted.
    - Findings are interpreted in relation to nutritional adequacy and possible health risks.
    - Students begin correlating results with Unani perspectives (e.g., *Mizaj*, dietary temperament alignment, humoral imbalance).
4. **Group Discussion and Faculty Feedback (1 hour)**
    - Small group presentations of findings and experiences.
    - Faculty-led discussion on common trends, field challenges, and key takeaways.
    - Integration of Unani and modern perspectives is emphasized.

- Reflection on how dietary assessment can guide both preventive and clinical care.

Experiential-Learning Learning 17.5: Diet modification based on metabolic and *Mizaj* assessment

Total Duration: 6 hours

1. **Introductory Orientation (1 hour)**
    - Faculty explains the integrated approach to dietary modification, combining modern metabolic assessment (BMR, BMI, lipid profile, glucose metabolism, etc.) with Unani temperament (Mizaj) and humoral imbalance.
    - Students are introduced to case formats and parameters for evaluation.
    - A brief recap is provided on relevant Unani concepts: *Mizaj*, *Ghidha-e-Mufid*, *Asbaab-e-Sitta Zarooriya*, and dietary classification (e.g., hot/cold, moist/dry).
2. **Case Distribution and Group Preparation (1.5 hours)**
    - Students are divided into small groups and assigned real-life or simulated cases. Each case includes clinical background, dietary habits, metabolic markers (e.g., blood sugar, lipid profile, BMI), and a *Mizaj* profile.
    - Each group analyzes the case to:
        - Determine key dietary imbalances or risks based on metabolic indicators.
        - Assess individual *Mizaj* and any signs of humoral disturbance.
        - Propose specific dietary modifications aligned with both biomedical and Unani principles.
    - Students prepare a structured summary for presentation.
3. **Case Presentations and Peer Discussion (2.5 hours)**
    - Each group presents their case, including metabolic interpretation, Mizaj assessment, and proposed dietary changes.
    - Faculty and peers provide critical feedback, pose questions, and suggest alternative strategies.
    - The discussion emphasizes the logic behind choices, evidence-based reasoning, and feasibility of recommendations in real-life settings.
4. **Faculty Synthesis and Reflection (1 hour)**
    - Faculty summarizes the key lessons from all cases.

- Strengths and gaps in student reasoning are addressed.
- Special focus is given to integrating *Mizaj* thinking with current nutritional guidelines, adapting diets for temperament-related tendencies (e.g., obesity in *Balghami* individuals, irritability in *Safravi* types), and respecting cultural food patterns.
- Reflection questions are posed to students for written response or follow-up discussion.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. LAQ (10 Marks): On Unani and contemporary concepts of nutrition and health maintenance. LAQ (10 Marks): On Formulate diet plans based on clinical and Unani guidelines. Compilation (15 marks): Create therapeutic diet charts for case studies (diabetic, hypertensive, obese). DOAP (15 marks): Use anthropometric tools to assess nutrition status in patients. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 18 : مَعدَہ۔کبدی وصفراوی نظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Perform and interpret abdominal examination techniques to assess gastrointestinal function in clinical settings.
2. Analyze liver function tests and correlate findings with hepatobiliary disorders using modern and Unani perspectives.
3. Interpret gastric function tests and evaluate conditions such as gastritis and dyspepsia clinically and conceptually.
4. Identify and assess various malabsorption syndromes through appropriate diagnostic approaches.

5. Integrate Unani concepts and clinical physiology in the evaluation and management of GI and liver disorders.

Unit 1 نظامِ ہضم کی کلینیکل تشخیص Clinical Assessment of Gastrointestinal System

18.1.1 معائنہ بطن کے اُصول وتکنیکات

(Principles and Techniques of Abdominal Examination)

18.1.2 امتحان بالنظر، امتحان بالمس، امتحان بالید، امتحان بالسمع

(Inspection, Palpation, Percussion & Auscultation)

18.1.3 مَعدَہ واَمعاء کے ریفلیکسز اور پیتھالوجیکل آصوات

(GI Reflexes and Bowel Sounds in Pathological States)

18.1.4 معدہ وآنتوں کے جسمانی علامات کا طبی اطلاق (مثلاً، ایلام، اِستسقاء

(Clinical Application of GI Physical Signs (e.g., tenderness, ascites)

References: 26,27,29,227,228,229,230,232

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe the anatomical and physiological basis of abdominal examination techniques	1	Lecture	CC	Knows-how	L&PPT
CO2,CO3	Discuss physical signs with underlying GI conditions (e.g., organomegaly, fluid shift)	1	Lecture	CC	Knows-how	DIS,L&GD,TUT
CO2,CO4	Demonstrate and interpret abdominal exam findings in clinical settings	4	Practical18.1	PSY-SET	Shows-how	RLE,PT,CBL,D-BED,D
CO2,CO4	Perform comprehensive GI assessments on patients and relate findings to diagnoses	4	Experiential-Learning18.1	PSY-MEC	Does	TUT,Mnt,D,D-BED

CO2,CO4	Display differential diagnoses based on clinical examination	4	Experiential-Learning18.2	PSY-SET	Does	CD,CBL,LRI,DIS

Unit 2 اختبارِ وظائف الکبد اور کبدی صفراوی اضطرابات Liver Function Tests and Hepatobiliary Disorders

18.2.1 جگر و صَفراوی نِظام کی فزیالوجی

Physiology of Liver and Biliary System

18.2.2 اختبارِ وظائف الکبد (ایل ایف ٹیز) اور ان کی تشریح

(Liver Function Tests (LFTs) and Interpretation)

18.2.3 عام کبدی و صفراوی امراض: (ورمِ کبد، ورمِ مرارہ، تلیئف کبد)

(Common Hepatobiliary Disorders (Hepatitis, Cholestasis, Cirrhosis)

18.2.4 طبِ یونانی میں جگر کی صحت و عوارض (اَمراضِ کَبِد)

(Unani Concepts of Liver Health and Disorders (*Amrāz-e-Kabid)*

References: 1,8,10,12,26,27,29,227,228,229,230,232

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe hepatic functions and their physiological regulation	2	Lecture	CC	Knows-how	PL,SDL,L&GD
CO2,CO4	Analyze LFT reports and correlate them with clinical scenarios	4	Experiential-Learning18.3	CAN	Does	SDL,DIS,CBL,LRI
CO2,CO4	Demonstrate Liver Function Test	4	Practical18.2	PSY-GUD	Shows-how	DL,D,PT,LRI

Unit 3 اختبارِ وظائف مَعدَہ اور اِمعائی فعلی عوارض Gastric Function Tests and Functional GI Disorders

18.3.1 مَعدَہ کے اِفراز و حَرکات کی فزیالوجی

(Physiology of Gastric Secretion and Motility)

اختبار وظائف مَعدَہ: ذروۃ الحمض، پی ایچ نگرانی، پیپسن کی مقدار 18.3.2

Gastric Function Tests: Acid Output, pH Monitoring, Pepsin Levels

عسر الہضم وظیفی اور ورم معدہ 18.3.3

(Functional Dyspepsia and Gastritis)

طب یونانی میں قُوَّتِ طَبِیعِیَّہ اور معوی امراض 18.3.4

Unani Perspective on *Quwate Tabiyah* and Gastrointestinal Dysfunction

References: 1,2,3,4,8,26,27,29,227,228,229,230,232

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Discuss physiological control of gastric secretions and motility	1	Lecture	CC	Knows-how	SDL,DIS,TUT,L&GD
CO2,CO4	Describe the indications and clinical utility of gastric function tests	2	Lecture	CC	Knows-how	TUT,L&GD,DIS
CO2,CO4	Demonstrate the procedure and analysis of pH monitoring and acid secretion tests	6	Practical18.3	PSY-SET	Shows-how	LRI,D,DL,PT
CO2,CO4	Combine functional GI disorders with Unani clinical categories (like Su' Mizāj-e-Mi'da)	4	Experiential-Learning18.4	PSY-ORG	Does	DIS,CBL,PBL,IBL,LRI

Unit 4 غذائی انجذاب کی خرابیاں اور طبی ربط Malabsorption Syndromes and Clinical Correlations

غذائی انجذاب کی خرابی کے میکانیزم واقسام 18.4.1

Mechanisms and Types of Malabsorption

مرض سلیاک، لیکٹوز عدم برداشت، اور لبلبے کی ناکافی فعالیات 18.4.2

Celiac Disease, Lactose Intolerance, and Pancreatic Insufficiency

18.4.3تشخیصی طریقہ کار،اختبار برازبایوپسی،بریتھ ٹیسٹ

Diagnostic Approaches (Stool Tests, Biopsy, Breath Tests)

References: 26,27,29,227,228,229,230,232

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe pathophysiological mechanisms underlying various malabsorption syndromes	2	Lecture	CC	Knows-how	L_VC
CO2,CO3	Identify clinical signs and diagnostic methods for celiac disease, lactose intolerance, and pancreatic insufficiency	1	Lecture	CC	Knows-how	L&PPT
CO2,CO3,CO4	Demonstrate interpretation of stool fat tests, lactose tolerance, and related diagnostics	6	Practical18.4	PSY-GUD	Shows-how	D,DL,PT,DIS
CO2,CO3,CO4	Revise clinical records of malabsorption syndromes and link with symptoms, labs, and imaging	6	Experiential-Learning18.5	PSY-ADT	Does	TUT,DIS,IBL,BS,CBL
CO1,CO2,CO3,CO4	Adapt Unani principles of digestion and absorption (Quwwat-e-Hāzima, Mizāj-e-Mi'da) to patient management	4	Experiential-Learning18.6	PSY-ADT	Does	CBL,C_L,DIS,PSM

Practical Training Activity

Practical Training 18.1 Abdominal exam findings in clinical settings

Total Duration: 4 hours

1. **Demonstration and Review of Examination Techniques (30 minutes)**
    - Faculty demonstrates standard techniques of abdominal examination:
        - Inspection

- Palpation (light and deep)
- Percussion
- Auscultation

- Special signs are introduced: Murphy's sign, rebound tenderness, fluid thrill, shifting dullness, etc.
- Students review relevant anatomy and physiology of abdominal organs.

2. **Supervised Student Practice on Peers or Simulated Models (1.5 hours)**
    - Students practice complete abdominal examinations in pairs or small groups.
    - Faculty observes and corrects hand positions, pressure application, and patient communication.
    - Emphasis is placed on systematic approach and documentation of normal/abnormal findings.
3. **Clinical Exposure – Observation and Practice on Patients (1 hour)**
    - In a clinical ward or OPD, students observe real patient abdominal exams performed by clinicians.
    - Selected students may repeat parts of the exam under supervision.
    - Typical clinical findings (e.g., hepatomegaly, ascites, tenderness) are highlighted and correlated with disease conditions.
4. **Interpretation, Discussion, and Feedback (1 hour)**
    - Students interpret documented findings from both peer practice and patient observation.
    - Faculty facilitates discussion linking physical findings with physiological mechanisms (e.g., bowel sounds and motility, ascites and portal hypertension).
    - Correlation is made with Unani diagnostic concepts such as *Tafarruq-e-Ittisāl*, *Waram*, and *Tahabuj*.
    - Faculty provides individualized feedback on clinical skills and interpretation accuracy.

Practical Training 18.2 Liver Function Test

Total Duration: 4 hours

1. **Introduction to Liver Function Tests (30 minutes)**
    - Faculty introduces the purpose of LFTs, explaining the key parameters:

        - **AST** (Aspartate aminotransferase)
        - **ALT** (Alanine aminotransferase)
        - **Bilirubin** (total and direct)
        - **Alkaline phosphatase (ALP)**
        - **Albumin**
        - **Prothrombin time (PT)**
    - The clinical significance of each parameter is discussed, focusing on how elevated or reduced levels can indicate various liver conditions (e.g., hepatitis, cirrhosis, cholestasis).
    - Students are introduced to standard procedures for collecting blood samples, ensuring hygiene and patient safety.
2. **Demonstration of LFT Procedure (30 minutes)**
    - Faculty demonstrates the step-by-step procedure for performing LFTs in a clinical or laboratory setting, including:
        - Sample collection (venous blood draw or capillary blood)
        - Proper handling and storage of samples
        - Use of diagnostic kits or automated analyzers to measure LFT parameters
    - Key points on safety, sterility, and equipment handling are emphasized.
3. **Student Practice on Performing LFT (2 hours)**
    - Students work in small groups to perform the LFT on simulated or real samples under supervision.
    - Each student practices:
        - Blood sample collection
        - Loading and processing the sample into the analyzer or diagnostic kits
        - Recording the results
    - Faculty provides hands-on guidance, ensuring accurate execution of each step.
4. **Result Interpretation and Clinical Correlation (1 hour)**
    - After completing the tests, students analyze the results and interpret the values for each of the LFT parameters.

- Each student or group correlates the results with hypothetical or real clinical cases (e.g., jaundice, abdominal pain, nausea, fatigue).
- Faculty leads a discussion on how to interpret elevated or decreased levels in the context of different liver diseases.
- Unani perspectives such as *Soo-e-Mizaj*, *Waram* (inflammation), and *Imtela* (congestion) are integrated into the interpretation.

Practical Training 18.3 pH monitoring and acid secretion tests

Total Duration: 6 hours

1. **Introduction to pH Monitoring and Acid Secretion Tests (1 hour)**
    - Faculty explains the concept and significance of pH monitoring and acid secretion tests in diagnosing conditions like gastroesophageal reflux disease (GERD), peptic ulcers, and gastritis.
    - Key tests are discussed:
        - **24-hour pH monitoring** (using catheter or capsule-based systems)
        - **Gastric acid secretion tests** (e.g., basal acid output, maximal acid output)
    - Students learn how these tests measure gastric acid production and the pH levels within the stomach, helping in the diagnosis of acid-related disorders.
    - Unani perspectives on digestive imbalance (*Tafarruq-e-Ittisal*, *Soo-e-Mizaj* of the stomach) are introduced.
2. **Demonstration of pH Monitoring Procedure (1.5 hours)**
    - Faculty demonstrates the procedure for performing 24-hour pH monitoring, including:
        - Insertion of a pH probe (nasogastric or capsule-based)
        - Calibration of the pH monitoring device
        - Instructions to the patient for the test duration and restrictions (e.g., diet, medication).
    - Emphasis is placed on patient comfort, sterile technique, and ensuring proper device placement.
    - Faculty also explains how to interpret the pH data recorded by the probe.
3. **Demonstration of Acid Secretion Test Procedure (1.5 hours)**
    - Faculty demonstrates the acid secretion test procedure, including:

- Collection of gastric juice through nasogastric tube or endoscopy
- Methods to stimulate acid secretion (e.g., using histamine, pentagastrin, or insulin)
- Measurement of basal acid output (BAO) and maximal acid output (MAO) through titration or automated systems.

- Students observe the complete process, including how to handle the samples and record data accurately.
- Discussion of normal and abnormal values in the context of acid-related disorders.

4. **Student Practice and Analysis of pH Monitoring Data (1 hour)**
    - Students practice setting up pH monitoring devices on simulated or real cases under faculty supervision.
    - Each student performs basic calibration, insertion, and recording of pH levels.
    - Students then analyze the pH data obtained, correlating abnormal pH patterns (e.g., persistent acidic environment) with possible diagnoses (e.g., GERD, Zollinger-Ellison syndrome).
5. **Student Practice and Analysis of Acid Secretion Data (1 hour)**
    - Students practice performing acid secretion tests by assisting in the collection of gastric samples and performing titration or using automated systems.
    - Students analyze the results and compare them with normal ranges, interpreting variations in acid output.
    - Clinical correlations are made based on findings, such as excessive acid output in peptic ulcer disease or low output in gastritis.

Practical Training 18.4 Interpretation of stool fat tests, lactose tolerance, and related diagnostics

Total Duration: 6 hours

1. **Introduction to Diagnostic Tests for Digestive Disorders (1 hour)**
    - Faculty introduces the significance of stool fat tests, lactose tolerance tests, and other related diagnostics in assessing malabsorption syndromes (e.g., celiac disease, pancreatic insufficiency).
    - **Stool Fat Test:** Explanation of the procedure to detect fat malabsorption by measuring the amount of fat excreted in stool.
    - **Lactose Tolerance Test:** Explanation of the test used to assess lactose intolerance by measuring blood glucose levels after lactose ingestion.

- Discussion on the pathophysiology of conditions like lactose intolerance and fat malabsorption, and their symptoms (e.g., diarrhea, bloating, weight loss).
- Introduction to Unani concepts of digestive imbalance (*Su' Mizāj*), and their relevance to malabsorption conditions.

2. **Demonstration of Stool Fat Test Procedure (1.5 hours)**
    - Faculty demonstrates how to conduct a stool fat test, including:
        - Collection of stool samples for 72 hours (to monitor fat excretion).
        - Procedures for preparing and analyzing stool samples for fat content (e.g., Sudan III stain method).
        - Interpretation of results, with a focus on the correlation between the amount of fat in stool and possible causes of malabsorption.
    - Students observe the demonstration and take notes on the techniques and analytical steps involved.
3. **Demonstration of Lactose Tolerance Test Procedure (1.5 hours)**
    - Faculty demonstrates the procedure for conducting a lactose tolerance test, including:
        - Preparation for the test (fasting state and intake of a set amount of lactose solution).
        - Blood glucose measurement before and after ingestion of lactose.
        - Interpretation of results, including the significance of blood glucose levels (e.g., a minimal rise suggests lactose intolerance).
    - Discussion on differential diagnosis and conditions that can mimic lactose intolerance (e.g., irritable bowel syndrome, bacterial overgrowth).
    - Students observe the demonstration, learning the correct procedure and safety considerations.
4. **Student Practice and Result Interpretation (2 hours)**
    - Students practice conducting stool fat tests and lactose tolerance tests in pairs or small groups under supervision.
    - Each student or group:
        - Collects and analyzes stool samples for fat content.
        - Conducts the lactose tolerance test, ensuring proper sample handling and timing for blood glucose measurement.
        - Analyzes and interprets the results of both tests.
    - Faculty guides students in interpreting the results, offering feedback and correcting any procedural errors.

- Students also correlate the diagnostic findings with clinical scenarios, discussing potential diagnoses (e.g., malabsorption syndromes, lactose intolerance) based on the test results.

5. **Discussion of Case Studies and Clinical Correlation (1 hour)**
    - Students are provided with clinical case studies featuring symptoms like chronic diarrhea, abdominal pain, bloating, and weight loss.
    - Students correlate the test results from stool fat and lactose tolerance tests with the clinical presentation of the cases.
    - Faculty leads a discussion on possible diagnoses based on test findings, emphasizing differential diagnoses and treatment strategies.
    - Unani perspectives on digestive imbalance, particularly in the context of *Su' Mizāj-e-Mi'da*, are integrated into the discussion to provide holistic management options.

Experiential Learning Activity

Experiential-Learning Learning 18.1: Comprehensive GI assessments on patients and relate findings to diagnoses

Total Duration: 4 hours

1. **Orientation and Assessment Framework (30 minutes)**
    - Faculty provides a structured overview of comprehensive GI assessment including:
        - Detailed history-taking (appetite, digestion, bowel habits, abdominal discomfort)
        - Physical examination (inspection, palpation, percussion, auscultation)
        - Use of relevant clinical tools or patient charts
    - Unani parameters like *Hazm*, *Tafarruq-e-Ittisāl*, *Mizaj-e-Meda*, and *Amraz-e-Meda o Ama'a* are reviewed for clinical correlation.
2. **Patient-Based GI Assessments in Clinical Settings (2 hours)**
    - Students individually or in pairs perform complete GI assessments on patients under supervision in hospital wards or OPDs.
    - Each student is assigned 1–2 cases, focusing on structured history and physical findings.
    - Faculty monitors for clinical skill, patient handling, and depth of inquiry.
    - Students note key signs (e.g., tenderness, distension, altered bowel sounds) and symptoms (e.g., bloating, nausea, altered appetite).
3. **Correlation with Diagnoses and Discussion (1 hour)**

- Students present their findings and suggest possible diagnoses based on:
    - Modern physiological and clinical understanding (e.g., gastritis, IBS, hepatic dysfunction, constipation)
    - Unani interpretations (e.g., *Soo-e-Mizaj*, *Imtela*, *Du'f-e-Hadm*)
- Faculty guides differential diagnosis formation and clarifies clinical reasoning.
- Peer feedback and inter-case comparisons are encouraged for broader understanding.

4. **Reflection and Summary (30 minutes)**
    - Each student writes a short reflective note on what they learned from the GI assessment experience.
    - Faculty summarizes key skills gained and highlights areas needing improvement.
    - Take-home tasks may be assigned (e.g., documenting Unani-based dietary plans for GI patients).

Experiential-Learning Learning 18.2: Differential diagnoses based on clinical examination

Total Duration: 4 hours

1. **Introduction to Differential Diagnosis and Clinical Examination (30 minutes)**
    - Faculty provides an overview of the differential diagnosis process, emphasizing:
        - The importance of systematic clinical examination.
        - How to analyze symptoms and signs to differentiate between similar diseases.
    - Unani diagnostic principles, such as *Mizaj* considerations, are discussed in the context of differential diagnosis.
2. **Case Study Review and Group Discussion (1 hour)**
    - Students are presented with 2–3 detailed case studies, each with patient history, clinical signs, examination findings, and preliminary lab results.
    - In groups, students analyze the case, focusing on identifying key findings that suggest certain conditions over others.
    - Students list possible differential diagnoses based on physical exam findings (e.g., abdominal tenderness, joint pain, rashes, neurological signs).
3. **Clinical Interpretation and Diagnosis Formulation (1.5 hours)**
    - Students present their differential diagnoses, explaining the reasoning behind each possible condition.

- Faculty facilitates discussion, guiding students in understanding how specific clinical signs can lead to differentials (e.g., fever + abdominal pain = appendicitis vs. mesenteric lymphadenitis).
- Students also integrate Unani concepts (e.g., *Waram*) to further refine the diagnoses and recommend next steps for management.
- The importance of considering both modern and Unani diagnostic frameworks is emphasized.

4. **Faculty Feedback and Synthesis (1 hour)**
    - Faculty provides structured feedback on student presentations, pointing out strengths and areas for improvement in clinical reasoning.
    - Key takeaways from each case are summarized, focusing on the challenges of differential diagnosis and how clinical examination and history-taking provide critical clues.
    - The integration of Unani thought with biomedical diagnoses is reinforced.

Experiential-Learning Learning 18.3: LFT reports and their correlation with clinical scenarios

Total Duration: 4 hours

1. **Introduction to Liver Function Tests (LFT) and Clinical Correlation (30 minutes)**
    - Faculty provides an overview of LFT parameters (e.g., ALT, AST, bilirubin, alkaline phosphatase, albumin, prothrombin time) and their significance in liver pathology.
    - Students are introduced to the different types of liver disorders (e.g., hepatitis, cirrhosis, cholestasis, fatty liver) and how they manifest in clinical settings.
    - Unani perspectives on liver health, such as the concept of *Asbaab-e-Sitta Zarooriya* and *Khabith-e-Kulk*, are discussed in the context of liver diseases.
2. **Case Study Distribution and Group Analysis (1 hour)**
    - Students are provided with several case studies, each containing LFT reports and a brief clinical scenario (e.g., jaundice, abdominal pain, fatigue, or unexplained weight loss).
    - Students are divided into groups and instructed to:
        - Analyze the LFT results, identifying abnormal values.

- Correlate the findings with clinical symptoms.
- Discuss potential diagnoses (e.g., hepatitis, cirrhosis, liver metastasis) based on lab results and clinical history.

3. **Group Presentations and Discussion (1.5 hours)**
   - Each group presents their analysis, explaining:
     - The abnormalities in the LFT and their clinical significance.
     - Possible differential diagnoses based on the laboratory results and the patient's clinical symptoms.
     - Suggested further investigations or management steps.
   - The faculty facilitates the discussion, correcting any misunderstandings and guiding students in integrating Unani perspectives (e.g., *Waram* in *Asbab*, *Imtela* in liver diseases) to refine the diagnosis.
4. **Faculty Feedback and Clinical Synthesis (1 hour)**
   - Faculty summarizes key learning points from the case discussions, emphasizing the relationship between LFT findings and clinical conditions.
   - The importance of a comprehensive clinical approach—combining laboratory tests, physical exam, and Unani diagnostic principles—is emphasized.
   - Students are encouraged to reflect on how clinical scenarios can vary and how LFTs contribute to understanding liver function and disease progression.

Experiential-Learning Learning 18.4: Functional GI disorders and their correlation with Unani clinical categories

Total Duration: 4 hours

1. **Introduction to Functional GI Disorders (30 minutes)**
   - Faculty provides an overview of common functional GI disorders (e.g., irritable bowel syndrome, functional dyspepsia, non-ulcer dyspepsia).
   - Discussion on symptoms, diagnostic criteria, and pathophysiology of functional GI disorders.
   - Students are introduced to the diagnostic challenges in functional GI disorders, emphasizing that they often present without clear organic findings, making clinical judgment essential.
2. **Unani Understanding of Digestive Health (30 minutes)**

- Faculty discusses the Unani perspective on digestive health, focusing on the concept of *Mizāj* (temperament) and its impact on various organs, especially the stomach (*Mi'da*).
- Detailed discussion on *Su' Mizāj-e-Mi'da* (impaired temperament of the stomach), including factors contributing to poor digestion such as excess cold, heat, or imbalance of the four humors.
- The relationship between *Su' Mizāj-e-Mi'da* and functional GI disorders is explored, focusing on how improper temperament of the stomach can lead to symptoms such as bloating, nausea, indigestion, and altered bowel movements.

3. **Case Study Analysis and Group Discussion (1.5 hours)**
    - Students are provided with several clinical case studies that present symptoms of functional GI disorders (e.g., recurrent abdominal pain, bloating, and discomfort without clear organic pathology).
    - In small groups, students analyze the case studies, focusing on:
        - Identifying symptoms and signs that match functional GI disorders.
        - Correlating these symptoms with *Su' Mizāj-e-Mi'da* or other Unani clinical categories (e.g., *Waram*).
        - Proposing potential Unani-based management strategies (e.g., diet modification, herbal therapies, lifestyle changes) that address the underlying *Mizāj* imbalance.
4. **Group Presentations and Faculty Feedback (1 hour)**
    - Each group presents their analysis of the case studies, explaining how they correlate the functional GI symptoms with Unani concepts of temperament.
    - Faculty provides feedback on the accuracy of the correlations and helps refine students' understanding of how functional GI disorders can be managed from a Unani perspective.
    - Discussion on the integration of modern diagnostic tools (e.g., endoscopy, imaging) with Unani diagnostic principles in identifying functional GI disorders.
5. **Summary and Clinical Synthesis (30 minutes)**
    - Faculty summarizes key learning points, emphasizing the relationship between functional GI disorders and Unani clinical categories like *Su' Mizāj-e-Mi'da*.

- Students are encouraged to reflect on how understanding the *Mizāj* of a patient can help in providing holistic management for functional GI disorders, which often involve addressing lifestyle, diet, and emotional stressors.
- Faculty highlights the importance of a patient-centered approach, integrating both modern and Unani diagnostic and treatment methods.

Experiential-Learning Learning 18.5: Malabsorption syndromes and link with symptoms, labs, and imaging

Total Duration: 6 hours

1. **Introduction to Malabsorption Syndromes (60 minutes)**
    - Faculty provides an overview of common malabsorption syndromes (e.g., celiac disease, lactose intolerance, chronic pancreatitis, Crohn's disease).
    - Discussion on symptoms commonly associated with these conditions: chronic diarrhea, weight loss, abdominal pain, bloating, and steatorrhea.
    - Overview of diagnostic approaches, including laboratory tests (e.g., stool fat test, celiac serology, lactase activity), imaging (e.g., CT, ultrasound, endoscopy), and their role in confirming diagnosis.
    - Introduction to Unani perspectives on digestive imbalance (*Su' Mizāj-e-Mi'dah*) and its correlation with malabsorption.
2. **Reviewing Clinical Records: Case Introduction and Analysis (1 hour)**
    - Students are provided with anonymized clinical records of patients diagnosed with different malabsorption syndromes. Each record includes:
        - Patient demographics (age, gender, medical history)
        - Presenting symptoms (e.g., diarrhea, bloating, weight loss)
        - Laboratory test results (e.g., stool fat content, serum vitamin levels, celiac markers)
        - Imaging findings (e.g., abdominal ultrasound, endoscopy reports, CT scans).
    - Faculty explains the importance of each diagnostic modality and its role in confirming malabsorption.
3. **Group Case Analysis (2 hours)**
    - Students are divided into small groups and given different case records to review and analyze. In their analysis, they are required to:
        - Link patient symptoms with laboratory results (e.g., correlation between steatorrhea and increased stool fat content, or abdominal pain and elevated inflammatory markers).

- Discuss imaging findings, such as how CT or ultrasound findings may support a diagnosis of chronic pancreatitis or Crohn's disease.
- Identify gaps in diagnosis or additional investigations that may be necessary.
- Integrate Unani concepts, such as *Su' Mizāj-e-Mi'dah* or *Tafarruq-e-Ittisal*, to explore potential underlying digestive imbalances that may contribute to the patient's symptoms.

- Each group documents their analysis and prepares to present their findings.

4. **Group Presentations and Faculty Feedback (1 hours)**
   - Each group presents their case analysis, linking symptoms, lab results, and imaging findings to the clinical diagnosis of malabsorption syndrome.
   - Faculty provides feedback on the accuracy of the analyses, particularly in the integration of diagnostic tests and clinical symptoms.
   - Discussion on how to refine the diagnostic approach and consider differential diagnoses based on the available information.
   - Integration of Unani diagnostic approaches is also discussed, and students learn how to consider these aspects when evaluating a clinical case.
5. **Synthesis and Clinical Reflection (1 hour)**
   - Faculty summarizes key learning points, emphasizing the importance of integrating clinical symptoms, lab results, and imaging findings for a comprehensive diagnosis.
   - Discussion on the role of Unani principles in understanding digestive imbalances and how these can be applied to modern clinical practice in malabsorption syndromes.
   - Students are encouraged to reflect on how this integrated approach (combining modern diagnostic tools and Unani perspectives) enhances clinical reasoning and patient management.

Experiential-Learning Learning 18.6: Unani principles of digestion and absorption in patient management

Total Duration: 4 hours

1. **Introduction to Unani Principles of Digestion and Absorption (30 minutes)**
   - Faculty introduces the core Unani concepts of *Quwwat-e-Hāzima* (digestive power) and *Mizāj-e-Mi'da* (temperament of the stomach).
   - Explanation of the importance of *Quwwat-e-Hāzima* in maintaining digestive health and how its impairment can lead to disorders like indigestion, bloating, and malabsorption.

- Discussion on *Mizāj-e-Mi'da*, highlighting how an imbalance in the stomach's temperament (e.g., excess cold, heat, or dryness) can affect digestion and absorption.
- Connection between these Unani principles and modern concepts of digestion and absorption is made, emphasizing their role in holistic patient care.

2. **Clinical Case Introduction (30 minutes)**
    - Students are introduced to a clinical case study of a patient presenting with digestive symptoms (e.g., bloating, indigestion, abdominal discomfort, or irregular bowel movements).
    - The case includes the patient's medical history, dietary habits, lifestyle factors, and any prior diagnostic tests (e.g., stool fat test, lactose tolerance test).
    - Students are asked to identify key symptoms that may suggest an imbalance in *Quwwat-e-Hāzima* or *Mizāj-e-Mi'da*.
3. **Application of Unani Principles to Diagnose Digestive Imbalance (1 hour)**
    - Students are divided into small groups and tasked with analyzing the case using Unani principles. They must:
        - Assess the patient's symptoms and history to identify signs of *Su' Mizāj-e-Mi'da* (impaired temperament).
        - Discuss potential imbalances in *Quwwat-e-Hāzima* (e.g., weak digestive power or excessive heat/cold in the stomach).
        - Use this analysis to hypothesize the root causes of the patient's digestive issues, integrating both Unani and modern diagnostic findings.
    - Each group documents their diagnosis, considering the temperamental imbalance and its impact on digestion and absorption.
4. **Formulation of Treatment Plan Based on Unani Principles (1.5 hours)**
    - Building on the diagnosis, students formulate a treatment plan for the patient, using Unani methods. This includes:
        - Dietary recommendations to balance the *Mizāj-e-Mi'da* (e.g., warm foods for a cold temperament or cooling foods for a hot temperament).
        - Herbal remedies or Unani medicines to strengthen *Quwwat-e-Hāzima* and address the underlying imbalance (e.g., using *Zanjabil* (ginger) to improve digestion or *Kushta* for a weak digestion).
        - Lifestyle modifications (e.g., stress management, sleep improvement, and physical activity) to enhance digestive power.
    - Students must also consider modern medical treatments (if necessary) alongside the Unani approach to provide a comprehensive plan.
5. **Group Presentations and Faculty Feedback (30 minutes)**

- Each group presents their treatment plan, detailing how they applied Unani diagnostic principles and what interventions they recommended.
- Faculty provides feedback on the appropriateness and completeness of the treatment plans, emphasizing the integration of Unani concepts with modern practices for effective patient management.
- Discussion on common clinical challenges in applying Unani principles in contemporary healthcare settings, and how to overcome them.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (10 Marks): A viva Voce on physical signs with underlying GI conditions (e.g., organomegaly, fluid shift) and hepatic functions and their physiological regulation. LAQ (10 Marks): The indications and clinical utility of gastric function tests. P-CASE (15 Marks): Demonstrate and interpret abdominal exam findings in clinical settings. Compilation (15 Marks): The compilation on the topic " Clinical records of malabsorption syndromes and link with symptoms, labs, and imaging" shall be evaluated. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ refelections / presentations can be taken as an assessment (25 marks).	4

Semester No : 4

Module 19 : نظامِ قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Demonstrate thorough cardiovascular system examinations, including accurate blood pressure and pulse assessments.

2. Interpret ECGs and utilize diagnostic tools such as pulse oximeters, echocardiography, and stress tests effectively.
3. Analyze the physiological basis and clinical presentation of common cardiovascular disorders, including hypertension, shock, and heart failure.
4. Describe congenital cardiac anomalies and developmental aspects such as fetal circulation and septal defects.
5. Integrate Unani concepts of cardiovascular health and disease, particularly the role of *Quwat-e-Haiwaniyah*, in clinical interpretation and management.

Unit 1 کلینیکل معائنہ اور بلڈ پریشر کی تشخیص Clinical Examination and Blood Pressure Assessment

19.1.1 قلبی نظام کا کلینیکل معائنہ

Clinical Examination of the Cardiovascular System (CVS)

19.1.2 ضغط الدم کی پیمائش کی تکنیکات و غلطیاں

Blood Pressure Measurement Techniques & Errors

19.1.3 نبض کا معائنہ اور پیریفرل علامات

Pulse Examination and Peripheral Signs

19.1.4 کیس مباحث: ضغط الدم قوی اور صدمہ

Case Discussions: Hypertension and Shock

References: 26,27,29,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the principles and methods of clinical cardiovascular examination	2	Lecture	CC	Knows-how	TUT,L&PPT ,DIS
CO2,CO4	Describe blood pressure physiology and correct BP measurement techniques	1	Lecture	CC	Knows-how	FC,L_VC,SDL
CO2,CO4	Demonstrate BP, pulse assessment, and JVP evaluation	4	Practical19.1	PSY-SET	Shows-how	DIS,TBL,DL,CBL,PT

CO2,CO4	Demonstrate diagnostic and therapeutic approaches in hypertensive and hypotensive patients	6	Experiential-Learning19.1	PSY-GUD	Does	FV,DIS,LRI,CBL,D-BED
CO2,CO4	Formulate Unani interpretation of hypertension (e.g. *Imtila*)	4	Experiential-Learning19.2	PSY-ORG	Does	Mnt,SIM,DIS,CBL,IBL

Unit 2 قلبی برق نگاری اور تشخیصی آلات Electrocardiography and Diagnostic Tools

19.2.1 قلبی برق نگاری: اُصول، لہریں، وقفے، تشریح

(ECG: Principles, Waves, Intervals, and Interpretation)

19.2.2 بلڈ پریشر مانیٹر، پلس آکسی میٹر، ہولٹر مانیٹر کا اِستعمال

Use of Blood Pressure Monitor, Pulse Oximeter, Holter Monitor

19.2.3 اختبار جھد ریاضت، ایکو کارڈیوگرافی

Exercise Stress Test and Echocardiography

19.2.4 کارڈیک ایم آر آئی اور سی ٹی سکین

Cardiac MRI, CT Scan

19.2.5 کارڈیاک کیتھیٹرائزیشن و اینجیو گرافی

Cardiac Catheterization and Angiography

19.2.6 سباتی ڈاپلر و دماغیّ وعائی خطرے کا جائزہ

Carotid Doppler and Cerebrovascular Risk Assessment

References: 26,27,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Interpret normal and abnormal ECG findings	2	Lecture	CC	Knows-how	DIS,L&PPT ,TUT

CO2,CO4	Describe indications and clinical significance of key cardiovascular diagnostic tools	2	Lecture	CC	Knows-how	L&PPT ,FC
CO2,CO4	Perform ECG recording, interpretation, and correlate with patient conditions	6	Practical19.2	CAP	Shows-how	DL,D-BED,D,PT,DIS
CO2,CO4	Evaluate imaging reports (angiograms, cardiac MRI) in real case scenarios	4	Practical19.3	CE	Shows-how	LRI,Mnt,CBL,DIS
CO2,CO4	Interpret carotid ultrasound and angiographic findings in relation to stroke and CAD	1	Lecture	CAN	Knows-how	TUT,L_VC,PER
CO2,CO4	Display modern diagnostics with Unani evaluation of cardiac functions	4	Experiential-Learning19.3	PSY-MEC	Does	LRI,CBL,C_L,D
CO2,CO4	Demonstrate echocardiography, Holter monitoring and stress tests	2	Experiential-Learning19.4	PSY-SET	Does	D,CBL,RLE,DIS

Unit 3 امراض قلب کی پیتھوفزیالوجی اور یونانی ربط Cardiovascular Pathophysiology and Unani Correlations

19.3.1 طب یونانی میں امراضِ قلب: تصوّرات، تشخیص اور قوتِ حیوانی سے اس کا تعلق

Unani Cardiology: Concepts, diagnosis and its relation to *Quwat-e-Haiwaniyah*

19.3.2 عضلۂ قلب کا اِقفار، احتشاء، اور قلبی درد (ذبحۂ صدر)

Myocardial Ischemia, Infarction, and Cardiac Pain (Angina)

19.3.3 قصور قلب احتقانی: اقسام، اسباب، ظاہری علامات

Congestive Cardiac Failure: Types, Causes, Clinical Presentation

19.3.4 جنینی دورانِ خون: انحرافات (شنٹس) اور نشوونما کی تبدیلیاں

Foetal Circulation: Shunts and Developmental Changes

اذینی حجاب کا نقص، پیٹنٹ ڈکٹس آرٹیریوسس، ٹیٹرالوجی آف فالوٹ19.3.5 Atrial Septal Defect, Patent Ductus Arteriosus, Tetralogy of Fallot **References:** 1,7,8,9,14,15,26,27,29,227,228,229,230						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO2,CO3	Describe pathophysiology of ischemia, infarction, and differentiate types of angina	1	Lecture	CC	Knows-how	L&PPT
CO2,CO3	Discuss the pathogenesis and clinical types of heart failure	1	Lecture	CC	Knows-how	L&PPT
CO2,CO3,CO4	Demonstrate skills to review and interpret clinical cases of cardiac ischemia and congenital defects	6	Practical19.4	PSY-SET	Shows-how	CBL,LRI,DIS,CD,Mnt
CO2,CO3,CO4	Operate management protocols in heart failure and MI	6	Experiential-Learning19.5	CAP	Does	DIS,C_L,CD,CBL,SIM
CO1,CO2,CO3,CO4	Rearrange Unani principles to cardiac failure (e.g. *Su' Mizāj al-Qalb*)	4	Experiential-Learning19.6	PSY-ADT	Does	DIS,C_L,LS,PSM,BS
Practical Training Activity						
Practical Training 19.1 BP, pulse assessment, and JVP evaluation						
Total Duration: 4 hours **1. Introduction and Orientation (30 minutes)** • Brief lecture with visual aids on: ▪ Physiological basis of blood pressure and pulse						

    - Clinical relevance of JVP in cardiovascular assessment
- Overview of clinical instruments: sphygmomanometer, stethoscope, stopwatch, and positioning for JVP
- Safety, hygiene, and patient communication protocols

2. Faculty-Led Demonstration (45 minutes)

    - Correct positioning and technique for BP measurement (manual method)
    - Palpation and character assessment of pulse at different sites (radial, carotid, dorsalis pedis)
    - Visual estimation and interpretation of JVP using anatomical landmarks
- Highlight common errors and troubleshooting tips
- Encourage questions for immediate clarification

3. Supervised Peer Practice – Round 1 (60 minutes)

- Divide students into small groups (pairs or trios)
- Each student performs:
    - BP measurement
    - Pulse rate and rhythm assessment
    - JVP estimation
- Faculty and/or clinical tutors observe and correct technique

4. Rotating Skill Stations with Clinical Scenarios (60 minutes)

- Three rotating stations (20 minutes each):
    1. **BP Station** – Assess BP in normotensive and hypotensive scenarios (using simulated data)
    2. **Pulse Station** – Identify irregular pulse (e.g., atrial fibrillation model)
    3. **JVP Station** – Evaluate JVP in a mock congestive heart failure case
- Each station includes a scenario brief, hands-on execution, and brief feedback

5. Group Debrief and Reflective Discussion (30 minutes)

- Common mistakes and performance observations

- Clinical importance of integrating these assessments in routine practice
- Unani perspectives on pulse reading (Nabz) and cardiovascular evaluation
- Feedback from students on challenges faced and learning gained

Practical Training 19.2 ECG recording, interpretation, and correlate with patient conditions

Total Duration: 6 hours

1. Introductory Briefing and Equipment Familiarization (30 minutes)

- Basics of cardiac electrophysiology and ECG waveform (P-QRS-T)
- Overview of 12-lead ECG system, electrode placement, and lead functions
- Demonstration of ECG machine operation, hygiene, and patient preparation

2. Hands-On ECG Recording Practice (2 hours)

- Practice electrode placement on volunteers or simulation mannequins
- Record ECGs for 2–3 individuals per student (normal and stress-induced conditions if feasible)
- Emphasize correct technique, artifact minimization, and patient communication
- Supervised correction of errors and reinforcement of accuracy

3. Guided ECG Interpretation Session (1.5 hours)

- Faculty-led analysis of sample ECGs:
  - Normal sinus rhythm
  - Sinus tachycardia/bradycardia
  - Atrial fibrillation/flutter
  - Ventricular ectopics, bundle branch blocks
  - Myocardial ischemia/infarction patterns (ST elevation/depression, T wave changes)
- Emphasize interpretation of rate, rhythm, axis, intervals, and waveform morphology
- Correlate findings with basic pathophysiology

4. Clinical Correlation with Patient Cases (1.5 hours)

- Provide case vignettes or observe selected patients with known ECG abnormalities (e.g., CAD, arrhythmia, electrolyte imbalance)
- Correlate:
  - Symptoms and history (e.g., chest pain, palpitations, dyspnea)
  - Vital signs and physical exam findings
  - ECG changes observed
- Discuss differential diagnosis and initial management

5. Group Debrief and Reflection (30 minutes)

- Each student shares key takeaways from one case or recording
- Faculty summarizes:
  - Importance of ECG in early diagnosis
  - Relevance of accurate technique and rapid interpretation
  - Common pitfalls to avoid in clinical settings

Practical Training 19.3 Imaging reports (angiograms, cardiac MRI) in real case scenarios

Total Duration: 4 hours

1. Orientation and Imaging Basics (30 minutes)

- Brief overview of:
  - Coronary angiography: technique, contrast flow, vessel identification, stenosis grading
  - Cardiac MRI: tissue characterization, wall motion, infarction, fibrosis, and viability
- Indications for ordering angiograms and cardiac MRI in clinical practice
- Interpreting structured imaging reports (format, terminology)

2. Guided Analysis of Coronary Angiograms (1.5 hours)

- Review 2–3 anonymized real-life angiogram reports or video loops

- Identify:
    - Coronary artery anatomy (LAD, RCA, LCx)
    - Sites and percentage of stenosis
    - Multi-vessel disease patterns
    - Implications for intervention (PCI, CABG)
- Correlate with patient data (symptoms, ECG, troponin, risk factors)

3. Cardiac MRI Interpretation and Correlation (1 hour)

- Review real or simulated cardiac MRI reports with images
- Identify:
    - Left/right ventricular ejection fraction
    - Areas of myocardial infarction or fibrosis (Late Gadolinium Enhancement)
    - Wall motion abnormalities
    - Pericardial pathology or cardiomyopathies
- Discuss relevance in cases of ischemic heart disease, myocarditis, or heart failure

4. Group Discussion and Case Synthesis (1 hour)

- Students work in small groups to analyze full case files (including history, ECG, labs, and imaging)
- Present findings:
    - Summarize imaging interpretations
    - Formulate likely diagnosis
    - Propose initial management plan
- Faculty provides feedback, emphasizes how imaging confirms or alters clinical hypotheses

Practical Training 19.4 Clinical cases of cardiac ischemia and congenital defects

Total Duration: 6 hours

1. Orientation and Diagnostic Framework (30 minutes)

- Key features of **cardiac ischemia**: types (stable angina, unstable angina, MI), risk factors, typical symptoms
- Overview of **common congenital heart defects**: ASD, VSD, Tetralogy of Fallot, PDA
- Diagnostic tools: ECG, ECHO, angiography, CXR, cardiac enzymes, MRI

2. Case Cluster 1 – Cardiac Ischemia (2.5 hours)

- **Case Review** (3–4 cases):
  - Present each case with history, vitals, ECG, cardiac enzyme reports, angiograms
  - Guide students to identify clinical diagnosis (e.g., NSTEMI, STEMI, angina)
- **Tasks for each case:**
  - Analyze symptoms in relation to ECG and lab findings
  - Identify the vessel involved from angiography (if available)
  - Outline the management approach (medical vs. PCI/CABG)
- **Facilitator Discussion:**
  - Reinforce red-flag features, risk stratification, and decision-making pathways

3. Case Cluster 2 – Congenital Heart Defects (2 hours)

- **Case Review** (2–3 cases):
  - Present clinical summaries with murmur descriptions, ECHO images, and basic chest X-rays
- **Tasks for each case:**
  - Identify the defect (e.g., ASD, VSD, TOF)
  - Correlate findings with symptoms (e.g., failure to thrive, cyanosis, clubbing)
  - Predict the hemodynamic consequence (L⟶R or R⟶L shunt)
  - Suggest initial steps of management (medical stabilization, surgical correction)

4. Comparative Analysis and Group Presentations (45 minutes)

- Students work in small groups to present:

- Summary of assigned cases
- Interpretation of diagnostic findings
- Clinical reasoning leading to diagnosis
- Management outline (acute and long-term)

- Faculty provides targeted feedback

5. Reflection and Wrap-up (15 minutes)

- Key differences in diagnostic pathways for ischemic vs. congenital cases
- How structural vs. perfusion-based abnormalities influence presentation
- Relevance of clinical correlation in interpreting diagnostics effectively

Experiential Learning Activity

Experiential-Learning Learning 19.1: Diagnostic and therapeutic approaches in hypertensive and hypotensive patients

Total Duration: 6 hours

1. Orientation and Pre-Observation Briefing (30 minutes)

- Diagnostic criteria and classification of hypertension and hypotension (e.g., systolic/diastolic thresholds)
- Key signs and symptoms to observe in real patients
- General therapeutic principles (modern and Unani)
- Ethical considerations in patient observation

- Assign clinical observation sheets to guide structured note-taking

2. Clinical Observation – Hypertensive Patients (2 hours)

- **Setting:** In-patient or out-patient department (cardiology, general medicine, or primary care)
- **Activities:**
  - Observe 2–3 patients diagnosed with different stages or types of hypertension (e.g., essential, secondary, hypertensive emergency)
  - Focus on:

- Patient history (risk factors, symptoms, duration)
- Physical examination findings (e.g., high BP readings, retinal changes, pulse quality)
- Ongoing investigations (ECG, creatinine, fundoscopy, etc.)
- Treatment regimen (pharmacological and lifestyle modification)

- Interact with attending physician if permitted

3. Clinical Observation – Hypotensive Patients (2 hours)

- **Setting:** Emergency unit or general wards
- **Activities:**
  - Observe 2–3 patients with hypotension (e.g., orthostatic hypotension, shock, drug-induced, dehydration)
  - Focus on:
    - Presenting complaints (dizziness, syncope, fatigue)
    - Clinical signs (low BP, cold extremities, altered consciousness)
    - Diagnostic workup (CBC, ECG, imaging, postural BP testing)
    - Management strategy (fluid resuscitation, vasopressors, addressing underlying cause)
  - Note patient outcomes and prognosis

4. Case-Based Group Discussion and Therapeutic Integration (1 hour)

- Group presentations of 1–2 observed cases per student (concise summary)
- Faculty-facilitated discussion on:
  - Differential diagnosis
  - Immediate and long-term therapeutic options
  - Unani diagnostic approach to Zuʿf al-Qalb (cardiac weakness), Imtilaʾ (congestion), and *Nabz* patterns
  - Unani regimens like *Tadil-e-Mizaj*, *Munzij-Mushil therapy*, and herbal drugs for hypertension or low BP
- Emphasize integration of Unani and modern clinical logic

5. Reflective Wrap-Up and Feedback (30 minutes)

- Guided reflection prompts:
    - What surprised you most in real patient behavior or response?
    - How would you modify your approach in future assessments?
    - How can Unani concepts add value to modern therapeutic strategies?
- Collect structured feedback from students to improve future experiential sessions

Experiential-Learning Learning 19.2: Unani interpretation of hypertension (e.g. *Imtila*)

Total Duration: 4 hours

1. Conceptual Orientation: Unani Framework of Hypertension (30 minutes)

- Brief presentation on:
    - Pathophysiological concept of *Imtilā'* (quantitative and qualitative)
    - Role of *Mizāj* (temperament), *Akhlaṭ* (humors), and *Aʿḍā' raʾīsah* (vital organs)
    - Correlation with clinical features of modern hypertension (e.g., pulsatile fullness, heaviness, flushed face, *Nabz* variations)
    - Types of *Nabz* (pulse) in *Imtilā'* and their clinical reading

2. Clinical Observation/Case Interaction (1 hour 30 minutes)

- **Setting:** Unani clinic or integrative medicine unit with real or simulated patients
- **Activities:**
    - Observe 2–3 patients diagnosed with hypertension
    - Focus on:
        - History-taking using Unani parameters (e.g., dietary habits, sleep, temperament, bowel habits, emotional state)
        - Identification of signs suggestive of *Imtilā'* (e.g., distended veins, flushed skin, sensation of fullness)
        - Pulse examination and correlation with types of *Nabz*
    - Interact with Unani physicians on differential Unani diagnosis (e.g., *Imtilā' Damvī*, *Zuʿf-e-Qalb*, *Harārat Ghaṅīẓah*)

3. Hands-On Simulation & Pulse Reading Practice (1 hour)

- Practice pulse reading (*Nabz*) under supervision with classmates or standardized patients
- Identify key features like:
    - Tension, rate, rhythm, fullness
    - Pulse changes post-exercise or positional shift
- Use case vignettes to simulate pulse interpretation in different types of *Imtilā'*

4. Group Discussion and Therapeutic Interpretation (1 hour)

- Diagnostic reasoning: How was hypertension interpreted within Unani concepts?
- Possible Unani interventions:
    - *Tanqiyah* (evacuation of excess matter through *Hijāmah*, *Fasd*, *Ishāl*)
    - *Tadbīr-e-Ghizā'ī* (dietary regulations)
    - Use of *Mufarrih* drugs like *Zarnab*, *Arjun*, *Gul-e-Nilofar*, etc.
- Integration of Unani and modern perspectives for individualized treatment

Experiential-Learning Learning 19.3: Modern diagnostics and Unani evaluation of cardiac functions

Total Duration: 4 hours

1. Conceptual Briefing: Dual Frameworks of Cardiac Evaluation (30 minutes)

- Overview of modern cardiac diagnostics: ECG, echocardiography, cardiac enzymes, angiography
- Overview of Unani cardiac assessment: *Nabz* (pulse), temperament (*Mizāj*), vital organ integrity (*A'ḍā' Raīsah*)
- Emphasis on Unani indicators of cardiac weakness (*Zu'f-e-Qalb*), congestion (*Imtilā'*), and associated symptoms

2. Clinical Observation and Case Interaction (1.5 hours)

- Observe 2–3 patients undergoing cardiac evaluations (e.g., ECG or ECHO being performed)
- Parallel bedside Unani evaluation by a Unani expert or trained faculty:
    - Pulse (*Nabz*) assessment

- Visual/tactile inspection (color, skin warmth, etc.)
- Symptom inquiry in Unani terms (e.g., heaviness, fatigue, anxiety, palpitation)

- Discuss the diagnostic impressions derived from both approaches

3. Comparative Reflection Workshop (1.5 hours)

- Group students into teams and assign each a patient or vignette
- Each team presents:
  - Modern diagnosis (e.g., hypertensive heart disease, ischemia, cardiomyopathy)
  - Unani interpretation (e.g., *Zuʿf-e-Qalb*, *Imtilāʾ Damvī*, *Tassadude Sharayin*)
  - Points of convergence (e.g., breathlessness, pulse irregularities)
  - Therapeutic parallels: lifestyle, dietary correction, stress reduction, pharmacological management
- Facilitator summarizes integrative insights

4. Faculty-Guided Wrap-Up Discussion (30 minutes)

- Can Unani assessment add clinical value where technology is inaccessible or insufficient?
- How can modern diagnostics validate or refine Unani observations?
- What competencies are needed for physicians to meaningfully bridge both systems?

Experiential-Learning Learning 19.4: Echocardiography, Holter monitoring and stress tests

Total Duration: 2 hours

1. Orientation to Cardiac Diagnostics (15 minutes)

- **Echocardiography:** Basic principle (ultrasound imaging), parameters observed (EF, wall motion, valve function)
- **Holter Monitoring:** 24–48-hour ambulatory ECG recording for arrhythmias and rate variability
- **Treadmill Stress Test (TMT):** ECG under graded exercise to detect ischemia

2. Clinical Observation: Echocardiography (30 minutes)

- **Setting:** Cardiology OPD or diagnostics lab

- **Activities:**
    - Observe 1–2 patients undergoing 2D echo
    - Note key structures: chambers, valves, wall motion
    - Listen to real-time interpretation by cardiologist (if possible)
    - Identify findings like hypertrophy, regurgitation, reduced EF

3. Clinical Observation: Holter Monitoring Setup and Report Review (30 minutes)

- Observe how Holter device is attached to patient
- Understand patient instructions for diary/log
- Review a sample Holter report:
    - Rhythm analysis
    - Arrhythmias, pauses, ST changes
    - Correlation with symptoms

4. Clinical Observation: Treadmill Stress Testing (30 minutes)

- Observe the protocol (Bruce protocol or equivalent)
- Understand termination criteria (symptoms, ECG changes, BP response)
- Note ECG and HR changes during each stage
- Discuss with technician or physician about interpretation and decision-making

5. Group Debrief (15 minutes)

- Key differences in diagnostic goals of the three tests
- Strengths and limitations of each
- How these diagnostics guide clinical decisions (e.g., need for angiography, medication titration)

Experiential-Learning Learning 19.5: Management protocols of heart failure and MI

Total Duration: 6 hours

1. Clinical Orientation & Overview of Protocols (1 hour)

- **Heart Failure (HF):**
  - Classification (HFrEF vs. HFpEF)
  - NYHA functional classes
  - Diagnostic work-up: BNP, ECHO, ECG
  - Management overview: ACEi/ARNI, β-blockers, diuretics, lifestyle
- **Myocardial Infarction (MI):**
  - Types (STEMI/NSTEMI)
  - Time-sensitive protocols (door-to-balloon time, thrombolysis)
  - MONA-B and post-MI care (dual antiplatelet therapy, statins, risk modification)

2. Case-Based Group Simulation: Acute MI Management (2 hours)

- Students divided into small groups
- Each group receives a simulated MI case (e.g., chest pain, ECG, vitals)
- Tasks include:
  - Diagnosing STEMI/NSTEMI
  - Initiating acute management (MONA-B, ECG interpretation)
  - Choosing reperfusion strategy (PCI vs. thrombolysis)
  - Creating discharge and rehabilitation plan
- **Facilitator Role:**
  - Guide critical steps
  - Discuss nuances such as contraindications to therapies or complications

3. Structured Discussion: Heart Failure Management Pathways (2 hours)

- Review 2–3 case vignettes of HF (e.g., new-onset, decompensated, refractory)
- Group tasks:

- Determine cause of HF and precipitating factors
- Propose diagnostic approach and necessary labs/imaging
- Initiate staged pharmacological and non-pharmacological management
- Discuss criteria for hospitalization, referral, or palliative care

- Integrate clinical guidelines (e.g., ACC/AHA or ESC) into decisions

4. Cross-System Reflection: Unani Perspectives (30 minutes)

- Concepts like *Zu'f-e-Qalb*, *Imtilā'*
- Unani principles of strengthening the heart (*Muqawwiyāt-e-Qalb*)
- Role of diet, temperament correction, regimental therapy

5. Panel Interaction or Faculty Wrap-Up (30 minutes)

- Open Q&A with clinician or faculty expert
- Key takeaways:
  - Early recognition and protocol-based care
  - Preventive strategies and follow-up
  - Challenges in rural or integrative settings

Experiential-Learning Learning 19.6: Unani perspective(e.g. *Su' Mizāj al-Qalb*) on cardiac failure

Total Duration: 4 hours

1. Conceptual Orientation to Unani Cardiac Physiology and Pathology (45 minutes)

- Heart (*Qalb*) as the seat of *Rūḥ* and *Quwwat-e-Haywāniya*
- Normal *mizāj* (temperament) of the heart
- Pathological shifts: *Su' Mizāj Ḥār*, *Bārid*, *Yābis*, *Raṭb* leading to structural/functional imbalance
- Role of *Imtilā'* (humoral congestion), *Tashannuj* (spasms), *Zu'f-e-Qalb* (weakness of the heart)

2. Clinical Observation and Reflection in Real-World Context (1 hour)

- **Setting:** Bedside/OPD observation of 2–3 patients with congestive heart failure (CHF)
- **Activities:**
    - Observe clinical symptoms: dyspnea, edema, fatigue, tachycardia
    - Discuss these features in terms of Unani diagnosis (e.g., *Imtilā' Damwī*, *Iltihāb-e-Qalb*, *Ẓuʿf*)
    - Note pulse quality, skin color, mood, etc., and relate to *mizāj* imbalances
    - Guided discussion with mentor: How would a Unani physician interpret and manage this case?

3. Textual Analysis and Therapeutic Insights (1 hour)

- **Objective:** Review classical texts for references to cardiac dysfunction.
- **Materials:** Selections from *Kāmil al-Ṣanāʿa*, *Al-Qānūn*, *Ikhtiyārāt-e-Badīʿī*, *Makhzan al-Adwiyah*
- **Activities:**
    - Extract Unani diagnostic descriptions and signs of *Ẓuʿf-e-Qalb*, *Su' Mizāj*, *Tafarruq-e-Ittisāl*
    - Identify corresponding Unani therapies:
        - *Muqawwiyāt-e-Qalb* (cardiotonic drugs)
        - *Munaffis*, *Mudirr*, *Muḥallil* treatments
        - Regimen (diet, massage, rest, temperament balancing)

4. Group Discussion and Case Mapping Exercise (1 hour 15 minutes)

- Group task: Map one clinical CHF case to Unani diagnosis using signs/symptoms
- Present findings:
    - Probable *mizāj* derangement
    - Proposed Unani diagnosis
    - Line of treatment with specific drugs, diet, and regimen
- Discussion: Strengths and limitations of the Unani approach in managing heart failure today

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Portfolio: (25 marks): Management protocols in heart failure and MI OSPE (25 marks): Demonstrate BP, pulse assessment, and JVP evaluation. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 20 : نظامِ تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Perform systematic clinical examinations of the respiratory system and recognize key signs such as dyspnea, cyanosis, and abnormal chest findings.
2. Demonstrate and interpret pulmonary function tests and arterial blood gas analyses in various respiratory conditions.
3. Discuss the pathophysiological basis of acute and chronic respiratory disorders including ARDS, respiratory failure, and COVID-related complications.
4. Demonstrate knowledge of ventilation support systems including oxygen therapy, CPAP, and mechanical ventilation.
5. Relate Unani principles and pharmacological interventions (e.g., *Munaffis* drugs) with modern respiratory disease management.

Unit 1 طبی معائنہ اور تشخیصی آلات/وسائل Clinical Examination and Diagnostic Tools

20.1.1 طبی معائنہ: امتحان بالنظر، امتحان بالمس، امتحان بالید، امتحان بالسمع

Clinical Examination: Inspection, Palpation, Percussion, Auscultation

20.1.2 طبی علامات: ضِیقُ التَّنَفُّس، زُرقت، صدری تشوہات

Clinical Signs: Dyspnoea, Cyanosis, Chest Deformities

20.1.3 بالینی آلات: پلس آکسی میٹر، پیک فلو میٹر، شرحِ تنفس کے اسالیب

Bedside Tools: Pulse Oximeter, Peak Flow Meter, Respiratory Rate Patterns

20.1.4 کیس ڈسکشن: سی او پی ڈی، نمونیہ، دمہ

Case Discussions: COPD, Pneumonia, Asthma

References: 26,27,29,33,227,228,229,230,231

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe steps and rationale of respiratory system examination	1	Lecture	CC	Knows-how	L&PPT
CO2,CO4	Discuss the physiological significance of clinical signs in pulmonary diseases	1	Lecture	CC	Knows-how	DIS,L&GD
CO2,CO4	Perform systematic respiratory exams and interpret findings	4	Practical20.1	CAP	Shows-how	DIS,D,D-BED,C_L,Mnt
CO1,CO2,CO4	Interpret respiratory conditions through Unani lens: *Insidād*, *Tafarruq al-Rūḥ*, *Sue Mizāj Riyah*	4	Experiential-Learning20.1	PSY-ADT	Does	IBL,CBL,DIS,LS

Unit 2 اختبارِ وظائف الرئہ اور خون میں گیسوں کا تجزیہ Pulmonary Function Test and Blood Gas Analysis

20.2.1 جائزہ اختبارِ وظائف الرئہ: قیاس النفس، فلو-والیوم لوپس، موسع قصبی کا ردِ عمل

PFT Overview: Spirometry, Flow-Volume Loops, Bronchodilator Response

20.2.2 حجمِ رئہ اور سعۃ الرئہ: طبی تشریح

Lung Volumes & Capacities: Clinical Interpretation

20.2.3 غاز الدم الشریانی (ABG): نمونہ کشی، تاویل، حِ ضی قاعدی توازن

Arterial Blood Gas (ABG): Sampling, Interpretation, Acid-Base Balance

20.2.4 آکسیجن کی کمی (ہائپوکسیا) اور کاربن ڈائی آکسائیڈ کی زیادتی (ہائپر کیپنیہ): اقسام اور تلافی

Hypoxia & Hypercapnia: Types and Compensation

20.2.5 علاج کی نگرانی اور مرض کی پیشگوئی میں اختبارِ وظائف الرئیۃ کا کردار

Role of PFTs in Monitoring Therapy and Prognosis

References: 26,27,29,33,227,228,229,230,231

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Illustrate the application of PFT and ABG in diagnosis and management	1	Lecture	CC	Knows-how	L&GD,PL,SDL
CO2,CO4	Analyze types of hypoxia and correlate ABG findings	2	Lecture	CAN	Knows-how	DIS,TUT,L&PPT
CO2,CO4	Perform and interpret PFTs; simulate ABG interpretation using clinical scenarios	6	Practical20.2	CAP	Shows-how	DL,LRI,CBL,D,PT
CO1,CO2,CO4	Evaluate Unani interpretation of pulmonary function and *Nafas*-related diseases in practical settings	6	Experiential-Learning20.2	CE	Does	LS,DIS,BS,CBL,PSM

Unit 3 نظامِ تنفس کی فعلیاتی امراضیات اور طبی ربط Respiratory Pathophysiology and Clinical Correlation

20.3.1 فشَلِ تنفّسی کی فعلیاتی امراضیات: قسم اول و دوم، حاد اور مزمن

Pathophysiology of Respiratory Failure: Type I & II, Acute & Chronic

20.3.2 تہویۃ-تروِیۃ کا عدمِ توازن اور تحویلۃ کی فعلیات

Ventilation-Perfusion mismatch & Shunt Physiology

20.3.3 کووڈ کے بعد کے اثرات، اور اے آر ڈی ایس، تپِ دِق کے لیے مربوط طریقہ کار

Integrated Approach to ARDS, COVID Sequelae, and TB

یونانی تعلق:نظام تنفس کے امراض میں منفث اور دیگر یونانی ادویات کا کردار اور طریقہ کار 20.3.4

Unani Correlation: Role and mechanism of *Munaffis* and other Unani drugs in Respiratory disorders

References: 1,8,26,27,29,204,205,227,228,229,230,231

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe pathophysiological mechanisms underlying respiratory failure	1	Lecture	CC	Knows-how	C_L,L&PPT ,SDL,TUT
CO2,CO4	Discuss Ventilation-Perfusion mismatch and its role in advanced pulmonary disorders	2	Lecture	CC	Knows-how	L&GD,SDL,TUT
CO2,CO4	Discuss and present clinical cases: ARDS, COVID-19 lung sequelae, TB using PFT and ABG data	4	Practical20.3	CAP	Shows-how	PT,PER,BS,CBL,DIS
CO1,CO2,CO4	Demonstrate clinical reasoning in a chronic lung condition case by applying Unani diagnostic principles and justifying the choice of pharmacotherapy	4	Experiential-Learning20.3	CC	Does	PER,IBL,DIS,CBL,Mnt

Unit 4 وینٹیلیشن سپورٹ Ventilation Support

میکانیکی تہویہ 20.4.1

Mechanical ventilation

آکسیجن سے علاج 20.4.2

Oxygen therapy

سی پیپ 20.4.3

CPAP

قلبی رؤی احیاء (سی پی آر) 20.4.4

Cardio Pulmonary Resuscitation (C.P.R)

References: 26,27,29,33,227,228,229,230,231						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO2,CO3,CO4	Describe the physiological principles, indications, and clinical applications of mechanical ventilation, oxygen therapy, CPAP, and CPR across acute and chronic care scenarios	1	Lecture	CC	Knows-how	L&GD,DIS,TUT
CO2,CO4	Discuss the types of mechanical ventilators (volume vs pressure controlled) and modes of ventilation (AC, SIMV, PSV)	1	Lecture	CC	Knows-how	L&PPT ,DIS
CO2,CO4	Demonstrate the setup and use of oxygen delivery systems, CPAP devices, and mechanical ventilators on mannequins or simulation stations	6	Practical20.4	PSY-SET	Shows-how	SIM,CBL,PT,D,DIS
CO2,CO4	Perform high-quality CPR using current resuscitation protocols, including airway management and use of defibrillators in simulated cardiac arrest situations	6	Experiential-Learning20.4	CAP	Does	D,D-M,CBL,SIM
CO2,CO4	Discuss on a real or simulated resuscitation or ventilator case, including outcome, ethical concerns, and communication with caregivers	6	Experiential-Learning20.5	CC	Does	SDL,RP,DIS,C_L,BS
Practical Training Activity						
Practical Training 20.1 Systematic respiratory examination						
Total Duration: 4 hours **1. Demonstration and Guided Practice (1 hour)**						

- Conducted by a clinician or faculty using a standardized patient or volunteer.
- Steps covered:
    - **Inspection:** Chest shape, movement, signs of distress, cyanosis, use of accessory muscles.
    - **Palpation:** Tracheal position, chest expansion, tactile vocal fremitus.
    - **Percussion:** Resonance, dullness, hyperresonance.
    - **Auscultation:** Breath sounds (vesicular, bronchial), added sounds (crackles, wheeze, pleural rub).
- Students follow along with detailed explanation and demonstration of technique.

2. Peer-to-Peer Examination Practice (1.5 hours)

- Students alternate as examiner and subject.
- Faculty circulates to provide feedback on:
    - Hand positioning and technique
    - Identification of anatomical landmarks
    - Auscultatory skill and stethoscope placement
- Emphasis on correct sequencing and professional communication with patient

3. Case-Based Clinical Correlation (1 hour)

- 3–4 short case vignettes (e.g., pneumonia, COPD, pleural effusion, pneumothorax)
- Each vignette includes:
    - Patient history
    - Physical exam findings (e.g., dull percussion + bronchial breath sounds → consolidation)
- Students tasked to:
    - Identify probable diagnosis
    - Match signs with underlying pathology
    - Suggest next step in investigation or management
- Group discussion to reinforce interpretation logic

4. Summary & Q&A Session (30 minutes)

- Quick recap of key physical signs and their clinical significance
- Common pitfalls in technique and interpretation
- Question round for students to address uncertainties

Practical Training 20.2 PFTs and ABG interpretation using clinical scenarios

Total Duration: 6 hours

1. Orientation and Demonstration of PFTs (1 hour)

- Brief theoretical overview:
  - Spirometry: FVC, FEV_1, FEV_1/FVC ratio, flow-volume loops
  - Peak expiratory flow rate (PEFR)
  - Lung volumes and capacities
  - Diffusing capacity (DLCO)
- Faculty demonstrates:
  - Equipment setup
  - Patient positioning and coaching
  - Performing a standard spirometry test
  - Infection control and calibration

2. Hands-On Practice of PFTs (2 hours)

- Students rotate through stations to:
  - Perform spirometry under supervision
  - Record key values and generate flow-volume curves
  - Identify errors in technique (e.g., poor effort, cough during test)
- Faculty assesses technique and provides feedback

3. PFT Interpretation Workshop (1 hour)

- Case-based discussion with sample PFT graphs:
    - Obstructive pattern (e.g., asthma, COPD)
    - Restrictive pattern (e.g., ILD, kyphoscoliosis)
    - Mixed pattern
- Students identify pattern, match with clinical features, and suggest further evaluation or management

4. Simulation of ABG Interpretation (1.5 hours)

- Brief explanation of ABG parameters:
    - pH, $PaCO_2$, PaO_2, HCO_3^-, SaO_2, base excess
    - Primary respiratory/metabolic acidosis/alkalosis
- Faculty presents 4–5 simulated clinical cases (e.g., COPD exacerbation, metabolic acidosis in sepsis)
- Students:
    - Interpret ABG values
    - Determine primary disturbance and compensation
    - Correlate with case scenario and suggest management

5. Integration and Review (30 minutes)

- Compare findings from PFTs and ABGs in clinical cases
- Discuss the importance of integrating both in diagnosis and monitoring
- Address common student queries and interpretation errors

Practical Training 20.3 PFT and ABG data of ARDS, COVID-19 lung sequelae, TB

Total Duration: 4 hours

1. Case Introduction and Grouping (30 minutes)

- Divide students into 3–4 small groups

- Introduce each group to one clinical scenario:
    - Acute Respiratory Distress Syndrome (ARDS)
    - Post-COVID pulmonary fibrosis
    - Pulmonary tuberculosis with restrictive sequelae
- Each case includes:
    - Brief history and examination findings
    - Pulmonary Function Test (PFT) report
    - Arterial Blood Gas (ABG) analysis

2. Group Case Analysis (1 hour 30 minutes)

- Analyze PFT patterns:
    - Obstructive vs restrictive vs mixed
    - Severity grading based on FVC, FEV_1, DLCO
- Interpret ABG values:
    - Identify hypoxemia, respiratory/metabolic acidosis/alkalosis, compensation
- Correlate findings with clinical symptoms and disease progression
- Prepare a brief summary:
    - Diagnosis
    - Pathophysiology involved
    - Role of PFT and ABG in clinical management

3. Inter-Group Presentations and Discussion (1 hour)

- Each group presents their case analysis (10–12 minutes each)
- Faculty-led discussion after each presentation:
    - Highlight key pathophysiological changes (e.g., reduced compliance in ARDS, diffusion defect in post-COVID)
    - Discuss importance of ABG in acute vs chronic management

- Address errors or alternative interpretations

4. Summary and Practical Takeaways (1 hour)

- Faculty presents ideal interpretations of all cases
- Comparative analysis of:
  - ABG profiles in acute (ARDS) vs chronic (post-TB fibrosis) cases
  - PFT limitations and how to complement with imaging or other diagnostics

Practical Training 20.4 CPAP devices, and mechanical ventilators

Total Duration: 6 hours

1. Introductory Briefing & Safety Orientation (30 minutes)

- Overview of respiratory distress types and oxygen therapy needs
- Classification of oxygen delivery methods: low-flow vs high-flow
- Brief on CPAP and mechanical ventilation indications (e.g., ARDS, COPD exacerbation)
- Safety protocols for equipment handling, oxygen usage, and patient monitoring

2. Station 1: Oxygen Delivery Systems (1.5 hours)

Hands-on Practice:

- Nasal cannula: Flow rate settings, oxygen concentration
- Simple face mask and non-rebreather mask: Assembly, fitting, flow settings
- Venturi mask: Color-coded nozzles, precise FiO_2 delivery
- High-flow nasal cannula (HFNC): Setup, humidification, titration

Tasks:

- Demonstrate fitting on mannequins
- Adjust oxygen flow to clinical scenarios (e.g., hypoxia vs hypercapnia)
- Troubleshooting poor oxygen delivery

3. Station 2: CPAP Systems (1.5 hours)

Hands-on Practice:

- Setup of CPAP machine and circuit
- Adjusting pressure settings and oxygen supplementation
- Applying CPAP mask to mannequin: mask seal, comfort checks

Clinical Simulation:

- Use CPAP in a patient with obstructive sleep apnea or acute cardiogenic pulmonary edema
- Monitor patient's simulated response (oxygenation, pressure alarms)
- Identify and resolve air leaks or discomfort

4. Station 3: Mechanical Ventilation Basics (2 hours)

Demonstration:

- Components: ventilator machine, tubing, humidifier, filters
- Modes: Volume control, pressure control, assist-control, SIMV
- Key settings: tidal volume, respiratory rate, FiO_2, PEEP, I:E ratio

Simulation Practice:

- Connect and ventilate a mannequin using a basic mode
- Modify settings for ARDS vs COPD scenario
- Interpret alarms and adjust settings accordingly
- Discuss weaning basics and spontaneous breathing trials

5. Integration, Recap & Faculty Feedback (30 minutes)

- Quiz or verbal Q&A on equipment setup and indications
- Students rotate to briefly demonstrate key steps from each station
- Faculty provides structured feedback, highlights best practices and common errors

Experiential Learning Activity

Experiential-Learning Learning 20.1: Respiratory conditions through Unani lens: *Insidād*, *Tafarruq al-Rūḥ*, *Sue Mizāj Riyah*

Total Duration: 4 hours

1. Conceptual Orientation (45 minutes)

- ***Riyā*** **(Lungs)**: Temperament and function in Unani physiology
- **Key Pathological Concepts:**
  - *Insidād al-Masālik* (obstruction of passages) — linked to asthma, bronchitis
  - *Qilate -Rūḥ* (disruption of pneuma) — akin to air hunger, acute dyspnea, trauma
  - *Su' Mizāj al-Riyah* (deranged lung temperament) — heat, cold, dryness, or moisture imbalances resulting in functional or structural issues
- Discussion of *Amrāz al-Riyā* from texts like *Kāmil al-Ṣanāʿa*, *Al-Qānūn*, *Mujarrabāt Ibn Baitar*

2. Clinical Case Observations (1 hour)

Setting: Ward or outpatient clinic

Activities:

- Observe patients with conditions such as:
  - Bronchial asthma
  - Chronic bronchitis
  - Pleural effusion or pneumonia
- Identify signs like wheezing, dyspnea, cough, sputum nature
- Group discussion post-observation:
  - Determine possible Unani diagnosis (e.g., *Insidād-e-Tarshūḥī*, *Su' Mizāj Bārid Yābis*)
  - Relate clinical signs to Unani theory (e.g., cold-induced *Su' Mizāj*, thick sputum = *Balgham Ghaleez*)

3. Textual Analysis & Therapeutic Reflection (1 hour)

- Analyze classical Unani passages describing lung disorders
- Match historical descriptions with observed clinical patterns
- Discuss Unani interventions:

- *Munaffis-e-Sadr* (expectorants) like *Ustukhuddus*, *Banafsha*, *Tukhm-e-Khatmi*
- *Muḥallil* and *Muqawwī Riyāḥ* agents
- Regimens: steam inhalation (*Bukhūr*), dietary guidelines, and *Ḥammām* (Unani bath therapy)

4. Integrative Case Mapping & Group Presentation (1 hour 15 minutes)

- Each group receives a brief clinical scenario (e.g., COPD with chronic sputum)
- Tasks:
  - Diagnose from Unani perspective
  - Identify contributing *Su' Mizāj* or *Insidād*
  - Suggest Unani line of treatment including drugs, regimen, and temperament correction
- Presentation and discussion with faculty feedback

Experiential-Learning Learning 20.2: Unani interpretation of pulmonary function and *Nafas*-related diseases

Total Duration: 6 hours

1. Introductory Session: Foundations of Unani Respiratory Physiology (1 hour)

- Discussion of Unani physiological texts describing:
  - *aFa'l al-Tanaffus* and its relation to *Rūḥ* and *Qalb*
  - Temperament (*Mizāj*) of lungs
  - Role of *Harārat Gharīziyya* and *Rooh* in sustaining life and breath
- Interpretation of basic respiratory functions through the lens of *Mizāj* and *Quwā*

2. Clinical Exposure and Observation (2 hours)

Setting: Hospital ward or outpatient clinic

Activities:

- Observe 4–5 cases (e.g., asthma, bronchitis, ILD, COPD)
- Document signs, symptoms, and diagnosis

- Correlate:
    - *Diq al-Nafas* with asthma/COPD
    - *Insidād al-Masālik* with bronchitis or ILD
    - *Su' Mizāj al-Riyāḥ* with functional disturbances (e.g., dry vs moist cough)
- Reflect on how changes in *Mizāj*, *Akhlāt*, or *Rūḥ* influence clinical presentation

3. Classical Text Review & Group Discussion (1.5 hours)

Objective: Link clinical patterns with descriptions in classical Unani literature.

Activities:

- Guided reading of relevant passages from:
    - *Al-Qānūn fī al-Ṭibb*
    - *Kāmil al-Ṣanāʿa*
- Compare historical categorizations of *Diq*, *Sual*, *Tashannuj al-Riyāḥ*
- Discuss temperament-based therapeutic suggestions (e.g., *Muṣaffī Damm*, *Munaffis*, *Muqawwī Qalb wa Riyā*)

4. Therapeutic Reflections and Integrative Mapping (1 hours)

- Case group activity:
    - Choose 1–2 real cases observed earlier
    - Provide Unani diagnosis
    - Suggest:
        - *Ilāj bi'l-Ghidha* (dietary regimen)
        - *Ilāj bi'l-Dawā* (drugs like *Banafsha*, *Khatmi*, *Behidana*)
        - *Ilāj bi'l-Tadbīr* (regimen: massage, *Bukhūr*, steam therapy)
- Present to faculty for critique and feedback

5. Summary and Integrative Discussion (30 minutes)

- Recap core Unani interpretations of lung function and *Nafas*-related conditions

- Discuss how traditional frameworks can enhance clinical sensitivity and individualized care
- Open Q&A for clarification and reflections

Experiential-Learning Learning 20.3: Unani-based approach to chronic lung conditions and drug selection rationale

Total Duration: 4 hours

1. Preparation and Assignment (Pre-session brief)

Note: To optimize the session, students should be informed in advance to prepare a case study. They may choose a chronic lung condition such as:

- *Waram Shoab muzmin* (Chronic Bronchitis)
- *Diq al-Nafas* (Bronchial Asthma)
- *Sil* (Pulmonary Tuberculosis)
- *Insidād al-Masālik* (ILD-like patterns)

2. Case Presentations by Students (2 hours)

Format for Each Student/Group (approx. 20 minutes each):

- Brief case history and clinical findings
- Identification of the Unani diagnosis (*Marz* and *Su' Mizāj*)
- Determination of cause (*Sabab*), affected organ (*A'zā-ye-Raīsah*), and humoural involvement (*Akhlāt*)
- Therapeutic approach:
    - **Ilāj bi'l-Ghidha**: Dietary restrictions and recommendations
    - **Ilāj bi'l-Tadbīr**: Regimenal therapies (e.g., *Bukhoor*, steam inhalation, *Hammām*)
    - **Ilāj bi'l-Dawā**:
        - Selection of Unani formulations
        - Rationale for individual drugs (e.g., *Ustukhuddus* for demulcent and *Munaffis* effects, *Tukhm-e-Khatmi* for anti-inflammatory action)
        - Temperament-based adjustment

3. Peer Review and Faculty Feedback (1 hour)

- Peers provide structured feedback:
    - Was the diagnosis logically framed?
    - Is the drug selection temperamentally and pathophysiologically sound?
- Faculty:
    - Highlights strengths and clinical insights
    - Suggests modifications or safer, more effective alternatives
    - Correlates with available evidence (e.g., pharmacognostic or clinical data on Unani drugs)

4. Consolidated Reflection and Integration (1 hour)

- Discuss patterns of management across cases:
    - Common herbs/formulas used across conditions
    - Customization of therapy based on *Mizāj* and chronicity
- Explore the possibility of integrating modern diagnostics (e.g., spirometry, imaging) in Unani case tracking
- Emphasize importance of individualized, holistic care rooted in Unani epistemology

Experiential-Learning Learning 20.4: CPR using current resuscitation protocols

Total Duration: 6 hours

1. Introduction to Advanced Life Support Protocols (30 minutes)

Objective: Familiarize students with the latest **Basic Life Support (BLS)** and **Advanced Cardiovascular Life Support (ACLS)** guidelines (e.g., AHA/ERC).

Topics Covered:

- Chain of survival
- Recognition of cardiac arrest
- Compression-to-ventilation ratio
- Defibrillation: timing, indications
- Use of airway adjuncts (OPA, NPA, supraglottic devices) and bag-mask ventilation

- Overview of rhythm types: shockable vs non-shockable

2. CPR Skills Training – Hands-On Practice (1.5 hours)

Activities:

- Perform compressions: depth, rate, recoil, hand position
- Rotate between rescuers for two-person CPR
- Practice bag-mask ventilation with proper head-tilt, seal, and synchronization
- Feedback-based correction using CPR mannequins with performance monitors

3. Airway Management Techniques (1 hour)

Hands-On Practice:

- Oropharyngeal (OPA) and nasopharyngeal (NPA) insertion
- Bag-mask ventilation with adjuncts
- Supraglottic airway devices (e.g., LMA)
- Endotracheal intubation demo (optional, if equipment/skill level permits)

4. Defibrillator Use – AED and Manual Mode (1 hour)

- Use of Automated External Defibrillator (AED): pad placement, shock delivery
- Manual defibrillation (where permitted): rhythm recognition, energy setting, charging, and shock
- Safety steps before and after defibrillation
- Synchronization and cardioversion (if device available)

5. Simulated Cardiac Arrest Scenarios – Team Response (1.5 hours)

Scenarios May Include:

- VF/VT arrest with AED
- Asystole/PEA arrest requiring airway + medication sequence
- Respiratory arrest leading to cardiac arrest

- Post-resuscitation care basics (return of spontaneous circulation)

Team Roles:

- Leader, compressor, airway manager, defibrillator operator, recorder

Emphasis On:

- Role clarity, communication, adherence to timing
- Rhythm interpretation and action
- Debriefing after each simulation

6. Reflection and Feedback (30 minutes)

- Instructor-led discussion on common errors
- Summary of ideal CPR cycle and resuscitation steps
- Student self-assessment and peer feedback
- Certificate of participation or skill log update (if part of formal training)

Experiential-Learning Learning 20.5: Real or simulated resuscitation or ventilator case

Total Duration: 6 hours

1. Case Selection and Context Setting (1 hour)

- Overview of reflective practice in medicine: Why it matters in high-stakes situations
- Criteria for selecting cases:
    - Real or simulated cases involving resuscitation or mechanical ventilation
    - Preferably involving decision points (e.g. DNR, withdrawal of care)
- Assign or allow self-selection of one significant case per student (individual or small group)

2. Structured Reflective Writing/Preparation (1.5 hours)

Framework for Reflection (e.g., Gibbs' Reflective Cycle or DEAL model):

- **Describe** the situation: clinical condition, interventions, resuscitation or ventilation process

- **Evaluate** the outcome: survival, complications, goals achieved or not
- **Analyze** the experience: what went well, what could be improved
- **Consider** ethical dilemmas:
    - Consent and autonomy (e.g., was the patient competent or had advance directives?)
    - Prolongation of suffering vs hope of recovery
    - Cultural or family beliefs impacting decision-making
- **Reflect** on communication:
    - What and how was communicated with caregivers?
    - Was empathy shown?
    - How did the family respond?

3. Group Presentations and Guided Peer Discussion (2 hours)

- Each student (or group) presents their case and reflection (10–15 minutes each)
- Others offer insights, questions, or parallels from their own experiences
- Faculty moderates:
    - Highlights learning points
    - Addresses common themes like moral distress, caregiver guilt, team conflict
    - Shares professional strategies for handling such dilemmas (e.g., team debriefs, ethics committee involvement)

4. Role-play and Communication Simulation (1 hour)

Scenarios May Include:

- Breaking bad news after failed resuscitation
- Explaining ventilator dependency or poor prognosis
- Discussing withdrawal of life support

Activities:

- Role-play: one student as doctor, one as family member, one observer

- Rotate roles; focus on body language, word choice, and managing emotions
- Faculty provides immediate feedback on clarity, compassion, and professionalism

5. Final Debrief and Emotional Closure (30 minutes)

- Open-floor reflection: how did these cases affect your thinking, confidence, or values?
- Share coping strategies: dealing with guilt, grief, or uncertainty
- Summarize take-home lessons:
    - Clinical acumen + ethical clarity + humane communication = holistic care

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Open Book Test (10 marks): The students may be given an open book test on physiological significance of clinical signs in pulmonary diseases. Structured LAQ (10 Marks): on application of PFT and ABG in diagnosis and management. Case Based Assessment (15 Marks): Perform and interpret PFTs; simulate ABG interpretation using clinical scenarios. Practical Viva (15 Marks): Demonstrate the setup and use of oxygen delivery systems, CPAP devices, and mechanical ventilators on mannequins or simulation stations. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 5

Module 21 : نظامِ کلیہ وتولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Assess male and female infertility, interpret hormonal profiles, and evaluate menstrual irregularities using modern diagnostic methods.
2. Perform renal function evaluations through tests like RFTs, urine analysis, and interpretation of electrolyte imbalances.
3. Describe the pathophysiology and clinical correlation of renal disorders such as AKI, CKD, nephrotic syndrome, and renal failure.
4. Apply Unani principles to infertility management and renal dysfunction, particularly through *Mudirr-e-Baul* drugs and integrated therapies.
5. Demonstrate knowledge of renal therapeutic approaches including diuretics, dialysis, and renal transplantation, alongside fluid and hormonal regulation during renal compromise.

Unit 1 نظامِ تولید کی طبی فعلیات Clinical Physiology of Reproductive System

21.1.1 عقمِ ذکور واناث کا جائزہ

Assessment of Male and Female Infertility

21.1.2 رسیلاتی شاکلہ اور تشخیصی تاویل" (FSH, LH, Prolactin, etc.)

Hormonal Profiles and Diagnostic Interpretation

21.1.3 "حیض کی بے قاعدگیوں کا جائزہ (اِحتباسِ حیض، عُسرِ طمث، متلازمہ متعدد الکیسات المبایض)

Evaluation of Menstrual Irregularities (Amenorrhea, Dysmenorrhea, PCOS)

21.1.4 موج نگاری (الٹراساؤنڈ) اور منی کا تجزیہ

Ultrasonographic and Semen Analysis

21.1.5 عقم پر یونانی نقطہ نظر

Unani Perspectives on Infertility

References: 1,3,4,7,8,9,10,11,12,19,26,27,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the physiological basis of male and female infertility and the hormonal regulation involved	1	Lecture	CC	Knows-how	L&PPT ,TUT

CO2,CO4	Interpret hormonal profiles (FSH, LH, Prolactin, etc.) in the assessment of infertility and menstrual disorders	1	Lecture	CC	Knows-how	L&GD,PL,SDL
CO2,CO4	Perform diagnostic interpretation of hormonal assay reports related to reproductive health	2	Practical21.1	CAP	Shows-how	PER,CBL,TUT,DIS
CO2,CO4	Perform Interpretation of the findings of pelvic ultrasonography and semen analysis reports	2	Practical21.2	CAP	Shows-how	SDL,CBL,DIS,LRI
CO2,CO4	Discuss case on menstrual irregularities (amenorrhea, dysmenorrhea, PCOS)	4	Experiential-Learning21.1	CC	Does	TUT,LRI,CBL,DIS,SDL
CO1,CO2,CO4	Evaluate Unani perspectives on infertility (uqr) with reference to clinical correlation and pharmacological approaches	4	Experiential-Learning21.2	CE	Does	IBL,DIS,CBL,PER,BS

Unit 2 اختبارِ وظائف الکلیہ اور کہال توازن Renal Function Evaluation and Electrolyte Homeostasis

21.2.1 اختباراتِ وظائفِ الکلیہ: یوریا، کریٹینین، یورک ایسڈ

Renal Function Tests (RFTs): Urea, Creatinine, Uric Acid

21.2.2 بول کی مقدار، مخصوص کثافت، اور خُردبینی کا جائزہ

Evaluation of Urine Output, Specific Gravity, and Microscopy

21.2.3 کہارل توازن: صودیم، پوٹاشیم، کیلشیم، میگنیشیم

Electrolyte Homeostasis: Sodium, Potassium, Calcium, Magnesium

21.2.4 حِ ضی قاعدی امراض اور استحالاتی شاکلہ کی تاوِیل

Acid-Base Disorders and Interpretation of Metabolic Profiles

21.2.5 جی ایف آر: پیمائش اور طبی اہمیت

GFR: Measurement and Clinical Relevance

References: 26,27,29,32,33,47,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe the principles and clinical relevance of renal function tests (RFTs)	1	Lecture	CC	Knows-how	DIS,TUT,L&GD
CO2,CO4	Discuss the measurement and clinical application of GFR in renal diagnostics	1	Lecture	CC	Knows-how	L&PPT ,PER,FC
CO2,CO4	Perform Interpretation of laboratory reports of Renal Function Tests (RFTs), urine analysis (volume, specific gravity, microscopy)	2	Practical21.3	CAP	Shows-how	LRI,PBL,CBL,DIS
CO2,CO4	Analyze electrolyte and acid-base parameters from patient investigations	4	Practical21.4	CAN	Shows-how	CBL,DIS,SIM,PER,LRI
CO2,CO4	Identify and document fluid and electrolyte correction strategies in clinical practice	6	Experiential-Learning21.3	PSY-SET	Does	PBL,DIS,L_VC,CBL,D

Unit 3 امراضِ گُلوی کا طبی ربط Clinical Correlation of Renal Disorders

21.3.1 مزمن اور حاد گُلوی مرض

Acute Kidney Injury (AKI) and Chronic Kidney Disease (CKD)

21.3.2 پروٹین یوریا اور بَول میں خون: طبی اور تجربہ گاہی ربط

Proteinuria and Hematuria: Clinical and Laboratory Correlation

21.3.3 متلازمۂ نفروٹک: فعلیاتی امراضیات اور ظاہری علامات

Nephrotic Syndrome: Pathophysiology and Clinical Presentation

21.3.4 فشلِ گُلوی: سبب، پیش رفت، اور کثیر نظامی اثر

Renal Failure: Etiology, Progression, and Multisystem Impact

یونانی ربط: احتباس البول 21.3.5

Unani Correlation: *Ihtibās al-Bawl*

References: 1,7,8,9,26,27,29,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2	Describe the clinical and pathophysiological features of AKI, CKD, and nephrotic syndrome	2	Lecture	CC	Knows-how	L&GD,L&PPT ,TUT,L_VC
CO2,CO4	Relate the Unani concept of *Ihtibās al-Bawl* with modern pathophysiological frameworks	1	Lecture	CC	Knows-how	L_VC,LRI,D,CBL
CO2,CO4	Analyze urinalysis results for proteinuria and hematuria and correlate with clinical symptoms	4	Practical21.5	CAN	Does	DIS,CBL,PER,D,L_VC
CO1,CO2,CO3	Revise Unani clinical documentation and treatment rationale in patients diagnosed with *Ihtibās al-Bawl*	6	Experiential-Learning21.4	PSY-ADT	Does	CBL,Mnt,DIS,BS,RP

Unit 4 علاج، غسلِ کُلیہ، اور مربوط طریقہ کار Therapeutics, Dialysis, and Integrated Approach

مُدرّاتِ بول: اقسام، طریقہ کار، اور طبی اطلاق 21.4.1

Diuretics: Types, Mechanisms, and Clinical Application

ادرارِ بول اور کُلوی اعانت میں یونانی مُدرّاتِ بول ادویہ کا کردار 21.4.2

Role of Unani Diuretics (*Mudirr-e-Baul Advia*) in *Idraar-e-Baul* and Renal Support

غسلِ کُلیہ: دَواعی، اقسام (دموی غسل، صفاقی غسل) 21.4.3

Dialysis: Indications, Types (Hemodialysis, Peritoneal Dialysis)

کُلوی پیوند کاری: دَواعی، فعلیات، مناعتی اساس 21.4.4

Renal Transplantation: Indications, Physiology, Immunological Basis

21.4.5 گُلوی تعطل کے دوران ہرمونی اور سیالاتی ضَبط و نظم

Hormonal and Fluid Regulation during Renal Compromise

References: 1,2,8,10,12,26,27,29,204,205,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO1,CO2	Discuss the mechanisms and clinical applications of modern and Unani diuretics.	2	Lecture	CC	Knows-how	SDL,L&PPT
CO2,CO3	Describe the physiological and immunological basis of dialysis and renal transplantation	1	Lecture	CC	Knows-how	L&GD
CO2,CO4	Review and compare dialysis modalities (hemodialysis vs. peritoneal) with patient case profiles	2	Practical21.6	CC	Shows-how	LRI,D,DIS,CBL,TBL
CO2,CO4	Perform evaluation of fluid and hormonal regulation strategies during renal compromise using case records	4	Practical21.7	CAP	Shows-how	DIS,BS,C_L,CBL,LRI
CO1,CO2,CO4	Adapt Unani therapeutic approaches including *Mudirr-e-Baul* drugs used adjunctively in renal conditions	6	Experiential-Learning21.5	PSY-ADT	Does	C_L,BS,DIS,CBL,SDL

Practical Training Activity

Practical Training 21.1 Diagnostic interpretation of hormonal assay reports related to reproductive health

Total Duration: 2 Hours

1. Introduction and Overview (15 minutes)

- Brief explanation of key reproductive hormones: FSH, LH, Estradiol, Progesterone, Prolactin, AMH, and Testosterone.

- Discuss physiological ranges and variations based on sex, age, and menstrual phase.
- Introduce the clinical relevance of hormone assays in reproductive health (e.g., infertility, menstrual irregularities, hypogonadism).

2. Guided Case-Based Group Work (30 minutes)

- Learners are divided into small groups (3–4 participants).
- Each group is given 2–3 real or simulated hormone assay reports (with clinical background: e.g., a woman with irregular menses, a man with low libido, etc.).
- Tasks:
    - Interpret the hormonal values.
    - Identify possible conditions (e.g., PCOS, premature ovarian failure, pituitary adenoma).
    - Discuss probable causes and suggest next steps.

3. Group Presentations and Peer Review (30 minutes)

- Each group presents one case interpretation.
- Other groups critically assess the presentation, add differential diagnoses, and suggest improvements.
- Facilitator guides discussion and clarifies misconceptions.

4. Instructor Wrap-Up and Clinical Correlation (15 minutes)

- Summarize key diagnostic patterns.
- Highlight red flags and typical hormonal signatures of common disorders.
- Reinforce learning with short clinical pearls (e.g., "High LH:FSH ratio suggests PCOS").

5. Reflective Questions and Feedback (10 minutes)

- Each participant writes short answers to reflection prompts:
    - What was the most important hormone you interpreted today and why?
    - How did clinical background influence your interpretation?
    - What do you still find challenging?
- Brief oral feedback from students and facilitator.

Practical Training 21.2 Pelvic ultrasonography and semen analysis reports

Total Duration: 2 Hours

1. Introductory Briefing and Diagnostic Criteria Overview (20 minutes)

- Instructor presents:
    - Normal anatomy and sonographic appearance of uterus, ovaries, and testes.
    - Common abnormalities in pelvic ultrasonography (e.g., polycystic ovaries, fibroids, testicular atrophy, varicocele).
    - WHO reference values for semen analysis: volume, concentration, motility, morphology, pH, etc.
    - Key clinical correlations (e.g., azoospermia, oligospermia, anovulation).

2. Hands-On Interpretation of Reports in Pairs or Small Groups (50 minutes)

- Learners are provided with:
    - 2–3 pelvic ultrasound reports (transabdominal and transvaginal for females; scrotal for males) with brief clinical context.
    - 2–3 semen analysis reports with anonymized clinical data (age, symptoms, infertility duration).
- Tasks:
    - Identify and highlight normal vs abnormal findings.
    - Make a probable diagnosis or suggest differential diagnoses.
    - Propose possible causes and further evaluations.
    - Document interpretations and reasoning.

3. Group Discussion and Collaborative Review (30 minutes)

- Selected learners present key findings from their group cases.
- Instructor leads a review with clinical insights, emphasizing correct interpretations and common pitfalls.
- Interactive Q&A to reinforce application of diagnostic norms.

4. Wrap-Up and Clinical Reflection (20 minutes)

- Summary of major diagnostic patterns and reproductive implications.
- Students complete a short written reflective exercise:

- What was the most surprising finding today?
- Which interpretation step felt most challenging?
- One clinical insight they will take forward.

Practical Training 21.3 Renal Function Test (RFT) and urine analysis

Total Duration: 2 Hours

1. Introductory Orientation (20 minutes)

- Instructor provides:
  - Overview of renal function test parameters and their physiological relevance
  - Normal vs abnormal values and clinical significance
  - Principles of urine analysis including interpretation of:
    - **Volume** (oliguria, polyuria)
    - **Specific gravity** (concentration ability of kidneys)
    - **Microscopy** (RBCs, WBCs, casts, crystals, bacteria)

2. Hands-On Report Interpretation (60 minutes)

- Learners work individually or in pairs on **4 anonymized clinical case reports** that include:
  - RFT panel with at least one abnormality
  - Complete urine analysis (chemical + microscopic)
  - Short clinical vignette (age, presenting symptoms)
- Tasks:
  - Identify abnormal findings and categorize the type of renal involvement
  - Correlate findings with clinical presentation (e.g., proteinuria + edema = nephrotic syndrome)
  - Suggest possible causes and additional investigations
  - Record interpretation notes with rationale

3. Group Review and Discussion (30 minutes)

- Instructor leads case-wise group discussion to:
    - Cross-verify student interpretations
    - Clarify key distinctions (e.g., prerenal vs intrinsic azotemia, concentrated vs dilute urine)
    - Discuss practical issues in lab reporting and common misinterpretations
    - Highlight limitations and relevance of RFTs in early renal disease

4. Summary and Reflective Learning (10 minutes)

- Recap of diagnostic clues from RFTs and urine reports
- Learners complete a brief reflection:
    - One key insight learned
    - One area needing further study

Practical Training 21.4 Electrolyte and acid-base parameters

Total Duration: 4 Hours

1. Concept Refresher and Interpretation Framework (40 minutes)

- Instructor-led briefing on:
    - Normal ranges of key electrolytes and ABG parameters (pH, pCO_2, HCO_3^-, base excess, anion gap)
    - Steps for ABG analysis:
        1. Assess pH (acidosis vs alkalosis)
        2. Determine respiratory vs metabolic origin
        3. Identify compensation and mixed disorders
        4. Calculate anion gap if metabolic acidosis is suspected
    - Common patterns and clinical examples (e.g., hypo/hyperkalemia, metabolic alkalosis with vomiting)

2. Report-Based Group Analysis (100 minutes)

- Students divided into small groups (3–4 per group)
- Each group receives **4 patient investigation files** including:
    - Serum electrolytes and ABG panel
    - Relevant case history (e.g., COPD, diabetic ketoacidosis, renal failure, vomiting, sepsis)
- Group tasks:
    - Stepwise analysis of ABG and electrolyte values
    - Classification of acid-base disorder (simple or mixed)
    - Interpretation of electrolyte imbalances and possible causes
    - Correlation with clinical presentation and suggestive diagnosis
    - Outline of likely compensatory mechanisms and potential interventions

3. Peer Presentation and Faculty Review (60 minutes)

- Each group presents one selected case:
    - Full diagnostic reasoning for acid-base and electrolyte status
    - Identification of key lab clues and their clinical implication
- Instructor provides guided feedback:
    - Clarifies conceptual doubts
    - Emphasizes stepwise interpretation logic
    - Demonstrates recognition of subtle or mixed disorders

4. Application to Unani Clinical Reasoning (30 minutes)

- Brief discussion on:
    - How Unani concepts like *su-e-mizaj*, *ifrat/tafrit*, and *tahallul* might relate to electrolyte balance and systemic derangement
    - Potential Unani interpretations of disorders like dehydration, weakness (*zu'f quwā*), or altered states of internal environment
    - Complementary use of Unani regimens (e.g., *tadbīr* for dehydration, diet correction, diuretics)

5. Reflective Summary and Feedback (10 minutes)

- What was the most challenging type of disorder to analyze?
- How can they apply this in future patient care scenarios?

Practical Training 21.5 Proteinuria and hematuria

Total Duration: 4 Hours

Learning Objectives:

By the end of this session, learners will be able to:

1. Identify and classify proteinuria and hematuria based on urinalysis reports.
2. Differentiate between glomerular and non-glomerular causes of urinary abnormalities.
3. Correlate laboratory findings with clinical symptoms (e.g., edema, flank pain, hypertension).
4. Develop a preliminary clinical impression and recommend appropriate follow-up investigations.

Activity Flow and Time Breakdown:

1. Theoretical Refresher and Interpretation Strategy (30 minutes)

- Instructor-led briefing on:
  - Normal urinalysis components: physical, chemical, and microscopic examination
  - Definitions and classifications:
    - **Proteinuria**: transient, orthostatic, persistent; nephrotic vs non-nephrotic range
    - **Hematuria**: gross vs microscopic; glomerular vs urological origin
  - Interpretation tips:
    - Red cell morphology (dysmorphic vs normal)
    - Presence of casts, RBCs, WBCs, epithelial cells, and crystals
    - Associated clinical symptoms (e.g., periorbital edema, dysuria, loin pain)

2. Sample Report Analysis (90 minutes)

- Students divided into small groups (3–4 per group)

- Each group receives **6 anonymized urinalysis reports** along with:
    - Brief clinical history (e.g., fever, flank pain, edema, hypertension, sore throat, recent infections)
- Tasks:
    - Identify proteinuria and hematuria presence and severity
    - Classify findings (glomerular vs non-glomerular)
    - Suggest likely diagnoses (e.g., glomerulonephritis, nephrotic syndrome, UTI, stones, trauma)
    - Record interpretations in structured answer sheets with justification

3. Group Presentation and Faculty Review (30 minutes)

- Groups present one or two cases to the class:
    - Highlight interpretation steps
    - Correlate symptoms with findings
    - Suggest probable diagnosis and next steps (e.g., 24h urine protein, renal USG, biopsy)
- Instructor reviews and gives diagnostic tips, flags common errors in interpretation

4. Practical Demonstration and Correlation (45 minutes)

- Live or video demonstration (by instructor or lab technician):
    - Use of dipstick and microscopy
    - Recognizing RBC casts, dysmorphic RBCs, and significant protein levels
- Discussion on limitations of routine urinalysis and need for confirmatory tests (e.g., spot protein/creatinine ratio)

5. Reflection and Summary (45 minutes)

- Learners write brief reflections on:
    - Most informative case they worked on
    - One clinical pearl they learned about interpreting hematuria or proteinuria
- Faculty summarizes key takeaway points and shares practice cases for further review

Practical Training 21.6 Dialysis modalities (hemodialysis vs. peritoneal)

Total Duration: 2 Hours

1. Introductory Briefing and Conceptual Overview (20 minutes)

- Instructor-led discussion on:
    - Basic principles of dialysis: solute clearance, fluid removal, diffusion, ultrafiltration
    - Mechanism of action for Hemodialysis (HD) vs Peritonial Dialysis (PD)
    - Key clinical indications and contraindications for each modality
    - Monitoring parameters and complications (e.g., hypotension in HD, peritonitis in PD)
    - Role of physiology in dialysis efficiency and patient tolerance

2. Case-Based Group Exercise (70 minutes)

- Students divided into small groups (3–4 per group)
- Each group receives **3 patient case profiles**, e.g.:
    - Case 1: 65-year-old diabetic with vascular access issues
    - Case 2: 35-year-old working professional requiring dialysis flexibility
    - Case 3: 50-year-old hypertensive with history of abdominal surgery

Tasks for each case:

- Review comorbidities, social/occupational context, and access limitations
- Compare suitability of HD vs PD
- Justify the best modality using physiological reasoning (e.g., hemodynamic stability, residual renal function, infection risk)
- Suggest any required monitoring or adjustments based on selected modality

3. Group Presentations and Expert Feedback (20 minutes)

- Each group briefly presents their modality choice and rationale for one selected case
- Instructor critiques and highlights:
    - Alignment with physiological principles
    - Evidence-based considerations

- Clinical practicality and patient-centered care

4. Wrap-up and Key Takeaways (10 minutes)

- Summary discussion by instructor:
  - Physiological pros and cons of HD vs PD
  - Importance of individualized dialysis planning
  - Emerging trends and technologies in renal replacement therapy

Practical Training 21.7 Fluid and hormonal regulation strategies during renal compromise

Total Duration: 4 Hours

1. Theoretical Refresher on Fluid and Hormonal Regulation (30 minutes)

- Instructor-led session on:
  - Overview of fluid balance in healthy kidneys: filtration, reabsorption, secretion
  - Role of **hormones** in fluid and electrolyte regulation:
    - Aldosterone and sodium retention
    - Antidiuretic hormone (ADH) and water reabsorption
    - Renin-angiotensin-aldosterone system (RAAS) activation in kidney dysfunction
  - Alterations in fluid and electrolyte balance during renal compromise (e.g., fluid retention in AKI, hyperkalemia in CKD, acid-base disturbances)
  - Pathophysiological changes during renal dysfunction (e.g., reduced glomerular filtration, impaired tubular reabsorption)

2. Case Record Analysis (2 hours)

- Students are divided into groups (3–4 students per group).
- Each group receives **3–4 anonymized case records** (hospital/clinic patients with renal compromise) containing:
  - Clinical history (e.g., diabetes, hypertension, renal injury)
  - Lab results (e.g., serum creatinine, electrolytes, urinalysis, urine output)
  - Fluid balance charts (input/output data, IV fluids given, etc.)

- Hormonal tests (e.g., aldosterone, ADH, renin levels)

- **Tasks** for each case:
  - Identify the type and stage of renal compromise (AKI, CKD, etc.)
  - Evaluate how hormonal and fluid regulation strategies have been employed (e.g., RAAS activation, diuretic use, dialysis)
  - Analyze compensatory mechanisms (e.g., hyperaldosteronism, ADH secretion)
  - Suggest any improvements or adjustments in management based on physiological understanding (e.g., modifying fluid therapy, correcting electrolyte imbalances)

3. Group Presentation and Discussion (60 minutes)

- Each group presents **one case** and their analysis of fluid and hormonal regulation strategies:
  - Discuss the hormonal and fluid balance abnormalities observed
  - Explain compensatory mechanisms based on physiological understanding
  - Present management strategies or recommendations for improvement
- Instructor provides expert feedback, discussing:
  - Alignment with physiological principles
  - Evidence-based treatment approaches in fluid and electrolyte management
  - Best practices for managing hormonal imbalances in renal dysfunction

4. Reflection and Wrap-up (30 minutes)

- Students reflect individually on:
  - The most important clinical takeaways from analyzing case records
  - Any challenges faced in understanding hormonal fluid regulation during renal compromise
  - How this learning integrates with their future practice in renal or clinical physiology
- Instructor wraps up the session:
  - Highlights key learning points from case discussions
  - Shares additional reading resources and advanced topics for further exploration

Experiential Learning Activity

Experiential-Learning Learning 21.1: Menstrual irregularities (amenorrhea, dysmenorrhea, PCOS)

Total Duration: 4 Hours

1. Orientation and Thematic Overview (30 minutes)

- Instructor-led presentation on:
    - Definitions and classifications: primary/secondary amenorrhea, primary/secondary dysmenorrhea, Rotterdam criteria for PCOS.
    - Etiological framework: hypothalamic-pituitary-ovarian axis, structural causes, endocrine disorders.
    - Diagnostic approach integrating history, labs, imaging.
    - Brief mention of Unani concepts like *Su-e-Mizaj*, *Uqr*, *Ehtibaase Haiz* and *awram*-related dysfunctions.

2. Small Group Case Analysis (90 minutes)

- Learners are divided into 3–4 small groups. Each group is assigned one case:
    - **Case 1: Primary Amenorrhea** (e.g., Turner syndrome or hypothalamic cause)
    - **Case 2: Severe Primary Dysmenorrhea** (e.g., endometriosis or idiopathic)
    - **Case 3: PCOS with infertility and metabolic syndrome**
    - **Case 4 (optional): Secondary Amenorrhea due to hypothyroidism or stress**
- Each group reviews a structured case file including:
    - Detailed patient history
    - Menstrual chart
    - Hormonal assay results
    - Ultrasound reports
    - Brief psychosocial background
- Tasks:
    - Identify key clinical findings

- Create a diagnostic work-up flow
- Discuss possible pathophysiology and confirmatory investigations
- Suggest provisional management plan (both modern and Unani options if relevant)

3. Case Presentation and Intergroup Discussion (60 minutes)

- Each group presents their case, interpretation, and proposed approach.
- Other groups critique constructively and add differential considerations.
- Instructor moderates, fills knowledge gaps, and emphasizes evidence-based practice.

4. Expert Commentary and Clinical Pearls (30 minutes)

- Instructor summarizes takeaways for each condition:
  - Red flag signs in amenorrhea
  - When to suspect structural abnormalities in dysmenorrhea
  - PCOS diagnostic dilemmas and lifestyle modification emphasis
- Short discussion on how these disorders are approached in integrative systems like Unani medicine and where collaboration is possible.

5. Reflection and Feedback (30 minutes)

- Students write responses to:
  - What clinical clue was most helpful in your case?
  - How did you balance hormonal and structural causes?
  - What aspect of Unani reasoning could complement modern diagnosis here?
- Group oral feedback and discussion on experiential value of the session.

Experiential-Learning Learning 21.2: Unani perspectives on infertility (uqr)

Total Duration: 4 Hours

1. Thematic Orientation: Unani Foundations and Clinical Relevance (40 minutes)

- Instructor-led interactive session introducing:

- Definition and classification of *Uqr* (primary vs secondary infertility)
- Unani causes: *Su-e-Mizaj* of uterus/testes, *Tafarruq-e-ittisāl*, *awram*, *sudad*, weakness of *quwā-ṭabīʿiyah*
- Role of *Aʿḍāʾ-tanasuliah* (reproductive organs), *quwā*, *akhlāṭ*, and *arwāḥ* in reproductive function
- Comparative analysis with modern reproductive physiology and infertility categories
- Brief discussion of Unani diagnostic tools: pulse, urine/stool examination, *mizaj* assessment

2. Case-Based Group Work: Unani-Modern Clinical Correlation (80 minutes)

- Learners form 3–4 groups, each receiving a detailed infertility case:
  - **Case A**: Female with anovulatory cycles, PCOS features
  - **Case B**: Male with low sperm count, history of varicocele
  - **Case C**: Couple with unexplained infertility
  - **Case D** (optional): Female with post-inflammatory tubal block (*sudad*)
- Tasks per group:
  - Identify Unani *asbāb* (causes) for infertility in the case
  - Determine *mizaj* of the patient and its influence on reproductive health
  - Correlate with modern diagnostic findings (ultrasound, hormone reports, semen analysis)
  - Propose a Unani management plan (pharmacological + regimenal therapy)
  - Identify possible integrative points for referral, collaboration, or co-treatment

3. Group Presentations and Interdisciplinary Feedback (60 minutes)

- Each group presents:
  - Unani diagnosis and rationale
  - Clinical correlation and interpretive link to biomedical findings
  - Proposed Unani pharmacotherapy (drugs, dosage, duration, route)
  - Suggested regimenal therapies (*ilāj bit-tadbīr*) such as *hammam* etc.
- Instructor and peers provide feedback, highlighting strengths and missing elements, and refining the clinical approach

4. Expert Commentary: Pharmacological Approaches in *Uqr* (30 minutes)

- Detailed discussion of key Unani single and compound drugs for infertility:
    - **Single drugs**:
    - **Compound formulations**:
- Discussion on:
    - *Muqawwī-e-bah*, *Mufattiḥ*, *Muqawwī*-e-raḥim* actions
    - Safety, dosage, and need for case-specific modifications
    - Integration potential with conventional hormonal therapy, ovulation induction, or ART

5. Reflective Practice and Learner Feedback (30 minutes)

- Students reflect in writing or oral form:
    - What Unani concepts added value to their understanding of infertility?
    - How did clinical correlation enrich their analysis?
    - What are the challenges in integrating Unani pharmacology with evidence-based practice?
- Open group discussion to share insights and suggestions for future sessions

Experiential-Learning Learning 21.3: Fluid and electrolyte correction strategies in clinical practice

Total Duration:

6 Hours

Learning Objectives:

By the end of the session, learners will be able to:

1. Identify common fluid and electrolyte imbalances observed in hospitalized patients.
2. Observe clinical decision-making for IV fluid therapy and electrolyte correction.
3. Document and analyze types of fluids used, indications, and monitoring parameters.
4. Correlate clinical presentation with biochemical reports to understand rationale behind interventions.

5. Reflect on how Unani concepts may interpret and support such interventions.

Activity Flow and Time Breakdown:

1. Pre-Clinical Briefing and Orientation (30 minutes)

- Instructor provides an overview of:
    - Common clinical conditions involving fluid/electrolyte imbalance: dehydration, vomiting, diarrhea, renal failure, sepsis, cardiac failure
    - Overview of IV fluids: crystalloids (NS, RL, Dextrose), colloids, and electrolyte supplements (NaCl, KCl, $MgSO_4$, Ca-gluconate)
    - Monitoring parameters: fluid input/output, serum electrolytes, vital signs
    - Ethical conduct and observation guidelines in patient settings

2. Clinical Rounds/Observation (4 hours)

Conducted in Medicine Ward, Emergency, or ICU, depending on institutional setting.

- **Activities during observation**:
    - Shadow physicians/nurses during patient rounds and IV therapy administration
    - Observe and record:
        - Clinical diagnosis and presenting signs of fluid/electrolyte disturbance
        - Type and volume of fluids/electrolytes prescribed
        - Mode and rate of administration (e.g., bolus vs maintenance)
        - Monitoring strategies (urine output, BP, repeat labs, ECG monitoring for K^+)
        - Decision-making points (when fluids changed or stopped, electrolyte re-assessed)
    - Focus on diverse cases (e.g., diarrhea with dehydration, diabetic ketoacidosis, renal dysfunction, postoperative care)

3. Documentation and Group Discussion (60 minutes)

- After the clinical round, students:
    - Complete an observation log (structured format) for 2–3 patient cases
    - Note the imbalance, rationale for therapy, type of fluid/electrolyte used, and clinical response
- Small group discussion with faculty or clinician:

- Compare cases and correction strategies
- Discuss appropriateness and variation in fluid/electrolyte use
- Raise questions about unclear decisions or practices

4. Integration with Unani Understanding (30 minutes)

- Guided session to discuss:
  - Unani understanding of dehydration (*jafāf*), fluid loss, and imbalance of *akhlāṭ*
  - Traditional fluid replenishment strategies (e.g., barley water, *mā' al-shaʿīr*, *Sharbat Unnāb*, etc.)
  - Relevance of *mizāj* correction and *quwā*-supportive strategies in modern electrolyte therapy
  - Scope for integrative advice in supportive care

Expected Deliverables from Learners:

- Observation log (2–3 case entries) with:
  - Clinical background
  - Lab findings
  - Fluid/electrolyte correction plan
  - Clinical reasoning observed
  - Student's reflective comment

Experiential-Learning Learning 21.4: Unani treatment rationale in *Ihtibās al-Bawl*

Total Duration: 6 Hours

1. Introductory Briefing and Theoretical Orientation (45 minutes)

- Instructor discusses:
  - Unani understanding of **Iḥtibās al-Bawl**:
    - Definitions, classifications (mild, partial, complete), and differentiation from *qillat al-bawl* and *ḥabs al-bawl*
    - Etiological categories: *sūʾ mizāj*, inflammation, obstruction, muscular weakness (*duʿf-i-miʿda al-bawl*), or nerve-related causes

        - Classical references (e.g., *Kāmil al-Ṣanāʿa*, *al-Qānūn fī al-Ṭibb*)
    - Brief on documentation style in Unani clinics:
        - Structured case sheets: complaint history, mizāj evaluation, pulse and urine inspection, stool pattern, dietary habits
        - Unani diagnosis (*tashkhīṣ*), rationale for choice of drug/regimen, and monitoring indicators

2. Clinical Observation of Unani Case Management (3 hours)

Conducted in Unani hospital/clinic or through recorded patient interactions.

- Learners shadow a *Hakīm* or Unani consultant managing patients with suspected or diagnosed *Iḥtibās al-Bawl*.
- For each patient (ideally 3–4 cases), learners document:
    - Presenting complaints, onset, duration, associated symptoms
    - Pulse, urine, and *mizāj*-based assessments
    - Clinical impression (e.g., *sūʾ mizāj bārid yā yābis*, obstruction due to swelling or stone)
    - Investigations used (urine analysis, ultrasound, etc.)
    - Prescribed treatment (e.g., *mufattiḥ*, *mudirr-i-bawl*, local fomentation, regimental therapy)
    - Patient response and clinical reasoning by physician

3. Case Documentation and Discussion (1 hour 30 minutes)

- Learners complete detailed case sheets for at least **two cases**, noting:
    - Classical Unani diagnosis with supportive signs/symptoms
    - Treatment rationale: choice of single or compound drugs, regimens like hot fomentation, massage, local leeching, or diet control
    - Integration (if any) with modern investigations or co-managed allopathic treatment
- Group discussion with Unani physician/faculty:
    - Comparison of treatment choices across cases
    - How physician tailored treatment based on patient's mizāj and symptoms
    - Observed outcomes and follow-up strategies

4. Reflective Integration and Summary (45 minutes)

- Learners reflect on:
    - How Unani diagnostic reasoning differs from biomedical approach
    - Clinical utility and limitations of classical treatments in urinary retention
    - How mizāj-based personalization affects outcomes
- Instructor summarizes:
    - Essential elements of good Unani clinical documentation
    - Value of integrating traditional and modern diagnostic tools
    - Suggested readings and classical references for reinforcement

Experiential-Learning Learning 21.5: Unani therapeutic approaches in renal conditions

Total Duration: 6 Hours

1. Theoretical Overview and Introduction to Mudirr-e-Baul (1 hour)

- Instructor-led presentation on:
    - Definition and classification of ***Mudirr-e-Baul*** (diuretics) in Unani medicine
    - Mechanisms of action: Diuretic effects, supporting renal function, increasing urine flow, and promoting elimination of waste products
    - Commonly used *Mudirr-e-Baul* drugs in Unani
    - Indications for use in renal conditions: nephritis, kidney stones, anuria, oliguria, edema, etc.
    - Mechanism of combining *Mudirr-e-Baul* drugs with other Unani therapeutic approaches (e.g., herbal formulations, regimental therapy)

2. Clinical Observation and Case Review (2 hours)

- Students observe Unani practitioners or review clinical case records where ***Mudirr-e-Baul*** drugs were used in renal conditions.
- **Tasks for students:**
    - Review 3–4 anonymized patient records (or observe actual patient interactions if feasible), which include:
        - Diagnosis (e.g., nephritis, kidney stones, etc.)
        - Treatment regimen (*Mudirr-e-Baul* drugs, supporting herbs, dietary changes)

        - Laboratory results (e.g., urine analysis, renal function tests, electrolyte levels)
        - Outcome assessment (urine volume, edema, renal function improvement)
    - Document how *Mudirr-e-Baul* drugs were used adjunctively, including any adjustments made based on patient response
    - Identify any specific challenges or contraindications faced in the use of these drugs

3. Pharmacological and Diagnostic Analysis (1 hour)

- Students are given **case-based assignments** involving specific renal conditions (e.g., acute kidney injury with oliguria, chronic nephritis with edema).
- For each case, students must:
    - Assess the clinical presentation and diagnostic indicators (e.g., urinary output, serum creatinine, electrolytes)
    - Determine the appropriateness of using *Mudirr-e-Baul* drugs in these cases
    - Analyze the pharmacokinetics and pharmacodynamics of the drugs used
    - Discuss possible interactions with other medications or therapies, including any contraindications or side effects
    - Provide rationale for the chosen *Mudirr-e-Baul* therapy (e.g., how it aligns with Unani concepts of humoral balance and renal health)

4. Interactive Case Discussion and Feedback (1 hour)

- Students present their analyses of **one renal case** from the earlier clinical observation, highlighting:
    - The role of *Mudirr-e-Baul* drugs in the treatment plan
    - Justification for their use in the context of renal function and urinary flow stimulation
    - Expected benefits or challenges in the clinical setting
- Group discussion with instructor feedback:
    - Comparison of Unani treatments to modern approaches in renal therapy
    - Integration of Unani principles with modern pharmacology (if applicable)
    - Addressing any concerns or adjustments in treatment

5. Reflection and Summary (1 hour)

- **Individual reflection:** Students summarize their learnings in a 300-word written reflection on:
    - How Mudirr-e-Baul drugs contribute to renal health according to Unani medicine

- Their thoughts on integrating Mudirr-e-Baul drugs with modern therapeutic practices
- Any new insights gained through clinical observations or discussions

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (20 marks): shall be conducted on topics like physiological basis of male and female infertility and the hormonal regulation involved, principles and clinical relevance of renal function tests (RFTs), clinical and pathophysiological features of AKI, CKD, and nephrotic syndrome. Log Book (15 marks): Practical on Perform evaluation of fluid and hormonal regulation strategies during renal compromise using case records recorded in Log book shall be evaluated. OSCE (15 marks): Observe and document fluid and electrolyte correction strategies in clinical practice. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 22 : Clinical Haematology, Immunology, Aging, and Inflammation دموية سريرية، مناعت، شيخوخة، اور التہاب

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Evaluate hematological disorders including anemia, hemoglobinopathies, and malignancies using clinical diagnostics such as CBC, smears, and coagulation studies.
2. Describe immune system components, dysfunctions (autoimmune, hypersensitivity, immunodeficiency), and the role of Unani immunomodulatory strategies.

3. Analyze the cellular and biochemical pathways of inflammation and repair, including relevant clinical biomarkers and therapeutic approaches.
4. Discuss the mechanisms of aging and immunosenescence and relate them to physiological decline, chronic inflammation, and Unani geroprotective concepts.
5. Integrate modern and Unani frameworks in the diagnosis and management of disorders related to blood, immunity, inflammation, and aging.

Unit 1 طبی علمُ الدم اور تشخیصی اَسالیب Clinical Haematology and Diagnostic Approaches

22.1.1 تخلیقِ دم اور خون کے خلیات کے سلسلۂ نسب

Hematopoiesis and Blood Cell Lineages

22.1.2 ہیموگلوبینوپیتھیاں، فقر الدم اور خون جمنے کے اِضطرابات

Hemoglobinopathies, Anemias & Coagulation Disorders

22.1.3 خون کے خبیث اورام: لیوکیمیا، لیمفوما، اور مایلوما

Blood Malignancies: Leukemia, Lymphoma, and Myeloma

22.1.4 تشخیصی آلات/وسائل: سی بی سی، اسمیر، نُخاعِ عظم، اِختباراتِ تخثر

Diagnostic Tools: CBC, Smear, Bone Marrow, Coagulation Tests

22.1.5 دم اور دموی امراض پر یونانی نقطہ نظر

Unani Perspective on Blood and Blood Disorders (*Damwī Amrāz*)

References: 1,3,7,9,15,26,27,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2	Describe hematopoiesis and blood cell lineages including regulatory mechanisms	1	Lecture	CC	Knows-how	TUT,L&PPT
CO2,CO4	Discuss anemias, hemoglobinopathies, coagulation disorders, and blood malignancies	2	Lecture	CC	Knows-how	DIS,L&PPT

CO2,CO4	Perform and interpret CBCs, smears and coagulation panels	6	Practical22.1	PSY-MEC	Shows-how	D,DL,PER,PT,RP
CO1,CO2,CO3,CO4	Adapt Unani perspectives in cases of anemia, leukemia, and bleeding disorders	4	Experiential-Learning22.1	PSY-ADT	Does	SDL,BS,DIS,Mnt,PER

Unit 2 طبی علمُ المناعت Clinical Immunology

22.2.1 فطری اور اکتسابی مدافعتی نظام

Innate and Adaptive Immune Systems

22.2.2 مدافعتی-غدودی ربط: الإجہاد، ہرمونات، اور مناعت

Immune-Endocrine Crosstalk: Stress, Hormones, and Immunity

22.2.3 خود مدافعت اور قوتِ مناعت کی کمی کے امراض

Autoimmune and Immunodeficiency Disorders

22.2.4 یونانی مداخلتوں سے قوتِ مناعت کی تعدیل

Immune Modulation through Unani Interventions (*Quwat-e-Mana'at*)

22.2.5 حساسیت کے اقسام اول تا چہارم کے ردِ عمل اور طبی مظاہ

Types I-IV Hypersensitivity Reactions and Clinical manifestations

References: 1,3,8,12,26,27,28,29,33,37,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe innate/adaptive immunity and hormonal modulation of immune responses	2	Lecture	CC	Knows-how	DIS,L&PPT
CO2,CO3,CO4	Discuss hypersensitivity reactions (Types I–IV) with examples and clinical relevance	1	Lecture	CC	Knows-how	FC,L_VC,PER

CO2,CO4	Demonstrate interpretation of diagnostic tests for autoimmune and allergic disorders (ANA, RF, IgE)	4	Practical22.2	PSY-SET	Shows-how	LRI,DL,PER,PT,CBL
CO1,CO2,CO3,CO4	Adapt Unani immunomodulationin clinical cases of autoimmune and allergic reactions	6	Experiential-Learning22.2	PSY-ADT	Does	CBL,Mnt,SDL,D,PER

Unit 3 اُلتِہاب، اِصلاح، اور مُضادِّ التِہاب تدابیر Inflammation, Repair, and Anti-inflammatory Strategies

22.3.1 اُلتِہاب کے طریقہ کار: حاد اور مزمن

Mechanisms of Inflammation: Acute & Chronic

22.3.2 اُلتِہاب کے حیاتیاتی علامات اور واسطے

Biomarkers and Mediators of Inflammation (CRP, IL-6, ESR, Ferritin)

22.3.3 نسیجی اِصلاح، تلیُّف، اور تحلیل

Tissue Repair, Fibrosis and Resolution

22.3.4 مُضادِّ التِہاب اَسالیب: جدید علمِ ادویات اور یونانی تدابیر

Anti-inflammatory Approaches: Modern Pharmacology & Unani *Tadabīr*

References: 26,27,28,29,32,33,37,192,193,204,205,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe cellular and molecular mechanisms in inflammation and repair processes	1	Lecture	CC	Knows-how	L_VC,DIS
CO2,CO4	Interpret inflammatory biomarkers and their clinical correlations	1	Lecture	CC	Knows-how	L&PPT ,TUT
CO2,CO4	Analyze inflammation profiles and simulate clinical management using lab data	4	Practical22.3	CAN	Shows-how	CBL,RP,SIM,C_L

CO1,CO2,CO3,CO4	Demonstrate and value anti-inflammatory methods in Unani Tibb	4	Experiential-Learning22.3	AFT-SET	Does	DIS,SDL,D,CBL,LRI

Unit 4 عمر رسیدگی، طولِ عمر، اور شیخوخت سے تحفظ Aging, Longevity, and Geroprotection

22.4.1 عمر رسیدگی کے خُلوی اور سالماتی طریقہ کار

Cellular and Molecular Mechanisms of Aging

22.4.2 مناعتی شیخوخت اور التہابی عمر رسیدگی

Immunosenescence and Inflammaging

22.4.3 طولِ عمر اور فعلیاتی مرونۃ

Longevity and Physiological Resilience

References: 26,27,28,29,33,37,42,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4	Describe the cellular and systemic changes in aging including senescence pathways	1	Lecture	CC	Knows-how	L&GD
CO2,CO3,CO4	Discuss the concepts of immunosenescence and inflammaging in disease susceptibility	1	Lecture	CC	Knows-how	L&PPT ,TUT
CO2,CO4	Perform assessment of aging-related conditions (frailty, sarcopenia, cognitive decline) clinically	6	Practical22.4	PSY-MEC	Does	CBL,PT,D,LRI
CO1,CO2,CO3,CO4	Perform geriatric evaluations; develop management plans with Unani geroprotection concepts	6	Experiential-Learning22.4	PSY-MEC	Does	C_L,D,PT,CBL,BS
CO1,CO2,CO3,CO4	Discuss and critique case studies on longevity, resilience, and Unani lifestyle integration	6	Experiential-Learning22.5	CC	Does	BS,CBL,TBL,IBL,DIS

Practical Training Activity

Practical Training 22.1 CBC, smear and coagulation panels

Total Duration: 6 Hours

1. Introduction and Overview of Blood Tests (30 minutes)

- Purpose and clinical relevance of **CBC**, **blood smears**, and **coagulation panels** in diagnostic pathology
- Overview of CBC parameters (e.g., RBC, WBC, hemoglobin, hematocrit, platelets) and their clinical significance in anemia, infection, and clotting disorders
- Overview of **blood smears**: techniques, morphology of blood cells, and identification of abnormal cells (e.g., sickle cells, blasts, inclusions)
- Coagulation panel interpretation: Prothrombin Time (PT), Activated Partial Thromboplastin Time (aPTT), International Normalized Ratio (INR) and their relevance in clotting disorders (e.g., hemophilia, vitamin K deficiency)

2. Blood Collection and CBC Testing (1 hour)

- **Demonstration** of blood collection techniques for CBC testing:
  - Venipuncture procedure
  - Handling of blood samples for CBC analysis
- **Student Practice**: Each student performs CBC tests on patient samples (or simulated samples), and prepares the results for interpretation.
  - Key components: WBC count, RBC count, hemoglobin, hematocrit, MCV, MCH, platelets, and differential counts.

3. Blood Smear Preparation and Analysis (2 hours)

- **Demonstration** by instructor:
  - Proper techniques for preparing blood smears (thin and thick smears)
  - Staining methods (e.g., Wright's stain) and preparation for examination under the microscope
- **Student Practice**:
  - Each student prepares blood smears from patient samples or simulated samples.
  - Examine slides under the microscope to identify:

        - **Normal and abnormal cells** (e.g., mature vs immature WBCs, RBC morphology, platelet clumping)
        - **Abnormal findings** (e.g., anisocytosis, poikilocytosis, rouleaux, blasts, parasitic inclusions)
    - Record findings and prepare a report.

4. Coagulation Panel Testing and Interpretation (1 hour)

- **Demonstration** by instructor:
    - How to perform **PT, aPTT, and INR** tests using automated analyzers or manual techniques (if feasible)
    - Explanation of the clinical indications for each test and what results indicate in clotting disorders
- **Student Practice**:
    - Students perform coagulation panel tests on provided patient samples or simulated samples.
    - Interpret results for common bleeding or clotting disorders (e.g., hemophilia, DIC, liver disease, warfarin therapy).
    - Identify prolonged PT, aPTT, or INR and correlate with potential clinical causes.

5. Case-Based Group Discussion and Interpretation (1 hour)

- **Case-Based Activity**: Students are divided into groups (3–4 students per group) and provided with clinical case scenarios that include abnormal CBC, smear findings, and coagulation panel results.
- Each group analyzes:
    - The laboratory findings and correlates them with the clinical presentation (e.g., fatigue and low RBC count indicating anemia, prolonged PT indicating a coagulation disorder)
    - Suggest potential causes for abnormalities (e.g., infection, clotting disorders, bone marrow failure)
    - Present findings and reasoning to the larger group, with instructor feedback and discussion on interpretation.

6. Reflection and Wrap-up (30 minutes)

- **Individual Reflection**: Students write a brief reflection (200 words) on what they learned during the practical session, challenges faced, and key takeaways in interpreting CBCs, blood smears, and coagulation panels.
- **Instructor Wrap-up**:
    - Summarize key concepts of CBC and coagulation testing

- Provide additional resources for further reading
- Discuss common clinical pitfalls in laboratory test interpretation and how to improve diagnostic accuracy.

Practical Training 22.2 Diagnostic tests for autoimmune and allergic disorders (ANA, RF, IgE)

Total Duration: 4 Hours

1. Introduction to Autoimmune and Allergic Disorders by Instructor (30 minutes)

- Overview of **autoimmune disorders** and their immune mechanisms (e.g., systemic lupus erythematosus, rheumatoid arthritis).
- Overview of **allergic disorders** and their immune mechanisms (e.g., asthma, hay fever, allergic rhinitis).
- The role of diagnostic tests in autoimmune and allergic diseases:
  - **ANA (Anti-Nuclear Antibody)**: Role in diagnosing systemic autoimmune conditions.
  - **RF (Rheumatoid Factor)**: Significance in rheumatoid arthritis and other conditions.
  - **IgE (Immunoglobulin E)**: Relevance in diagnosing allergies.

2. Diagnostic Test Preparation and Sample Collection (30 minutes)

- **Demonstration**:
  - How to collect and handle samples for **ANA**, **RF**, and **IgE** assays.
  - Discussion on **serum preparation**, **storage**, and **handling of blood samples** for testing.
  - Safety precautions during sample handling and test preparation.
- **Student Activity**:
  - Each student will practice preparing and handling samples for the diagnostic assays.

3. ANA, RF, and IgE Test Procedures (1 hour)

- **Demonstration** by the instructor:
  - The procedure for performing **ANA**, **RF**, and **IgE** tests using enzyme-linked immunosorbent assay (ELISA) or immunofluorescence methods (depending on available resources).
  - Interpretation of **ANA** patterns (e.g., speckled, homogenous, nucleolar) and their association with various autoimmune conditions.

- Understanding **RF** results in the context of rheumatoid arthritis and other autoimmune diseases.
- Analysis of **IgE** levels in relation to allergic reactions and hypersensitivity disorders.

- **Student Activity**:
  - Students will perform these tests on patient or simulated samples, following proper lab techniques.
  - Record the results for further analysis.

4. Interpretation of Results and Case Correlation (1 hour)

- **Case-Based Activity**:
  - Students are divided into small groups and provided with 2–3 anonymized clinical cases that include diagnostic results for ANA, RF, and IgE.
  - **Case 1**: A patient with fatigue, joint pain, and butterfly rash (possible lupus).
  - **Case 2**: A patient with morning stiffness, joint swelling, and elevated RF levels (suspected rheumatoid arthritis).
  - **Case 3**: A patient with sneezing, itchy eyes, and elevated IgE levels (suspected allergic rhinitis).
- **Group Tasks**:
  - **Interpret the diagnostic results** for each case, correlating ANA, RF, and IgE levels with the clinical symptoms and suspected conditions.
  - Discuss the clinical significance of the test results:
    - **ANA** patterns and their association with systemic lupus erythematosus, Sjögren's syndrome, or scleroderma.
    - **RF** levels and their correlation with rheumatoid arthritis or other conditions.
    - **IgE** levels in the context of allergic diseases (e.g., asthma, atopic dermatitis).
  - Prepare a diagnostic report and clinical recommendation based on the findings.

5. Group Presentation and Instructor Feedback (1 hour)

- **Group Presentations**:
  - Each group presents their case analysis, including:
    - Interpretation of the ANA, RF, and IgE results.
    - Clinical correlation with the suspected autoimmune or allergic condition.
    - Suggested follow-up tests or treatments based on the results.

- The instructor will provide feedback on the students' interpretation and reasoning, clarifying any doubts and emphasizing key learning points.

Practical Training 22.3 Inflammation profiles and clinical management

Total Duration: 4 Hours

1. Introduction to Inflammation Profiles (30 minutes)

- Overview of **inflammation**: acute vs. chronic, local vs. systemic inflammation.
- Key laboratory tests for assessing inflammation:
  - **C-Reactive Protein (CRP)**: Indicator of acute inflammation.
  - **Erythrocyte Sedimentation Rate (ESR)**: General marker of inflammation.
  - **Pro-inflammatory cytokines** (e.g., IL-6, TNF-α).
  - **White Blood Cell (WBC) count** and **neutrophil-to-lymphocyte ratio**.
- Correlation of lab data with clinical conditions (e.g., rheumatoid arthritis, infections, systemic inflammation).

2. Case-Based Group Activity: Analyzing Inflammation Profiles (1 hour 30 minutes)

- **Group-Based Case Review** (1 hour 15 minutes):
  - Students are divided into small groups and assigned specific clinical cases (e.g., rheumatoid arthritis, bacterial infections, systemic lupus erythematosus). Each group receives:
    - **Lab Data**: ESR, CRP, WBC count, cytokine levels, and other relevant lab results.
    - **Clinical Symptoms**: A brief summary of the patient's symptoms and medical history.
    - **Task**:
      1. Analyze the lab data to assess the level of inflammation and determine the likely cause (e.g., infection, autoimmune disease, inflammatory arthritis).
      2. Interpret the lab results in the context of the patient's clinical presentation.
      3. Discuss the potential diagnosis and severity of inflammation (acute vs. chronic).

- **Clinical Management Simulation** (15 minutes):
    - Based on their findings, students simulate a clinical management plan, considering:
        - Modern Medicine: Anti-inflammatory medications (e.g., NSAIDs, corticosteroids, disease-modifying anti-rheumatic drugs).
        - Unani Approaches: Suggest Unani treatments.
    - Focus on patient-centered care, reducing inflammation, and promoting immune modulation.

3. Practical Simulation of Inflammation Management (1 hour)

- **Simulation Exercise** (1 hour):
    - Students, in pairs or small groups, will simulate the clinical management of an inflammation case using the lab data they have analyzed.
    - They will create a treatment protocol that integrates:
        - Modern treatment strategies: Pharmacological agents (e.g., NSAIDs, corticosteroids, biologics).
        - Unani-based treatments:
            - Herbal therapies (e.g., Zingiber officinale for reducing inflammation, Boswellia for joint inflammation).
            - Dietary recommendations to control inflammation (e.g., Saffron, Olive oil).
            - Unani Regimen Therapies: Hijama (cupping) for inflammatory pain, Dalk (massage) for muscle relaxation, and Qayla (balneotherapy).
    - Simulated Patient Interaction: Discuss the management plan with a simulated patient, justifying the choice of treatments.
    - Patient Monitoring: How to monitor the effectiveness of treatment based on changes in inflammation markers (e.g., repeat ESR, CRP after 1–2 weeks).

4. Group Presentations and Discussion (1 hour)

- **Group Presentations** (40 minutes):
    - Each group presents their analysis of the inflammation profile, clinical diagnosis, and treatment protocol.
    - Focus on the integration of Unani and modern treatment modalities.
    - Discuss any challenges in combining these two approaches, and how they complement each other in managing inflammation.
- **Instructor Feedback and Wrap-Up** (20 minutes):

- Provide constructive feedback on each group's presentation and treatment plan.
- Summarize the key takeaways:
  - The importance of comprehensive inflammation profiling in diagnosing and managing inflammatory conditions.
  - The role of Unani therapies in managing inflammation and complementing modern medicine.

Practical Training 22.4 Aging-related conditions (frailty, sarcopenia, cognitive decline)

Total Duration: 6 Hours

1. Introduction to Aging-Related Conditions (1 hour)

- **Instructor-Led Presentation** (1 hour):
  - Frailty: Definition, diagnostic criteria, and clinical signs (e.g., weakness, fatigue, weight loss, low physical activity).
  - Sarcopenia: Mechanisms of muscle loss with aging, assessment tools (e.g., muscle mass measurement, grip strength, gait speed).
  - Cognitive Decline: Understanding cognitive impairment, including early signs of dementia and Alzheimer's disease, and screening methods (e.g., Mini-Mental State Examination - MMSE).
  - Discuss the relationship between these conditions and their impact on functional status and quality of life in older adults.
  - Introduction to Unani perspectives on aging, frailty, and cognitive decline (e.g., Ihtilāl al-'Aql for cognitive decline and Ihtilāl al-Qūwwah for frailty).

2. Clinical Assessment of Frailty (1 hour 30 minutes)

- **Frailty Assessment Techniques** (45 minutes):
  - Geriatric Assessment Tools: Introduction to tools such as Frailty Index and Fried's Frailty Phenotype.
  - Physical Assessments: Measurement of grip strength, walking speed, weight loss, and self-reported exhaustion.
  - Functional Assessments: Observation of daily activities such as dressing, bathing, and mobility.
  - Instructor Demonstration: The instructor will demonstrate how to assess frailty using standardized tools and clinical examination.
- **Hands-On Practice** (45 minutes):
  - Students practice frailty assessments on each other or simulated patients, including:
    - Measuring grip strength and walking speed.

- Asking standardized questions related to exhaustion and activity levels.
- Assessing functional status using activities of daily living (ADLs) questionnaires.

3. Clinical Assessment of Sarcopenia (1 hour 30 minutes)

- **Sarcopenia Assessment Techniques** (45 minutes):
  - Muscle Mass Measurement: Brief explanation of how muscle mass is measured (e.g., bioelectrical impedance, dual-energy x-ray absorptiometry – DXA).
  - Functional Assessment: Testing grip strength and gait speed as markers of sarcopenia.
  - Instructor Demonstration: The instructor will demonstrate proper technique for grip strength measurement and gait speed test.
- **Hands-On Practice** (45 minutes):
  - Students perform hands-on assessments of sarcopenia, focusing on:
    - Measuring grip strength using a dynamometer.
    - Assessing gait speed (walking 4 meters) and timed-up-and-go (TUG) test.
    - Discussing potential causes and implications of muscle wasting in elderly patients.

4. Clinical Assessment of Cognitive Decline (1 hour)

- **Cognitive Decline Screening Tools** (30 minutes):
  - Introduction to tools for assessing cognitive decline, including:
    - Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA).
    - Discussion of early signs of cognitive impairment (e.g., memory loss, difficulty concentrating, confusion).
  - **Instructor Demonstration: The instructor will demonstrate how to administer a cognitive screening test (e.g., MMSE or MoCA) to assess cognitive function in an elderly patient.**
- **Hands-On Practice** (30 minutes):
  - Students practice cognitive screening on simulated patients or each other using tools like MMSE or MoCA.
  - Students will observe and document signs of cognitive decline and discuss their findings in the context of aging-related cognitive disorders.

5. Integrating Modern and Unani Approaches to Management (1 hour)

- **Instructor-Led Discussion on Management Plans** (30 minutes):
    - For frailty: Focus on physical activity interventions (e.g., strength training, balance exercises), nutrition, and psychosocial support.
    - For sarcopenia: Focus on protein supplementation, resistance exercise, and vitamin D.
    - For cognitive decline: Cognitive training, medications (e.g., acetylcholinesterase inhibitors), and social engagement.
    - **Unani Approaches**:
        - For frailty: Use of Muḍirriyat (diuretics) for expelling excess humors, oil massages (Dalk) for strengthening the body, herbal tonics like Ginseng and Ashwagandha to boost energy and strength.
        - For sarcopenia: Focus on unani remedies like Zanjabeel (ginger) for muscle strength, Saffron for improving vitality, and Habb-e-Sawda (black seed) to enhance muscle function.
        - For cognitive decline: Unani tonics such as Amla and Brahmi for enhancing brain function, herbal teas (e.g., Saffron and Rosemary) for memory enhancement.
- **Case-Based Group Work** (30 minutes):
    - Students are divided into small groups and given case scenarios of elderly patients with frailty, sarcopenia, or cognitive decline.
    - Each group is tasked with creating an integrated management plan that includes both modern and Unani treatment strategies.
    - Groups present their plans, discussing the rationale for combining modern medical interventions with Unani remedies.

Experiential Learning Activity

Experiential-Learning Learning 22.1: Anemia, leukemia, and bleeding disorders in Unani perspective

Total Duration: 4 Hours

1. Introduction to Unani Concepts of Anemia, Leukemia, and Bleeding Disorders (45 minutes)

- Instructor-led session covering:
    - **Anemia** in Unani medicine
    - **Leukemia**: its Unani understanding as a disturbance in the balance of **dam**, and its correlation with humoral theory.
    - **Bleeding disorders**: Role of **dam** in clotting disorders, and the importance of the **ḥarārat** (heat) and **rūḥ** (spirit) in blood flow.

- Modern concepts: Defining anemia, leukemia, and bleeding disorders, their classification, and diagnostic tests (e.g., CBC, bone marrow analysis, coagulation profiles).

2. Case-Based Group Activity: Case Review and Diagnosis (1 hour)

- **Case Scenarios**: Students are divided into small groups and provided with 2–3 anonymized clinical cases representing anemia, leukemia, and bleeding disorders.
  - **Case 1**: A patient presenting with fatigue, pale skin, low hemoglobin, and low RBC count (suspected anemia).
  - **Case 2**: A patient presenting with persistent fever, unexplained weight loss, elevated white blood cell count, and abnormal blood smear (suspected leukemia).
  - **Case 3**: A patient with frequent nosebleeds, prolonged bleeding after minor cuts, and prolonged PT and aPTT (suspected bleeding disorder).
- **Student Tasks**:
  - **Review** the clinical findings (including CBC, blood smear, and coagulation profiles).
  - **Interpret** the modern diagnostic reports, correlating them with the clinical symptoms.
  - **Analyze** the cases from an **Unani perspective**:
    - Identify imbalances in **dam**, **safrāʾ**, **balgham**.
    - Determine if the condition aligns with any Unani syndromes
    - Discuss Unani diagnostic processes (analysis of urine, stool, pulse, etc.).
  - **Prepare a group diagnosis**: Combine modern findings with Unani diagnostic views to suggest a diagnosis and appropriate treatment approach.

3. Unani Treatment Strategies: Therapeutic Approaches for Anemia, Leukemia, and Bleeding Disorders (1 hour)

- **Instructor Presentation** on:
  - **Anemia**: Unani treatments.
  - **Leukemia**: Use of **ḥarārat**-enhancing herbs like **khurfa** (Cressa cretica), **ṣafra**-balancing herbs, and the role of regimens for balance.
  - **Bleeding Disorders**: Hemostatic Unani treatments.
- **Student Activity**: In the groups:
  - Based on the case analysis, suggest appropriate **Unani treatments** for each condition, focusing on:

- **Herbal medicine**: Specific herbs or formulations commonly used for managing anemia, leukemia, or bleeding disorders.
- **Dietary and lifestyle recommendations**: Unani-based suggestions for managing these.
- **Regimen therapy**

4. Group Discussion and Presentation of Treatment Plans (45 minutes)

- **Group Presentations**: Each group presents their findings and suggested Unani treatment plans for one of the three cases (anemia, leukemia, bleeding disorders).
  - They should discuss:
    - Modern and Unani diagnostic correlations
    - Treatment modalities (e.g., herbal remedies, regimental therapy, diet)
    - Expected outcomes of the Unani treatment approach
    - Potential integration of modern and Unani methods in a multidisciplinary treatment plan
- **Instructor Feedback**: The instructor provides feedback on the treatment plans, highlighting any gaps in clinical reasoning or integration of Unani concepts.

5. Reflection and Wrap-up (30 minutes)

- **Reflection Exercise**: Each student writes a brief reflection (200 words) on their learning experience, focusing on:
  - Key insights from analyzing the cases through both modern and Unani perspectives.
  - Challenges encountered in integrating Unani theories with modern diagnostics.
  - How this exercise enhances their understanding of Unani medicine in managing hematological conditions.
- **Instructor Wrap-up**:
  - Summarize the key Unani therapeutic principles for treating anemia, leukemia, and bleeding disorders.
  - Discuss the potential benefits and challenges of integrating Unani treatments with modern medical approaches.

Experiential-Learning Learning 22.2: Autoimmune and allergic reactions and Unani immunomodulation

Total Duration: 6 Hours

1. Introduction to Autoimmune and Allergic Reactions (1 hour)

- **Instructor-Led Presentation** (30 minutes):
    - Overview of autoimmune disorders and allergic reactions, including their immunological basis:
        - Autoimmunity: The body's immune system attacking its own tissues (e.g., lupus, rheumatoid arthritis).
        - Allergy: Immune system overreaction to harmless substances (e.g., pollen, dust mites).
    - Immunological Mechanisms:
        - Autoimmune diseases: T-cell mediated destruction, autoantibodies, and tissue damage.
        - Allergic diseases: IgE-mediated hypersensitivity, mast cell degranulation, and the release of inflammatory mediators.
    - Modern Diagnostics: Relevant diagnostic tests like ANA, RF, and IgE for autoimmune and allergic conditions.
- **Unani Overview** (30 minutes):
    - Understanding Immunomodulation in Unani:
        - The concept of ***Quwwat-e-Mudabbira*** (the natural healing power) and its role in maintaining immune balance.
        - Importance of **Dam**, **Balgham**, **Safrāʾ**, and **Ṣūdāʾ** in immune health, and their relevance in autoimmune and allergic reactions.

2. Case-Based Group Activity: Autoimmune and Allergic Reaction Evaluation (2 hours)

- **Group-Based Case Review** (1 hour 30 minutes):
    - Students are divided into small groups, and each group is given 2 anonymized clinical cases, which include:
        - **Case 1**: A patient with joint pain, morning stiffness, and positive rheumatoid factor (suspected rheumatoid arthritis).
        - **Case 2**: A patient with skin rash, photosensitivity, and positive ANA (suspected lupus).
        - **Case 3**: A patient with sneezing, itchy eyes, and elevated IgE (suspected allergic rhinitis).
    - **Group Tasks**:
        - Modern Diagnostic Interpretation: Discuss the diagnostic tests (e.g., ANA, RF, IgE) and their results.
        - Unani Diagnostic Correlation: Analyze the case in terms of Unani concepts:
            - Which humor or imbalance (e.g., Dam, Balgham, Safrāʾ) could be the root cause?
            - How would these conditions be understood in Unani?
        - Prepare a diagnostic report that combines modern findings and Unani insights.

        - Treatment Plan: Suggest Unani immunomodulatory treatments based on the case, including:
            - Herbal remedies
            - Unani Regimens.

- **Student Presentations** (30 minutes):
    - Each group presents their case evaluation, including modern diagnostic interpretation and Unani diagnostic correlation.
    - Discuss the proposed treatment approach in detail, focusing on how Unani therapies can modulate the immune system.

3. Discussion on Unani Immunomodulation and its Applications (1 hour)

- **Instructor-Led Discussion** (45 minutes):
    - The role of Unani immunomodulatory therapies in treating autoimmune and allergic conditions:
        - Immunomodulation in Unani.
        - Key herbal remedies for modulating immunity.
        - The importance of dietary regimens: Foods that strengthen *Quwwat-e-Mudabbira* and restore immune balance.
        - Regimen therapies in the context of immunomodulation.
- **Group Activity**:
    - In groups, students will review and compare various Unani immunomodulatory therapies. They will:
        - Discuss their relevance and effectiveness in the context of the autoimmune and allergic cases.
        - Prepare a detailed therapeutic treatment plan that incorporates Unani herbs, dietary recommendations, and regimen therapies.

4. Role of Unani in Autoimmune and Allergic Disease Management: Practical Considerations (1 hour)

- **Case Integration**:
    - Students will work in pairs to integrate Unani immunomodulation with modern management strategies for the autoimmune and allergic cases reviewed earlier.
    - Clinical Scenarios: Each pair will discuss how to combine Unani therapies (e.g., herbal medicine, regimen treatments) with modern drugs (e.g., corticosteroids, immunosuppressants, antihistamines).
    - Focus on patient-centered care, preventative strategies, and the long-term management of autoimmune and allergic conditions.

- **Group Presentation and Discussion**:
    - Pairs will present their integrated approach, explaining how Unani immunomodulatory treatments can complement or enhance conventional medical treatments for autoimmune or allergic conditions.

5. Wrap-up and Reflection (1 hour)

- **Reflection Exercise**:
    - Each student writes a brief reflection (200–300 words) on the session, including:
        - How Unani immunomodulatory approaches can be applied to modern clinical practices.
        - The potential benefits and challenges of integrating Unani and modern treatments for autoimmune and allergic diseases.
        - Personal insights gained from analyzing real-life cases and understanding immune modulation from both perspectives.
- **Instructor Wrap-Up**:
    - Summarize the role of Unani immunomodulation in the context of autoimmune and allergic diseases.
    - Discuss the potential for integrative medicine, combining Unani therapies and modern immunology, to provide holistic care for patients.
    - Provide additional reading and resources for further exploration of Unani immunology.

Experiential-Learning Learning 22.3: Anti-inflammatory methods in Unani Tibb

Total Duration: 4 Hours

1. Introduction to Unani Anti-Inflammatory Methods (30 minutes)

- Overview of inflammation in Unani medicine: Al-Ḥummah (heat) and Iḥtibās al-Ṭafā'ī (blockage of humors).
- Key anti-inflammatory approaches in Unani:
    - Muḍirriyat (Diuretics) to expel harmful humors.
    - Cupping (Hijama): To remove stagnant blood and reduce inflammation.
    - Herbal Remedies: Use of ginger (Zingiber officinale), saffron (Crocus sativus), garlic (Allium sativum) for reducing heat and inflammation.
    - Regimen Therapies (Maqālāt): Bathing, massage, and blood-letting.
- The concept of balance in Unani medicine (hot, cold, dry, moist) and its relevance to inflammation.

2. Demonstration of Unani Anti-Inflammatory Techniques (1 hour)

- **Instructor-Led Demonstrations** (1 hour 30 minutes):
    - **Cupping (Hijama)**:
        - The instructor demonstrates the process of dry cupping on a volunteer, explaining the benefits for reducing muscular inflammation and improving blood circulation.
        - Students observe the technique, the equipment used (cups, suction devices), and safety precautions.
    - **Herbal Remedies**:
        - Demonstration of anti-inflammatory herbal preparations such as:
            - Ginger and Turmeric Paste: For local application on swollen joints or muscles.
            - Saffron Infusion: As a mild anti-inflammatory drink.
            - Garlic Tincture: To reduce systemic inflammation.
        - Explanation of how to prepare and use these remedies in clinical practice.
    - **Massage (Dalk)**:
        - Demonstrating anti-inflammatory massage techniques using oil preparations such as olive oil or mustard oil infused with anti-inflammatory herbs.

3. Hands-On Practice: Students Demonstrate Techniques (1 hour)

- **Group-Based Practice Sessions** (1 hour 30 minutes):
    - Students will break into small groups and practice the techniques demonstrated by the instructor:
        - **Cupping (*Hijama*)**: Students will practice setting up the equipment and learning the safety steps involved. Volunteers (within the group) may receive cupping treatment under supervision.
        - **Herbal Preparations**: Each group will prepare one herbal remedy (e.g., ginger paste, saffron infusion, garlic tincture) and practice administration on a simulated patient or on themselves (if appropriate).
        - **Massage (Dalk)**: Students will pair up and practice anti-inflammatory massage on each other, focusing on areas with perceived tension or inflammation (e.g., shoulder, lower back).

- Instructor provides individual feedback and supervision to ensure proper technique and safety during practice.

4. Case Discussions and Integration with Modern Treatments (1 hour)

- **Group Discussions and Simulations** (45 minutes):
  - Students will be presented with case scenarios (e.g., rheumatoid arthritis, knee osteoarthritis, chronic back pain) and asked to devise a treatment plan using Unani anti-inflammatory techniques.
  - In groups, students will:
    - Identify the root causes of inflammation in the case.
    - Integrate Unani therapies (e.g., Hijama, Herbal Remedies, Dalk) to create a comprehensive management plan.
    - Discuss how the treatment plan can be enhanced with modern medical approaches (e.g., NSAIDs, corticosteroids).
  - Students will also consider the role of diet (e.g., avoiding hot and dry foods, promoting cool and moist foods) and lifestyle changes in managing inflammation.
- **Instructor Feedback and Wrap-Up** (30 minutes):
  - Each group will share their proposed treatment plan with the class.
  - The instructor will provide feedback on the integration of Unani and modern approaches, emphasizing patient-centered care and holistic treatment.
  - The instructor will highlight the importance of personalization in treatment, based on individual patient needs and conditions.

Experiential-Learning Learning 22.4: Geriatric evaluations and Unani geroprotection concepts

Total Duration: 6 Hours

1. Introduction to Geriatric Medicine and Unani Geroprotection Concepts (1 hour)

- **Instructor-Led Presentation** (1 hour):
  - Geriatric Evaluation: Understanding the multidimensional approach to geriatric assessments, including physical health, cognitive function, emotional well-being, and social context.

- Unani Geroprotection: Introduction to the concept of geroprotection in Unani medicine, focusing on preventing aging-related diseases and enhancing longevity.
    - Unani Concepts of Aging.
    - Use of Unani tonics, herbal formulations, and lifestyle interventions to slow down aging processes.
    - Geroprotection therapies in Unani, such as nutritional support, body oil massages (Dalk), and mental well-being through cognitive stimulation and social integration.

2. Conducting Geriatric Physical Health Evaluations (2 hours)

- **Physical Health Assessment** (1 hour 15 minutes):
    - **Geriatric Physical Examination**:
        - Cardiovascular and Musculoskeletal Evaluation: Check for frailty, mobility impairments, muscle strength, joint flexibility, postural stability.
        - Nutritional Assessment: Assess signs of malnutrition, cachexia, or underweight, focusing on BMI, muscle mass, and dietary intake.
        - Gait and Balance Testing: Measure gait speed (e.g., 4-meter walk), timed-up-and-go (TUG) test, and assess for signs of sarcopenia or fall risk.
        - Instructor Demonstration: Demonstrate a comprehensive geriatric physical exam, including musculoskeletal and cardiovascular assessments.
    - **Hands-On Practice** (45 minutes):
        - Students will practice the geriatric physical exam on each other or simulated patients. They will assess gait, mobility, muscle strength, and balance.
        - Students document their findings and compare them with age-related changes in physical health.

3. Conducting Cognitive and Emotional Health Evaluations (1 hour)

- **Cognitive and Emotional Health Assessment** (45 minutes):
    - **Cognitive Function Testing**:
        - Introduction to MMSE (Mini-Mental State Examination) and MoCA (Montreal Cognitive Assessment).
        - Focus on assessing memory, attention, language, and executive function.

- **Emotional Well-Being**:
  - Assessment of depression, anxiety, and social isolation using tools such as Geriatric Depression Scale (GDS).
  - Discuss the impact of mental well-being on physical health and aging.
- **Instructor Demonstration**: The instructor will demonstrate how to conduct cognitive assessments (MMSE or MoCA) and emotional health evaluations (GDS).

- **Hands-On Practice** (15 minutes):
  - Students perform cognitive and emotional assessments on simulated patients or each other, using **MMSE**, **MoCA**, and **GDS**.

4. Developing Geriatric Management Plans (1 hour 30 minutes)

- **Creating Personalized Management Plans** (1 hour):
  - Assessment Integration: Students integrate findings from physical, cognitive, and emotional health assessments to create a comprehensive management plan.
  - Focus Areas for Management Plans:
    - Frailty and Sarcopenia: Exercises, nutritional support, and Unani remedies such as Ginseng and Ashwagandha for vitality and muscle strength.
    - Cognitive Decline: Cognitive stimulation therapies, Brahmi, Amla, and Saffron to enhance brain function and memory.
    - Nutritional Interventions: Customized diets, herbal supplements, and Unani tonics for energy, longevity, and immune support.
    - Social Well-Being: Encourage community participation, social integration, and mental health care.
  - **Unani Geroprotection Concepts**:
    - Herbal Formulations: Discuss the role of Unani herbs in aging.
    - Nutritional Support: Diet suggestions incorporating balancing of humors and promoting longevity.
    - Physical and Mental Care: Integration of exercise, Dalk (massage), and Unani mental health practices.
- **Group Work on Case Studies** (30 minutes):
  - Students will work in groups to develop personalized management plans for a case study involving elderly patients with common geriatric concerns (e.g., frailty, cognitive decline, depression).

- The management plan should incorporate both modern medicine and Unani therapies, integrating findings from the earlier evaluations.

5. Presenting Management Plans (30 minutes)

- Each group will present their geriatric management plan, discussing the rationale for their choice of modern interventions and Unani treatments.
- The focus will be on integrating geroprotection principles into both physical and cognitive health management strategies.
- Peer feedback and instructor guidance on how to optimize these plans.

Experiential-Learning Learning 22.5: Longevity, resilience, and Unani lifestyle integration

Total Duration: 6 Hours

1. Introduction to Longevity, Resilience, and Unani Lifestyle Integration (1 hour)

- Instructor-Led Presentation (1 hour):
  - Longevity: The concept of longevity from both modern medical and Unani perspectives, focusing on healthspan versus lifespan.
  - Resilience: Understanding resilience as the ability to adapt to physical and psychological stress, particularly in older age.
  - Unani Lifestyle Integration: Introduction to how Unani lifestyle practices (diet, exercise, mental wellness, herbal therapies) contribute to longevity and resilience.
    - Key Unani concepts such as fitra, balance of humors, and environmental harmony in promoting healthy aging.
    - Role of herbs like Brahmi, Ashwagandha, and Ginseng for stress resilience and vitality.

2. Case Study Presentations on Longevity and Resilience (2 hours)

- Group Work (Preparation of Case Studies) (1 hour):
  - Students will be divided into groups and provided with pre-prepared case studies of elderly individuals who have maintained longevity and resilience through various lifestyle factors.
  - Case Study Details: Include patient histories, chronic conditions, social background, lifestyle habits, and health interventions used by the individuals.
  - Students will research and integrate Unani principles into the case study, considering how diet, mental well-being, and herbal therapies could have influenced the patient's longevity and resilience.

- Group Presentations (1 hour):
    - Each group will present their case study, focusing on key elements that contribute to the patient's longevity and resilience.
    - The presentation should include a discussion of how Unani interventions (such as herbal remedies, dietary changes, and lifestyle modifications) could contribute to their longevity and resilience.

3. Critique and Discussion of Case Studies (2 hours)

- Instructor-Led Critique (30 minutes):
    - The instructor will provide feedback on the case study presentations, highlighting the strengths and weaknesses in the integration of Unani lifestyle practices and modern medical perspectives.
    - The critique will focus on the appropriateness of the proposed Unani interventions, their scientific basis, and the integration of modern health concepts.
- Peer Review and Group Critique (1 hour 30 minutes):
    - Students will critique the case studies presented by other groups.
        - Key Questions for Critique:
            - Did the case study adequately incorporate Unani concepts of longevity and resilience?
            - Are the suggested Unani treatments aligned with modern medical practices?
            - How well did the case study balance traditional wisdom with evidence-based practice?
            - Were lifestyle interventions (such as diet, exercise, and mental wellness practices) appropriately addressed?
    - Each student will provide constructive feedback to at least two other groups, focusing on how the Unani lifestyle integration can be improved or strengthened.

4. Developing Comprehensive Management Plans with Unani Integration (1 hour)

- Creation of Management Plans (30 minutes):
    - Based on the critiques and feedback from the case study presentations, students will work on developing comprehensive management plans for elderly patients who aim to improve longevity and resilience.
    - These management plans should integrate both Unani concepts and modern medical practices, covering:

- Herbal therapies (e.g., Brahmi, Ashwagandha).
- Dietary changes based on Unani principles of humoral balance.
- Physical activity and mental wellness interventions.
- Preventive health measures for aging-related diseases.

- **Discussion of Management Plans** (30 minutes):
  - Students will present their management plans to the group, providing rationale for the use of Unani therapies and lifestyle interventions.
  - Feedback and refinement of the plans will occur during this session, with an emphasis on improving the balance between traditional and modern approaches.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. App Based Question (20 Marks): An App Based Question shall be prepared on any of the Topics covered through lectures (Cognitive domain). Practical Viva (15 Marks): for the practical - Perform and interpret CBCs, smears and coagulation panels. Class Presentation (15 Marks): on the topic anti-inflammatory methods in Unani Tibb shall be taken as assessment. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 6

Module 23 : نظامِ غدد کی کلینکل فزیالوجی Clinical Physiology of the Endocrine System

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Demonstrate comprehensive clinical evaluations of endocrine disorders and recognize typical signs and symptoms of thyroid, adrenal, pituitary, and pancreatic dysfunctions.
2. Apply a syndromic and integrative approach in identifying endocrine-related causes of secondary conditions such as obesity, hypertension, and infertility.
3. Analyze and interpret key hormonal assays (TSH, insulin, cortisol, etc.) and perform dynamic endocrine function tests for accurate clinical correlation.
4. Interpret imaging results (ultrasound, CT, MRI) relevant to endocrine glands for diagnostic and therapeutic decision-making.
5. Integrate Unani perspectives in understanding and managing endocrine conditions like *Ziabetus* and *Saman-e-Mufrit* in modern clinical contexts.

Unit 1 غدوددی اضطرابات کا طبی جائزہ Clinical Evaluation of Endocrine Disorders

23.1.1 غدوددی نقص کے لیے طبی معائنہ

Clinical Examination for Endocrine Dysfunction

23.1.2 عام ظاہری علامات: دُرَاق، سمنِ مفرط، حیض کی بے قاعدگیاں، نشوونما کے اضطرابات

Common Presentations: Goiter, Obesity, Menstrual Irregularities, Growth Disorders

23.1.3 درقیہ، فَوقَ کُلوی، غدۂ نخامیہ، اور لبلبہ کے اضطرابات

Thyroid, Adrenal, Pituitary, and Pancreatic Disorders

23.1.4 ذیابیطس ملیٹس اور انسولین مزاحمت کی طبی فعلیات

Clinical Physiology of Diabetes Mellitus and Insulin Resistance

23.1.5 سمنِ مفرط، ذیابیطس کی یونانی طبی تاوِیل

Unani Clinical Interpretation of *Saman-e-Mufrit*, *Ziabetus*

References: 1,7,8,9,26,27,28,29,32,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Identify and examine signs and symptoms of major endocrine disorders	3	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT,L,FC

CO2,CO4	Relate endocrine symptoms with clinical diagnoses and Unani diagnosis	2	Lecture	CC	Knows-how	TUT,L&PPT
CO2,CO4	Perform simulated endocrine system evaluations (thyroid, adrenal, etc.)	4	Practical23.1	PSY-MEC	Shows-how	C_L,DIS,CBL,SIM,LRI
CO1,CO2,CO3,CO4	Perform Unani evaluation and Mizaj assessment in endocrine patients	6	Experiential-Learning23.1	PSY-MEC	Does	C_L,D,PT,CBL,DIS

Unit 2 غدودی اضطرابات کے لیے متلازماتی طریقہ کا Syndromic Approach to Endocrine Disorders

23.2.1 ثانوی ارتفاعِ خون، سمنِ مفرط، عقم کے غدودی اسباب

Syndromic Recognition of Endocrine Disorders (e.g., Cushing's, Addison's, PCOS)

23.2.2 ثانوی ارتفاعِ خون، سمنِ مفرط، عقم کے غدودی اسباب

Endocrine Causes of Secondary Hypertension, Obesity, Infertility

23.2.3 کوتاہ قدی، کثرتِ شعر، ثَدی رَشح پر طریقہ کار

Approach to Short Stature, Hirsutism, Galactorrhea

23.2.4 نظامی امراض میں ہرمونی عدمِ توازن (مثلاً: مزمن کبدی/کُلوی مرض، خبیث ورم)

Hormonal Imbalances in Systemic Diseases (e.g., chronic liver/kidney disease, malignancy)

References: 26,27,28,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Identify clinical syndromes associated with endocrine dysfunction using signs and symptom clusters	2	Lecture	CAN	Knows-how	L_VC,SDL,TUT

CO2,CO4	Differentiate primary and secondary endocrine disorders using case scenarios	2	Lecture	CAN	Knows-how	CBL,DIS,PBL,L&GD
CO2,CO4	Perform mock case history and clinical chart analysis of endocrine syndromes	4	Practical23.2	PSY-MEC	Shows-how	LRI,PT,DIS,TBL,C_L
CO2,CO4	Discuss clinical case presentations focused on syndromic evaluation of endocrine diseases	4	Experiential-Learning23.2	PSY-SET	Does	PER,DIS,BS,SDL,LRI
CO1,CO2,CO3,CO4	Discuss Unani diagnostic of *Mizaj* derangement in endocrine syndromes	4	Experiential-Learning23.3	CC	Does	LRI,CBL,Mnt,C_L,DIS

Unit 3 ہرمونی اندازہ جات اور تاؤیل Hormonal Assays and Interpretation

23.3.1 ہرمونی شاکلہ کا تجزیہ: ٹی ایس ایچ، ٹی تھری، ٹی فور، کورٹیسول، ایل ایچ، ایف ایس ایچ، جی ایچ، انسولین

Hormonal Profile Analysis: TSH, T3, T4, Cortisol, LH, FSH, GH, Insulin

23.3.2 فعال غدودی اختبارات (تحریض اور ابطال کے اختبارات)

Dynamic Endocrine Testing (Stimulation and Suppression Tests)

23.3.3 تجربہ گاہی رپورٹوں اور ہرمونی عدمِ توازن کی تاؤیل

Interpretation of Lab Reports and Hormonal Imbalance

23.3.4 غدودی تصویر کشی: نخامیہ، فوقِ کُلوی، درقیہ کے لیے الٹراساؤنڈ، ایم آر آئی، سی ٹی

Endocrine Imaging: Ultrasound, MRI, CT for Pituitary, Adrenals, Thyroid

References: 26,27,28,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe indications and utility of endocrine imaging techniques	1	Lecture	CC	Knows-how	L&PPT ,TUT,SDL

CO2,CO4	Perform interpretation of hormonal assay reports and diagnostic test results	6	Practical23.3	PSY-MEC	Shows-how	DIS,CBL,LRI
CO2,CO4	Demonstrate in lab visits for observing hormone testing procedures	6	Experiential-Learning23.4	PSY-SET	Does	DIS,D,RLE,Mnt,PER
CO2,CO4	Practice reading hormone profiles and discuss case interpretations	6	Practical23.4	CAP	Shows-how	C_L,LRI,PER,DIS
CO1,CO2,CO3,CO4	Prepare correlation reports based on cases with dual perspectives (biomedical + Unani)	6	Experiential-Learning23.5	CAP	Does	CBL,LRI,C_L,PER

Practical Training Activity

Practical Training 23.1 Endocrine system evaluations

Total Duration: 4 hours

Hour 1: Introduction & Clinical Assessment Overview

- 15 min: Brief lecture/discussion on the endocrine system, focusing on thyroid and adrenal glands.
- 15 min: Overview of common conditions:
  - **Thyroid**: Hypothyroidism, Hyperthyroidism
  - **Adrenal**: Addison's Disease, Cushing's Syndrome
- 30 min: Demonstration and guided practice of physical examination techniques:
  - Inspection of the neck (thyroid enlargement)
  - Reflex testing (e.g., delayed relaxation in hypothyroidism)
  - Vital signs assessment (e.g., BP variations in adrenal dysfunction)
  - Skin assessment (hyperpigmentation, thinning)

Hour 2: Simulated Patient Encounter – Thyroid Evaluation

- 10 min: Students receive a **case scenario** with patient history and symptoms.
- 30 min: In small groups, students:
  - Perform physical examination on a mannequin or standardized patient.
  - Document findings on a SOAP note template.
- 20 min: Review simulated lab results (e.g., TSH ↑, Free T4 ↓ → Primary Hypothyroidism).
  - Interpret findings and propose a diagnosis and plan.

Hour 3: Simulated Patient Encounter – Adrenal Evaluation

- 10 min: Distribute new **case scenario** (e.g., fatigue, hyperpigmentation, hypotension).
- 30 min: Groups conduct assessment and document findings.
- 20 min: Review lab data (e.g., Cortisol ↓, ACTH ↑ → Addison's Disease).
  - Discuss differential diagnoses and treatment priorities.

Hour 4: Case Discussion & Evaluation

- 30 min: Group presentations:
  - Each group presents one case (thyroid or adrenal) including:
    - Summary of findings
    - Lab interpretation
    - Proposed diagnosis and plan
- 15 min: Instructor feedback and clarification of key learning points.
- 15 min: Short reflective quiz or discussion:
  - What did you learn?
  - What would you do differently?

Practical Training 23.2 Case history and clinical chart analysis of endocrine syndromes

Total Duration: 4 hours

1. **Introductory Briefing (30 minutes)**
    - Overview of structured case history taking in endocrine patients, emphasizing symptoms such as fatigue, weight changes, menstrual irregularities, mood disturbances, skin changes, etc.
    - Introduction to reading and interpreting clinical charts: lab data (TSH, cortisol, ACTH, HbA1c), imaging reports, medication history, and progress notes.
    - Brief on key clinical syndromes and expected data patterns.
2. **Mock Case History Taking (1 hour 15 minutes)**
    - Students work in pairs or small groups using mock/simulated patient profiles (written or role-played).
    - Each group elicits a full endocrine-focused history, including chief complaints, symptom chronology, family and drug history, lifestyle factors, and review of systems.
    - Focus on communication skills, structured questioning, and clinical relevance.
    - Documentation of the mock case using a standard case history proforma.
3. **Clinical Chart Analysis (1 hour 15 minutes)**
    - Each group is provided with a detailed clinical chart of an endocrine case (e.g., hypothyroidism with anemia, PCOS with insulin resistance, adrenal crisis).
    - Students identify abnormal trends, correlate history with labs and findings, and suggest a probable diagnosis.
    - Key task: construct a diagnostic summary and suggest next steps (investigations/referrals/therapy).
4. **Group Presentations and Feedback (1 hour)**
    - Each group presents one mock case and its corresponding chart analysis.
    - Discussion focuses on the accuracy of history-taking, interpretation of clinical data, and logical reasoning.
    - Instructor and peer feedback to reinforce clinical insight and address gaps.
    - Optional: reflective discussion on how such analysis could be enriched with Unani perspectives (*mizaj*, *amraz ghudood*).

Practical Training 23.3 Hormonal assay reports and diagnostic test results

Total Duration: 6 hours

1. **Introductory Orientation (45 minutes)**
    - Overview of the principles behind hormonal assays: types (RIA, ELISA, CLIA), sampling protocols, circadian rhythm influence.
    - Explanation of key terms: baseline levels, stimulation/suppression tests, interpretation in context.
    - Clinical examples to illustrate the consequences of misinterpretation (e.g., subclinical hypothyroidism, adrenal crisis).
2. **Hands-on Interpretation of Thyroid & Adrenal Profiles (1 hour 30 minutes)**
    - Groups are given sets of thyroid panels (TSH, T3, T4) and adrenal panels (cortisol, ACTH, dexamethasone suppression test results).
    - Students interpret:
        - Hypothyroidism (primary and secondary)
        - Hyperthyroidism (Graves', toxic nodular goiter)
        - Cushing's syndrome and Addison's disease
    - Focus on integrating hormonal patterns with likely pathophysiology.
3. **Interpretation of Gonadal and Metabolic Hormones (1 hour 30 minutes)**
    - Sample reports of FSH, LH, estrogen, testosterone, prolactin, insulin, and OGTT provided.
    - Interpretation tasks include:
        - PCOS hormonal profile
        - Hypogonadism (male/female)
        - Hyperprolactinemia
        - Insulin resistance and prediabetes
    - Students correlate results with clinical signs and possible etiologies (e.g., pituitary vs peripheral origin).
4. **Case-Based Integration and Clinical Reasoning (1 hour 15 minutes)**
    - Students work in pairs to analyze composite endocrine cases with full history and hormonal workup.
    - Each case involves:

- Identifying abnormal patterns
- Stating probable diagnosis
- Recommending further tests or treatment direction

- Instructor guides interpretation depth and encourages evidence-based reasoning.

5. **Review, Group Presentation, and Feedback (1 hour)**
   - Groups present 1–2 interpreted cases with rationale.
   - Peer and instructor critique provided to validate logic and highlight interpretive accuracy.
   - Summary of key interpretive cues and diagnostic pearls for practice.

Practical Training 23.4 Hormone profiles and case interpretations

Total Duration: 6 hours

1. **Introduction and Review of Interpretation Framework (60 minutes)**
   - Instructor presents a brief framework for hormone profile interpretation.
   - Key hormonal axes covered:
     - **Thyroid axis** (TSH, T3, T4)
     - **Adrenal axis** (ACTH, cortisol, dexamethasone suppression test)
     - **Pituitary-gonadal axis** (LH, FSH, testosterone/estradiol, prolactin)
     - **Metabolic hormones** (insulin, glucose, C-peptide)
2. **Guided Case-Based Reading of Hormone Profiles (1.5 hour)**
   - Students work in pairs to interpret 4–5 anonymized real or simulated hormone panels.
   - Each profile includes:
     - Clinical scenario
     - Lab results with reference ranges
     - Imaging or supporting data (if relevant)

- Tasks:
  - Identify abnormal values
  - Determine possible condition (e.g., primary hypothyroidism, PCOS, adrenal insufficiency)
  - Consider differential diagnoses and next steps

3. **Unani Correlation and Concept Mapping (60 minutes)**
   - For select cases, students link hormone profiles with possible Unani diagnostic equivalents:
     - *Sū'-i-mizāj*, *tafarruq-i-ittiṣāl*, *taḥallul*, etc.
   - Mapping of endocrine dysfunction to *mizaj*, *akhlāt*, or *a'zā'* derangement
4. **Small Group Discussions and Peer Teaching (1.5 hour)**
   - Students split into small groups and present one interpreted case each.
   - Other group members question or challenge findings to deepen understanding.
   - Emphasis on reasoning, exclusion of differentials, and relevance to patient care.
5. **Integrated Instructor Review (1 hour)**
   - Instructor leads a group review of 2–3 complex profiles.
   - Compares interpretations across groups and highlights key takeaways.
   - Discusses pitfalls in interpretation, overlapping presentations, and importance of context.
   - Provides a checklist or summary flowchart for hormone profile analysis.

Experiential Learning Activity

Experiential-Learning Learning 23.1: Unani evaluation and Mizaj assessment in endocrine patients

Total Duration: 6 hours

1. **Orientation and Framework (45 minutes)**
   - Brief lecture and demonstration on Unani diagnostic principles relevant to endocrine disorders.
   - Introduction to structured *Mizaj* assessment.

- Ethical considerations and consent for patient-based assessment.

2. **Live Case-Based Unani Evaluation (1 hour 30 minutes)**
   - Students work in pairs to conduct complete Unani evaluation on endocrine patients (real or standardized).
   - Examination includes pulse (*Nabz*), complexion, voice, anthropometry, body hair, sleep, appetite, bowel habits, and physical reaction to touch/temperature.
   - Findings recorded in standard Unani history format.
3. **Mizaj Assessment – Tool Application and Scoring (1 hour)**
   - Use of structured *Mizaj* assessment scales for classification (e.g., *Damwī*, *Safrāwī*, *Balghamī*, *Sawdāwī*).
   - Documentation of each component (hot/cold, moist/dry) with rationales.
   - Compare traditional findings with standard scoring-based temperament determination.
4. **Group Case Presentation and Comparative Analysis (1 hour 15 minutes)**
   - Each group presents one case, highlighting Unani clinical signs, *Mizaj* profile, and symptom correlation.
   - Discuss overlaps and differences with biomedical diagnosis (e.g., cold-dry Mizaj and hypothyroidism).
   - Explore prognostic and therapeutic implications from Unani perspective.
5. **Reflection and Integrative Thinking (1 hour)**
   - Guided reflective discussion: How does Mizaj assessment contribute to clinical understanding?
   - Can it supplement biomedical endocrinology? Where are the limitations?
   - Small group writing activity: draft a brief integrative case summary (Unani + modern view).
6. **Wrap-up and Feedback (30 minutes)**
   - Peer and instructor feedback on case presentations and reflections.
   - Clarification of misconceptions in Mizaj interpretation.
   - Encourage follow-up reading on Unani perspectives of endocrine disorders from authoritative texts.

Experiential-Learning Learning 23.2: Syndromic evaluation of endocrine diseases

Total Duration: 4 hours

1. **Orientation and Pre-briefing (30 minutes)**
    - Instructor outlines the concept of syndromic evaluation in endocrine disorders (e.g., fatigue + weight gain + cold intolerance = hypothyroid syndrome).
    - Key clinical features of major syndromes discussed:
        - Hypothyroidism / Hyperthyroidism
        - Cushing's syndrome
        - Addison's disease
        - PCOS and metabolic syndrome
    - Tips on clinical observation and structured case analysis.
2. **Observation of Clinical Case Presentations (1 hour 30 minutes)**
    - Students attend 2–3 detailed endocrine case presentations by clinicians or senior postgraduates.
    - Each presentation includes: history, physical findings, lab reports, diagnostic reasoning, and management plan.
    - Students are given case observation templates to note syndromic features, diagnostic cues, and treatment rationale.
3. **Group Discussion and Case Deconstruction (1 hour)**
    - Small-group breakout discussion led by facilitators.
    - Each group analyzes one observed case, identifying:
        - Presenting syndrome(s)
        - Major diagnostic features
        - Supporting and conflicting evidence
        - Missed or alternative differentials
    - Brief on how Unani observations (e.g., *sue mizaj*, *tahallul badn*, *istirkha*) could complement syndromic impressions.
4. **Feedback and Reflective Wrap-Up (1 hour)**
    - Groups present key learning points and diagnostic insights from the cases.

- Instructor provides feedback on observation quality and reasoning clarity.
- Students reflect on how syndromic thinking improves diagnostic efficiency and integrative clinical understanding.
- Optional: submission of a short reflective summary or comparative diagnostic note (biomedical + Unani perspective).

Experiential-Learning Learning 23.3: *Mizaj* derangement in endocrine syndromes

Total Duration: 4 hours

1. **Introductory Conceptual Briefing (60 minutes)**
   - Instructor-led explanation of the concept of *mizaj*, its classification (e.g., hot/cold, dry/moist), and its clinical evaluation in Unani practice.
   - Overview of *sū'-i-mizāj* in common endocrine syndromes.
2. **Case-Based Group Discussions (1 hour 15 minutes)**
   - Groups are given 2–3 endocrine case studies (e.g., a patient with hypothyroidism, PCOS, or Cushing's syndrome).
   - Each group evaluates the case to:
     - Identify signs of *mizaj derangement* based on Unani criteria (pulse, complexion, stool, sleep, appetite, psychological state, etc.)
     - Assign a probable *mizaj* and correlate with the endocrine syndrome
     - Describe contributing *asbāb* (causes) such as lifestyle, diet, or environmental factors
3. **Comparative Diagnostic Roundtable (1 hour)**
   - All groups come together for a moderated roundtable discussion.
   - Each group shares one case, outlining:
     - Unani diagnosis and *mizaj* profile
     - Comparison with biomedical diagnosis and lab findings
     - Suggestions for Unani management approaches (e.g., *ta'dīl mizaj*, *tanqiya*, *tadeel-i-ghiza*)
   - Open peer discussion on challenges in correlating Unani and modern diagnostic approaches.
4. **Reflective Wrap-Up and Feedback (45 minutes)**
   - Instructor-led reflection on diagnostic reasoning skills, the strengths of temperament-based analysis, and its modern clinical relevance.

- Discussion on limitations, potential for integration, and future research avenues in *mizaj* assessment of endocrine diseases.
- Students write and share one key insight or challenge they encountered during the session.

Experiential-Learning Learning 23.4: Hormone testing procedures

Total Duration: 6 hours

1. **Pre-Visit Orientation and Safety Briefing (30 minutes)**
   - Overview of the purpose and structure of the lab visit.
   - Safety instructions and behavioral protocols in diagnostic lab settings.
   - Introduction to major hormone testing methods:
     - **ELISA** (Enzyme-Linked Immunosorbent Assay)
     - **CLIA** (Chemiluminescent Immunoassay)
     - **RIA** (Radioimmunoassay – if available)
   - Introduction to hormone panels commonly tested (thyroid, adrenal, gonadal, metabolic hormones).
2. **Guided Laboratory Tour and Observation (2 hours)**
   - Students visit sections of the lab including:
     - Sample collection and labelling area
     - Centrifugation and storage unit
     - Hormone assay processing room
     - Result verification and reporting section
   - Live demonstrations (if available) or guided explanation of:
     - Reagent preparation and calibration
     - Assay processing steps and automation
     - Internal and external quality controls
3. **Interaction with Laboratory Experts (1 hour 30 minutes)**

- Q&A session with lab technologists, biochemists, or pathologists.
- Discussion on:
  - How to ensure sample integrity and avoid false results
  - Importance of test timing (e.g., diurnal variation in cortisol, LH surge timing)
  - Common challenges in hormonal testing and ways to overcome them
- Real-life examples of misinterpreted results due to technical or sampling errors.

4. **Small Group Reflection and Report Drafting (1 hour)**
   - Students form small groups to summarize observations.
   - Each group prepares a short reflective note on:
     - What they observed
     - How it affects clinical interpretation
     - Any surprising findings or challenges noted
   - Instructor facilitates discussion on how lab visits bridge theory and clinical decision-making.
5. **Instructor Wrap-Up and Debrief (1 hour)**
   - Recap of key learning points.
   - Brief comparison of testing modalities, sensitivity, specificity, and clinical implications.
   - Discussion on integrating lab knowledge into endocrine case management and diagnostics.

Experiential-Learning Learning 23.5: Dual perspectives (biomedical + Unani) on endocrine disorders

Total Duration: 6 hours

1. **Introductory Orientation: Integrative Diagnostic Framework (60 minutes)**
   - Instructor-led session introducing the rationale, methods, and challenges of integrating biomedical and Unani diagnoses.
   - Key concepts reviewed:
     - Biomedical: hormone axes, endocrine syndromes, lab markers

        - Unani: *Mizaj*, *Akhlāṭ*, *Uzwī tafarruq*, *Tashkīl-e-badan*, *Aʿẓāʾ raʾīsah* involvement in hormonal functions
    - Discussion of how endocrine disorders may reflect *Mizaj* imbalance or deranged *quwwat* and *afʿāl*.

2. **Case Discussion in Mixed-Method Groups (2 hours)**
    - Groups of 4–5 students analyze 3–4 curated clinical cases (e.g., hypothyroidism, Cushing's syndrome, PCOS, adrenal insufficiency).
    - For each case, students are provided:
        - Biomedical summary (history, labs, imaging)
        - Structured prompts for Unani analysis (e.g., temperamental attributes, *Asbāb-e-sitta*, signs of *Su'-i-mizaj*)
    - Group task:
        - Identify biomedical diagnosis
        - Determine likely *Mizaj* and Unani dysfunctions
        - Draft points of correlation between the two systems
        - Discuss if Unani diagnostic terms predict biomedical findings or vice versa

3. **Preparation of Correlation Reports (1 hour 30 minutes)**
    - Each group prepares 1–2 written case correlation reports.
    - Template includes:
        - Clinical summary
        - Biomedical interpretation
        - Unani diagnostic assessment
        - Points of convergence and divergence
        - Clinical relevance of integrative understanding
    - Optional: Recommendations for management using both systems

4. **Group Presentations and Reflective Feedback (1 hour 30 minutes)**
    - Each group presents one correlation report to the class.
    - Instructor and peers provide feedback on accuracy, conceptual clarity, and integration depth.

○ Instructor highlights examples of successful cross-referencing and encourages refinement of terminology and correlation logic.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. SAQ (5 Marks each)- 02 SAQs: Two SAQs on any topics from cognitive domain of this module shall be given for assessment- Trainers Report (15 Marks): on Perform Unani evaluation and Mizaj assessment in endocrine patients shall be taken for assessment. Practical Exam (25 Marks): Perform interpretation of hormonal assay reports and diagnostic test results. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4
Module 24 : کلینیکل نیوروفزیالوجی Clinical Neurophysiology	
Module Learning Objectives (At the end of the module, the students should be able to) 1. Perform a comprehensive clinical examination of the central and peripheral nervous systems, including cranial nerve testing and neurological status evaluation using tools such as the Glasgow Coma Scale. 2. Interpret diagnostic modalities including EEG, EMG, and nerve conduction studies in the assessment of neurophysiological conditions. 3. Analyze the mechanisms and classification of nerve injuries, nerve regeneration, and pain, incorporating both contemporary and Unani physiological frameworks. 4. Discuss and assess neurogenesis, neural plasticity, and peripheral neuropathies, with an emphasis on integrating modern and classical views including Galenic and Unani interpretations.	

5. Evaluate sleep physiology, emotional and behavioral changes, and employ neuroimaging (CT, MRI, PET) for diagnosis and clinical correlation in neurological and psychiatric conditions.
6. Apply Unani concepts related to neurological disorders such as *Fālij*, *Laqwa*, and *Naum*, and relate them to their modern counterparts through structured case-based learning.

Unit 1 نظامِ اعصاب کا طبی معائنہ اور تشخیصی اختبار Clinical Examination and Diagnostic Testing of Nervous System

24.1.1 مرکزی اور طرفی اعصابی نظام کا طبی معائنہ

Clinical Examination of CNS and PNS

24.1.2 اِنعکاسی اختبار اور دِماغی اعصاب کا معائنہ

Reflex Testing & Cranial Nerve Examination

24.1.3 طرفی عصب کی فعلیت کا جائزہ

Assessment of Peripheral Nerve Function

24.1.4 گلاسگو کوما اسکیل اور اعصابی حیثیت

Glasgow Coma Scale (GCS) and Neurological Status

24.1.5 تشخیصی آلات/وسائل: ای ای جی، ای ایم جی، عصب کی توصیلی مطالعات

Diagnostic Tools: EEG, EMG, Nerve Conduction Studies

References: 26,27,28,29,33,228,229,230,231

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Describe neurological examination techniques for CNS and PNS	2	Lecture	CC	Knows-how	TUT,L&PPT ,SDL
CO2,CO4	Discuss underlying principles of diagnostic tests including EEG, EMG, and GCS.	2	Lecture	CC	Knows-how	FC,SY,L&GD

CO2,CO4	Perform cranial nerve and reflex testing in peer groups	4	Practical24.1	CAP	Shows-how	C_L,D-BED,PT,D,DL
CO2,CO4	Demonstrate interpretation of diagnostic tests including EEG, EMG, and GCS (Glasgow Coma Scale)	4	Practical24.2	PSY-SET	Shows-how	DL,SIM,LRI,PAL,TBL
CO2,CO4	Demonstrate neurodiagnostic labs (EEG/NCS/EMG) and GCS evaluation in patients	6	Experiential-Learning24.1	PSY-SET	Does	CBL,BL,D,FV,DL
CO2,CO4	Evaluate Neuroimaging Techniques: CT, MRI, PET Scan with clinical presentations in neurology	4	Experiential-Learning24.2	CE	Does	CD,LRI,BS,C_L,W

Unit 2 اِصابۃ الأعصاب، اعصابی بحالی، اور درد کی فعلیات Nerve Injuries, Neuro-regeneration and Pain Physiology

24.2.1 اِصابۃ الأعصاب اور تنزل کی اقسام

Types of Nerve Injuries & Degeneration

24.2.2 اعصابی بحالی کا طریقہ کار اور جائزہ

Mechanism and Assessment of Nerve Regeneration

24.2.3 درد کی درجہ بندی اور فعلیات

Classification and Physiology of Pain

24.2.4 درد کی فعلیاتی امراضیات اور یونانی نقطہ نظر (تفرّقِ اِتّصال، سُوءِ مزاج)

Pathophysiology of Pain and Unani View (*Tafarruke Itesaal*, *Sue Mizaj*)

References: 1,7,8,10,11,12,26,27,28,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G
CO2,CO4	Differentiate types of nerve injuries and describe nerve degeneration-regeneration processes	1	Lecture	CAN	Knows-how	D,L_VC,CBL

CO2,CO4	Describe mechanisms and types of pain including clinical manifestations	1	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC
CO2,CO4	Perform pain threshold testing and nerve injury case simulations	4	Practical24.3	CAP	Shows-how	CBL,D
CO2,CO4	Analyze and document pain characteristics in patients with varied *Mizaj*	4	Experiential-Learning24.3	CAN	Does	CBL,PER,L_VC
CO2,CO4	Demonstrate clinical assessment skills in the outpatient evaluation of patients with chronic pain and neuralgia	4	Experiential-Learning24.4	CE	Does	D-BED,DIS,RLE,BL,CBL

Unit 3 Neurogenesis and Neuropathies

24.3.1 "مرکزی اعصابی نظام میں نیوروجینسس اور پلاسٹسٹی

Neurogenesis and Plasticity in CNS

24.3.2 اطرافی نیوروپیتھی: جانچ اور کلینیکل مطابقت

Peripheral Neuropathy: Assessment and Clinical Relevance

24.3.3 ہیمی پلیجیا اور اسپائنل ضعیفات: جدید بمقابلہ گیلینک نقطہ نظ

Hemiplegia and Spinal Lesions: Modern vs Galenic Views

24.3.4 کلینیکل کیس ڈسکشنز کے ساتھ کرینیئل نروز کا معائنہ

Examination of Cranial Nerves with Clinical Case Discussions

24.3.5 لقوہ، فالج (پیرالیسس) کے لیے یونانی نقطہ نظر

Unani Approach to *Laqwa*, *Fālīj* (Paralysis)

References: 1,8,26,27,28,29,44,227,228,229,230

3A	3B	3C	3D	3E	3F	3G

CO2,CO4	Describe neurogenesis and regeneration mechanisms in the CNS	1	Lecture	CC	Knows-how	D,L_VC,CBL
CO2,CO4	Assess and interpret signs of peripheral neuropathies	1	Lecture	CAN	Knows-how	CBL,L_VC,D,DIS
CO2,CO4	Discuss neurological examination in neuropathy and hemiplegia	4	Practical24.4	CC	Shows-how	L_VC,L&GD,BS,L&PPT
CO1,CO2,CO3,CO4	Perform evaluation of classical Unani texts in relation to neurological clinical presentations	4	Experiential-Learning24.5	CAP	Does	LRI,TBL,SDL,BS,CBL

Unit 4 Sleep Physiology, Emotion, Behavior and Neuroimaging نوم کی فعلیات، جذبات، طرزِ عمل، اور اعصابی تصویر کشی

24.4.1 نوم کی فعلیات اور نوم کے اضطرابات

Sleep Physiology and Sleep Disorders

24.4.2 نوم پر یونانی نقطہ نظر

Unani Perspectives on Sleep (*Naum)*

24.4.3 طرزِ عمل اور جذباتی اضطرابات کا جائزہ

Assessment of Behavior and Emotional Disturbances

24.4.4 اعصابی تصویر کشی کے طریقہ کار: سی ٹی، ایم آر آئی، پی ای ٹی اسکین

Neuroimaging Techniques: CT, MRI, PET Scan

24.4.5 طبی مطالعہ ہائے واقعات: مرگی، اکتئاب، طرزِ عمل کے متلازمے

Clinical Case Studies: Epilepsy, Depression, Behavioral Syndromes

References: 1,3,4,7,8,9,19,26,27,29,33,227,228,229,230

3A	3B	3C	3D	3E	3F	3G

CO2,CO4	Demonstrate observation of EEG recordings during various sleep cycle stages in a laboratory setting.	4	Experiential-Learning24.6	PSY-SET	Does	ML,SIM,IBL,DL,Mnt
CO2,CO4	Classify sleep disorders and relate to neurophysiological basis	1	Lecture	CAN	Knows-how	L
CO2,CO4	Describe behavioral and emotional disturbances in clinical neurology	1	Lecture	CC	Knows-how	SY,TUT,L&PPT
CO2,CO4	Demonstrate interpretation of sleep logs, behavior scales, and neuroimaging results	4	Practical24.5	PSY-SET	Shows-how	PER,LRI,DIS,CD,CBL

Practical Training Activity

Practical Training 24.1 Cranial nerve and reflex testing in peer groups

Total Duration: 4 hours

1. **Introduction to Cranial Nerve and Reflex Testing (30 minutes)**
    - Brief overview of cranial nerve anatomy and function.
    - Introduction to reflexes: types (e.g., monosynaptic, polysynaptic), normal and abnormal responses.
    - Key cranial nerves tested:
        - **CN I:** Olfactory (smell)
        - **CN II:** Optic (vision)
        - **CN III, IV, VI:** Oculomotor, Trochlear, Abducens (eye movements)
        - **CN V:** Trigeminal (sensation and motor)
        - **CN VII:** Facial (muscle movement, taste)
        - **CN VIII:** Vestibulocochlear (hearing, balance)
        - **CN IX, X:** Glossopharyngeal, Vagus (gag reflex, voice)

        - **CN XI:** Accessory (shoulder shrug, head turn)
        - **CN XII:** Hypoglossal (tongue movement)
    - Introduction to reflexes:
        - **Deep tendon reflexes** (e.g., patellar, Achilles, biceps, triceps)
        - **Superficial reflexes** (e.g., plantar reflex)
        - **Pathological reflexes** (e.g., Babinski, Hoffman sign)

2. **Demonstration of Cranial Nerve and Reflex Testing (30 minutes)**
    - Instructor demonstrates proper technique for cranial nerve testing and reflex examination.
    - Emphasis on techniques such as:
        - Observing for asymmetry or abnormal responses
        - Using appropriate stimuli for sensory tests (e.g., light touch, pinprick)
        - Performing facial muscle tests and checking for symmetry
        - Performing deep tendon reflex tests, ensuring proper positioning and grading responses
    - Instructor explains the clinical significance of each test and abnormal findings.
3. **Peer Group Testing Practice (2 hours)**
    - Students split into pairs (peer groups) and perform cranial nerve and reflex testing on each other.
    - Tasks:
        - Test all cranial nerves in order.
        - Perform a full reflex examination, including superficial and deep tendon reflexes.
        - Record normal and abnormal findings.
        - Provide peer feedback on technique, thoroughness, and findings.
    - After completing each test, students will exchange roles.
4. **Group Reflection and Discussion (30 minutes)**
    - After completing testing, groups come together to discuss their findings.

- Instructor facilitates reflection on:
  - Any challenges faced during testing (e.g., difficulty testing sensation or reflex response).
  - Abnormal findings and their possible clinical significance (e.g., signs of a stroke, neuropathy).
  - Best practices for improving technique and ensuring accurate results.
- Discuss how cranial nerve and reflex testing helps in localizing neurological lesions (e.g., upper vs. lower motor neuron disorders).

5. **Wrap-Up and Summary (30 minutes)**
   - Instructor summarizes key points from the session:
     - Importance of thorough cranial nerve and reflex testing in clinical practice.
     - Common neurological conditions associated with abnormal findings (e.g., Bell's palsy, multiple sclerosis).
   - Emphasis on the importance of a systematic approach in neurodiagnostic testing.
   - Provide additional resources or references for further study.

Practical Training 24.2 EEG, EMG, and GCS

Total Duration: 4 hours

1. **Introduction to Diagnostic Tests (45 minutes)**
   - **EEG (Electroencephalography):**
     - Purpose and types of EEG (e.g., resting, sleep, induced).
     - Common EEG abnormalities (e.g., spike waves, slow waves, epileptic patterns).
     - Clinical applications of EEG (e.g., seizure disorders, sleep disorders).
   - **EMG (Electromyography):**
     - Explanation of EMG technique and its role in diagnosing neuromuscular disorders.
     - Normal vs abnormal findings (e.g., spontaneous activity, motor unit potentials).
     - Clinical indications of EMG (e.g., myopathy, neuropathy, radiculopathy).
   - **GCS (Glasgow Coma Scale):**

- Understanding the GCS scoring system: Eye, verbal, and motor responses.
- How GCS is used in clinical settings (e.g., traumatic brain injury, coma assessments).
- Interpreting changes in GCS scores.

2. **Demonstration of Diagnostic Test Interpretation (45 minutes)**
   - **EEG:**
     - Instructor demonstrates how to read a sample EEG printout, explaining various waveforms and their significance.
     - Discuss clinical implications of different patterns (e.g., alpha rhythm, beta waves, spikes).
   - **EMG:**
     - Instructor demonstrates sample EMG recordings and explains muscle and nerve dysfunction signs.
     - Focus on identifying abnormal motor unit potentials and insertional activity.
   - **GCS:**
     - Instructor provides a live demonstration on how to assess and score GCS based on patient responses.
     - Discuss clinical scenarios where GCS scoring is critical.
3. **Hands-On Practice and Interpretation (1 hour 30 minutes)**
   - Students will be divided into small groups (3–4 members per group).
   - Each group will receive a set of sample diagnostic results (EEG, EMG, and GCS) to interpret:
     - **EEG Interpretation:**
       - Read and interpret EEG tracings from various clinical scenarios (e.g., seizure, normal sleep patterns, encephalopathy).
     - **EMG Interpretation:**
       - Interpret sample EMG results, identifying signs of different neuromuscular disorders (e.g., ALS, carpal tunnel syndrome, peripheral neuropathy).
     - **GCS Scoring:**
       - Review patient scenarios with varying levels of consciousness and apply GCS to determine severity.
   - Each group will prepare a brief interpretation report for each diagnostic test.

4. **Group Presentations and Discussion (45 minutes)**
    - Each group will present their interpretations and rationale for each diagnostic test (EEG, EMG, and GCS).
    - Instructor and peers will provide feedback and suggestions for improvement.
    - Discussion of the clinical relevance of findings and how they affect the management of patients.
    - Emphasize how to integrate EEG, EMG, and GCS findings into comprehensive patient care plans.
5. **Wrap-Up and Summary (30 minutes)**
    - Instructor summarizes key takeaways from the session:
        - The importance of EEG, EMG, and GCS in diagnosing neurological disorders.
        - Common challenges in interpreting these tests and strategies for overcoming them.
        - Clinical examples of how these diagnostic tests influence treatment decisions.
    - Provide additional resources (books, articles, or online modules) for further study on diagnostic testing in neurology.

Practical Training 24.3 Pain threshold and nerve injury testing

Duration:

4 hours

Learning Objectives:

By the end of this session, students will be able to:

1. Understand the concepts of pain threshold testing and its clinical relevance.
2. Learn and apply various methods for testing pain thresholds in different anatomical regions.
3. Understand the types of nerve injuries and how to simulate and assess them.
4. Perform simulated nerve injury cases and assess the sensory and motor deficits associated with different types of nerve damage.
5. Learn to correlate pain threshold testing with clinical presentations of neuropathies and other nerve-related disorders.

Structure of the Practical Session (4 hours)

1. **Introduction to Pain Threshold Testing and Nerve Injury (30 minutes)**
    - **Pain Threshold Testing:**
        - Overview of pain perception, nociceptors, and how pain thresholds are measured.
        - Different types of pain threshold tests (e.g., pressure, thermal, electrical).
        - Clinical relevance of pain threshold testing in diagnosing conditions like neuropathy, central sensitization, and fibromyalgia.
    - **Nerve Injury Simulation:**
        - Overview of common nerve injuries (e.g., peripheral nerve injury, brachial plexus injury, carpal tunnel syndrome).
        - Sensory and motor symptoms associated with nerve injuries.
        - Explanation of how nerve injury simulations work and how they relate to real-world clinical cases.
2. **Demonstration of Pain Threshold Testing Methods (30 minutes)**
    - **Pressure Pain Threshold:**
        - Demonstration using devices like algometers or pressure dolorimeters.
        - Measurement of the pressure at which a subject first perceives pain in a specific anatomical region (e.g., forearm, calf).
    - **Thermal Pain Threshold:**
        - Demonstration using thermal sensory devices (e.g., thermal probes) to assess temperature sensitivity.
        - Discussing the physiological basis of thermal pain thresholds (cold and heat pain).
    - **Electrical Pain Threshold:**
        - Demonstration using transcutaneous electrical nerve stimulation (TENS) or similar devices to measure electrical pain threshold.
        - Discussing the concept of electrical stimulation and its role in assessing nerve function.
3. **Pain Threshold Testing Practice (1 hour 30 minutes)**
    - Students will work in pairs or small groups to practice pain threshold testing:
        - **Pressure Threshold Testing:**
            - Practice using pressure dolorimeters or similar devices to assess pressure pain thresholds on each other (ensuring safety protocols).

        - Record the results and compare thresholds between different anatomical regions.
    - **Thermal Pain Testing:**
        - Use thermal sensory devices to test heat and cold pain thresholds on each other.
        - Record the temperature at which pain is first perceived.
    - **Electrical Pain Testing:**
        - Use electrical stimulation devices to assess the electrical pain threshold.
        - Discuss patient comfort and safety considerations during testing.

4. **Nerve Injury Simulation and Assessment (1 hour 30 minutes)**
    - **Simulated Nerve Injuries:**
        - **Case 1:** Simulated radial nerve injury.
        - **Case 2:** Simulated ulnar nerve injury.
        - **Case 3:** Simulated sciatic nerve injury.
    - **Instructions:**
        - Students will work in pairs or small groups to simulate nerve injuries using models or by applying controlled pressure to specific nerves (e.g., radial, ulnar, sciatic).
        - Each group will simulate the injury and then assess sensory and motor deficits (e.g., sensory loss, muscle weakness, atrophy).
        - **Sensory Assessment:**
            - Use tools like monofilaments or cotton to test sensory loss (e.g., light touch, pain perception, temperature sensitivity).
        - **Motor Assessment:**
            - Test muscle strength using manual muscle testing to evaluate motor deficits associated with nerve injury.
    - **Assessment and Discussion:**
        - After simulation, students will assess the results and discuss how the injury correlates with real clinical cases of nerve damage.
        - Discuss the potential causes, prognosis, and management of the simulated injuries.
5. **Q&A, Feedback, and Wrap-Up (30 minutes)**

- Open discussion for students to ask questions and clarify any doubts related to pain threshold testing and nerve injury simulations.
- Instructor-led feedback on the accuracy and effectiveness of pain threshold testing and nerve injury assessments.
- Summary of key points:
  - The clinical importance of pain threshold testing in diagnosing neuropathy and other sensory disorders.
  - How nerve injury simulations can aid in understanding the sensory and motor deficits of various neuropathies.
  - Safety protocols and considerations when performing these tests in a clinical setting.

Resources Required:

- Pressure dolorimeters, thermal sensory devices, and electrical stimulation devices for pain threshold testing.
- Nerve injury simulation kits (e.g., models or simulated injury protocols for radial, ulnar, sciatic nerves).
- Monofilaments, cotton wools, and muscle strength testing tools.
- Record sheets for students to document pain thresholds and nerve injury assessment results.
- Instructional videos or diagrams demonstrating normal and abnormal sensory and motor findings.

Additional Notes:

- Ensure that students are aware of the ethical considerations and patient safety when performing pain threshold tests on individuals.
- Proper hygiene and safety protocols must be followed during testing (e.g., sanitizing devices between uses).
- For nerve injury simulations, ensure students understand that these are controlled scenarios, not real injuries, to prevent harm.

Practical Training 24.4 Neurological examination in neuropathy and hemiplegia

Duration: 4 hours

Learning Objectives:

By the end of this session, students will be able to:

1. Perform a thorough neurological examination for patients presenting with neuropathy and hemiplegia.
2. Identify and assess various signs and symptoms associated with neuropathy and hemiplegia.
3. Correlate neurological findings with potential pathologies (e.g., peripheral vs. central nerve involvement).

4. Understand the clinical features of neuropathy (sensory and motor) and hemiplegia (focal weakness, altered coordination).
5. Develop skills in documenting and interpreting neurological examination findings.

Structure of the Practical Session (4 hours)

1. **Introduction to Neurological Examination (30 minutes)**
    - **Overview of Neurological Examination:**
        - Importance of a systematic neurological exam to identify abnormalities in nerve function.
        - Basic principles of the neurological examination: history, inspection, palpation, and functional tests.
        - Differentiating between neuropathy and hemiplegia: Key signs and symptoms.
    - **Types of Neuropathy:**
        - Peripheral neuropathy (e.g., diabetic neuropathy, alcohol-induced neuropathy).
        - Autonomic neuropathy (e.g., dysautonomia).
        - Mononeuropathies (e.g., carpal tunnel syndrome).
    - **Hemiplegia Overview:**
        - Definition and causes of hemiplegia (e.g., stroke, cerebral palsy).
        - Key clinical signs: weakness or paralysis on one side of the body, hyperreflexia, abnormal tone.
2. **Neurological Examination of Neuropathy (1 hour)**
    - **Sensory Assessment:**
        - **Light Touch:** Use cotton wool to assess sensation on distal extremities (hands, feet).
        - **Pinprick/Sharp-Dull Discrimination:** Using a pin or neurotip to assess pain sensation.
        - **Temperature Sensation:** Using cold objects to assess temperature sensation in limbs.
        - **Vibration Testing:** Use a tuning fork to assess vibration sensation on bones (e.g., ankle, wrist).
        - **Proprioception:** Test for joint position sense by asking the patient to detect movement in their finger or toe.
    - **Motor Assessment:**

        - **Muscle Strength Testing:** Evaluate strength in major muscle groups, focusing on distal and proximal muscles (e.g., grip strength, dorsiflexion, plantar flexion).
        - **Tone Assessment:** Check for hypertonia or hypotonia, especially in the lower extremities.
    - **Reflex Testing:**
        - Deep tendon reflexes (e.g., patellar, Achilles, biceps) and assessment of reflexes in neuropathy.
        - Check for signs of hyperreflexia or absent reflexes.
    - **Autonomic Function Testing (if applicable):**
        - Assess sweating, blood pressure response, and heart rate changes for signs of autonomic dysfunction.
3. **Neurological Examination of Hemiplegia (1 hour)**
    - **Inspection:**
        - Observe posture, gait, and the symmetry of the face and limbs.
        - Look for signs of hemiplegic posture (e.g., arm held in flexion, leg extended, plantar flexion).
    - **Motor Assessment:**
        - **Muscle Strength Testing:** Test muscle strength on both sides of the body, paying attention to weakness or paralysis in the affected limbs.
        - Evaluate upper and lower limb strength separately to identify any asymmetry.
        - **Tone Assessment:** Check for spasticity (increased muscle tone) in hemiplegia.
        - **Coordination Testing:** Perform tests like the finger-to-nose test and heel-to-shin test to assess for cerebellar involvement.
    - **Reflexes:**
        - Assess for hyperreflexia (exaggerated reflexes) and the presence of pathological reflexes such as the Babinski sign (extension of the big toe in response to stimulation of the sole).
        - Check for clonus, which can occur with spasticity in hemiplegia.
    - **Cranial Nerves:**
        - Perform a basic cranial nerve exam to check for any asymmetry or deficits (e.g., facial droop, dysphagia, dysarthria).
        - Focus on assessing the facial nerve (cranial nerve VII) for drooping or weakness.

4. **Clinical Scenarios and Peer Practice (1 hour)**
    - **Peer Practice:**
        - Students will be divided into pairs to perform a complete neurological examination on each other.
        - One student will present with a simulated case of neuropathy (e.g., sensory loss in the feet) and the other with hemiplegia (e.g., weakness on one side of the body).
        - Each student will take turns performing the neurological exam, documenting findings, and discussing potential diagnoses.
    - **Case Discussion:**
        - Students will engage in a group discussion about their findings and share their observations.
        - Focus on correlating neurological signs with possible pathologies, such as peripheral neuropathy vs. central nervous system involvement in hemiplegia.
        - Discuss differential diagnoses and the importance of comprehensive clinical assessment.
5. **Q&A, Feedback, and Wrap-Up (30 minutes)**
    - **Open Discussion:**
        - Students will have the opportunity to ask questions related to the practical session.
        - Discuss challenges faced during the examination process and areas for improvement.
    - **Feedback from Instructor:**
        - Instructor provides feedback on students' techniques, highlighting areas for improvement and offering suggestions for better assessment skills.
    - **Wrap-Up:**
        - Summarize key points of the session: the importance of a thorough neurological examination in differentiating neuropathy and hemiplegia.
        - Emphasize the value of careful documentation of findings, as it aids in diagnosis and treatment planning.

Resources Required:

- Neurological examination tools (e.g., reflex hammer, tuning fork, cotton wools, pin).

- Patient or simulation cases for both neuropathy and hemiplegia.
- Observation sheets for documenting neurological findings.
- Charts or guidelines for assessing muscle strength, tone, and reflexes.

Additional Notes:

- Ensure students understand the importance of patient comfort and respect during the examination process, especially when assessing painful conditions such as neuropathy.
- Ensure proper hygiene and safety protocols are followed while performing sensory testing (e.g., using sterile or clean equipment).
- Encourage students to correlate clinical findings with treatment strategies in both biomedical and Unani approaches to neurological disorders.

Practical Training 24.5 Sleep logs, behavior scales, and neuroimaging

Total Duration: 4 hours

1. **Introduction to Sleep Logs, Behavior Scales, and Neuroimaging (30 minutes)**
    - **Overview of Sleep Logs:**
        - Explanation of sleep logs as a tool for tracking sleep patterns (e.g., sleep onset, wake time, frequency of night awakenings).
        - The role of sleep logs in diagnosing sleep disorders (insomnia, sleep apnea, etc.).
    - **Behavioral Scales in Sleep Assessment:**
        - Overview of commonly used sleep behavior scales such as:
            - **Epworth Sleepiness Scale (ESS)**: Used to measure daytime sleepiness and assess the risk of sleep disorders like sleep apnea.
            - **Pittsburgh Sleep Quality Index (PSQI)**: A tool to assess overall sleep quality and potential sleep disorders.
            - **Insomnia Severity Index (ISI)**: Used to assess the severity of insomnia.
    - **Neuroimaging Techniques in Sleep Studies:**
        - Introduction to different neuroimaging techniques: MRI, CT, and fMRI.
        - Understanding how neuroimaging can be used to study the brain structures involved in sleep and sleep disorders (e.g., changes in brain regions in patients with insomnia or narcolepsy).

2. **Interpretation of Sleep Logs and Behavioral Scales (1 hour)**
    - **Review Sleep Logs:**
        - Students will be given sample sleep logs and asked to interpret sleep patterns, identifying potential signs of sleep disorders such as insomnia, fragmented sleep, or delayed sleep phase disorder.
        - Discuss the relationship between recorded sleep patterns and common sleep disorders.
    - **Behavioral Scale Interpretation:**
        - Students will review completed behavior scales (e.g., Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index) from hypothetical patients or case studies.
        - Task: Interpret the scores and provide a preliminary diagnosis based on the data.
        - Discuss how scores on these scales relate to clinical conditions such as excessive daytime sleepiness, poor sleep quality, or sleep disturbances.
3. **Neuroimaging Interpretation (1 hour 30 minutes)**
    - **Introduction to Neuroimaging Results:**
        - Discuss different types of neuroimaging modalities and how they are used in sleep studies:
            - **MRI:** To observe structural changes in the brain that may affect sleep (e.g., brain tumors, lesions, or atrophy in sleep-related regions).
            - **fMRI:** To observe brain activity during sleep and its connection to various sleep stages.
            - **CT Scan:** Used to rule out structural issues like strokes or brain injuries that may affect sleep.
        - **Hands-on Neuroimaging Interpretation:**
            - Students will be given sample neuroimaging scans (MRI, CT, or fMRI) and asked to identify relevant structures involved in sleep (e.g., thalamus, hypothalamus, brainstem).
            - Analyze the neuroimaging findings in the context of sleep disorders: for instance, abnormalities in the thalamus in patients with sleep disorders like narcolepsy or alterations in the hypothalamus related to circadian rhythm disturbances.
        - **Case Study Discussion:**

- Students will review a case where neuroimaging results contribute to the diagnosis of a sleep disorder (e.g., identifying lesions or changes in brain regions associated with sleep-wake cycles).
- Discuss how neuroimaging and sleep log/behavior scale data can complement each other in diagnosing and treating sleep disorders.

4. **Integrated Case Analysis and Group Discussion (1 hour)**
    - **Comprehensive Case Study:**
        - Present a case study where students are provided with sleep logs, behavior scale scores, and neuroimaging results for a patient with a suspected sleep disorder (e.g., sleep apnea, insomnia, or narcolepsy).
        - Task: Students will analyze all the data (sleep logs, scales, and neuroimaging) and formulate a comprehensive diagnostic and treatment plan for the patient.
        - Discuss how different types of data can influence the clinical decision-making process, and how they should be integrated into the patient's care plan.
    - **Group Discussion:**
        - In small groups, students will share their findings and interpretations, discussing the strengths and limitations of using these tools in isolation and together.
        - The instructor will facilitate a discussion on the clinical importance of combining these data sources to provide an accurate diagnosis and effective treatment plan.

Experiential Learning Activity

Experiential-Learning Learning 24.1: EEG/NCS/EMG and GCS evaluation in patients

Total Duration: 6 hours

1. **Introduction and Overview of Neurodiagnostic Tests (30 minutes)**
    - **Overview of EEG, NCS, EMG, and GCS:**

- Brief introduction to each diagnostic test: EEG (Electroencephalography), NCS (Nerve Conduction Studies), EMG (Electromyography), and GCS (Glasgow Coma Scale).
- Explanation of the role of these tests in diagnosing neurological disorders (e.g., epilepsy, neuropathies, myopathies, consciousness levels in comatose patients).
- Overview of patient preparation and equipment setup for each test.
- Importance of interpreting test results in clinical context.

2. **Observation of EEG Testing (1 hour 30 minutes)**
   - **Patient Observation:**
     - Students will observe a live EEG test being conducted on a patient (or a simulation, if applicable).
     - Observe patient preparation, electrode placement, and data collection.
     - Monitor the setup of the EEG system and how different waveforms are recorded.
     - Understand how clinicians guide patients during the test (e.g., breathing techniques for hyperventilation test, sleep-induced patterns).
   - **Discussion:**
     - Instructor-led discussion of the clinical indications for EEG and the different patterns identified during the test (e.g., normal activity, epileptic discharges, sleep stages).
     - Clinical relevance of abnormal findings, such as seizure activity or encephalopathy.
3. **Observation of NCS/EMG Testing (2 hours)**
   - **NCS Observation:**
     - Observe the Nerve Conduction Studies (NCS) procedure:
       - Introduction to how nerve conduction is measured, electrode placement, and interpretation of results.
       - Students will learn how motor and sensory nerve conduction studies are conducted and how latencies and velocities are interpreted.
     - Watch for clinical relevance in conditions like peripheral neuropathy, carpal tunnel syndrome, and radiculopathies.
   - **EMG Observation:**

- Observe Electromyography (EMG) testing, where needle electrodes are inserted into muscles to assess their electrical activity.
- Learn how motor unit potentials and spontaneous activities are recorded, and their significance in diagnosing conditions like myopathy, neuropathy, and radiculopathy.
- Understand how EMG data is correlated with clinical symptoms.

- **Discussion:**
  - Discuss abnormal findings in NCS and EMG, such as decreased conduction velocity, denervation potentials, and fibrillations.
  - Understand the diagnostic implications of these findings (e.g., diagnosing ALS, Guillain-Barré syndrome).

4. **Observation of GCS Evaluation in Patients (1 hour 30 minutes)**
   - **Patient Observation:**
     - Students will observe clinical staff conducting GCS assessments on patients with varying levels of consciousness.
     - Observation of how clinicians assess eye-opening response, verbal response, and motor response to determine the GCS score.
     - See how GCS is used to monitor changes in patient condition, particularly in trauma or post-surgical patients.
   - **Discussion:**
     - Instructor-led discussion on the significance of GCS scores and their clinical implications (e.g., brain injury, coma, trauma).
     - Learn about different levels of consciousness and the role of GCS in predicting patient outcomes.
5. **Q&A and Reflection (30 minutes)**
   - After each observation session, students will have the opportunity to ask questions and reflect on the experiences.
   - Discussion of key learning moments:
     - What were the most interesting findings during EEG, NCS, EMG, and GCS evaluations?
     - How did the observed findings correlate with the clinical history of the patient?
   - Discussion on how these diagnostic techniques can be integrated into broader clinical practice and patient care.

Experiential-Learning Learning 24.2: Neuroimaging Techniques: CT, MRI, PET Scan in Neurology

Total Duration: 4 hours

1. **Introduction to Neuroimaging Techniques (40 minutes)**
    - **Overview of Neuroimaging:**
        - Introduction to neuroimaging and its significance in diagnosing and monitoring neurological conditions.
        - Discuss the importance of choosing the appropriate imaging technique based on the clinical scenario.
    - **CT Scan (Computed Tomography):**
        - Basic principles: X-ray based imaging, providing detailed cross-sectional images of the brain.
        - Applications: Acute conditions like stroke, brain hemorrhage, and trauma.
        - Advantages: Quick, widely available, and useful in emergencies.
        - Limitations: Limited resolution, inability to visualize soft tissues as effectively as MRI.
    - **MRI (Magnetic Resonance Imaging):**
        - Basic principles: Uses magnetic fields and radio waves to produce detailed images of brain structures.
        - Applications: Chronic neurological conditions, brain tumors, multiple sclerosis, and spinal cord pathologies.
        - Advantages: High resolution, ability to differentiate soft tissue types, no radiation.
        - Limitations: Expensive, time-consuming, and not suitable for patients with metal implants.
    - **PET Scan (Positron Emission Tomography):**
        - Basic principles: Measures brain metabolism and blood flow by injecting radioactive tracers.
        - Applications: Functional imaging for Alzheimer's disease, epilepsy, and brain tumor assessments.
        - Advantages: Provides functional data and helps visualize brain activity.
        - Limitations: Expensive, lower resolution compared to MRI, involves radiation exposure.
2. **Case Study Discussion: CT Imaging in Neurology (50 minutes)**
    - **Introduction to CT Imaging in Neurology:**
        - Discuss the role of CT scans in evaluating acute neurological conditions.
        - Focus on its use in identifying brain hemorrhages, ischemic strokes, and traumatic brain injuries.
    - **Live Case Study Discussion:**

- Present a case where a CT scan was used to diagnose a patient with an acute stroke or hemorrhage.
- Analyze the CT images of the case: Identify key findings such as hemorrhages, ischemic changes, or fractures.

- **Group Discussion:**
  - Students discuss the benefits of using CT in an emergency setting and its limitations compared to MRI.
  - Talk about alternative imaging techniques if the CT scan results are inconclusive.

3. **Case Study Discussion: MRI Imaging in Neurology (50 minutes)**
   - **Introduction to MRI Imaging in Neurology:**
     - Discuss the role of MRI in diagnosing chronic neurological conditions, such as multiple sclerosis, brain tumors, and neurodegenerative diseases.
   - **Live Case Study Discussion:**
     - Present a case of a patient with suspected multiple sclerosis or a brain tumor, highlighting MRI results.
     - Analyze MRI images to identify lesions, plaques, or structural abnormalities.
   - **Group Discussion:**
     - Discuss how MRI provides a detailed view of brain structures and its advantages over CT in certain cases.
     - Consider challenges in interpreting MRI, such as differentiating between tumors and other types of lesions.
4. **Case Study Discussion: PET Scan in Neurology (50 minutes)**
   - **Introduction to PET Imaging in Neurology:**
     - Discuss the use of PET scans to evaluate brain activity and metabolism in conditions like Alzheimer's disease, epilepsy, and brain tumors.
   - **Live Case Study Discussion:**
     - Present a case of a patient with suspected Alzheimer's disease or epilepsy, using PET scan data.
     - Analyze the PET scan results, highlighting areas of reduced glucose metabolism or abnormal brain activity.
   - **Group Discussion:**

- Discuss the benefits of PET scans in understanding functional aspects of the brain and their complementary role with CT and MRI in diagnosing neurological disorders.
- Consider limitations of PET, including its cost, need for radioactive tracers, and lower spatial resolution compared to MRI.

5. **Comparing Neuroimaging Techniques (30 minutes)**
    - **Interactive Discussion:**
        - Discuss when to use CT, MRI, or PET scan based on the patient's condition and the clinical scenario.
        - Examine the strengths and weaknesses of each technique in diagnosing specific neurological conditions (e.g., stroke, tumors, epilepsy, dementia).
    - **Case Comparison:**
        - Present a case where both MRI and PET scans were used to evaluate a neurological disorder (e.g., brain tumor or Alzheimer's disease).
        - Compare the findings from each imaging modality and discuss how they complement each other in providing a complete diagnostic picture.
6. **Q&A and Wrap-Up (20 minutes)**
    - **Student Questions and Clarifications:**
        - Open the floor for students to ask questions regarding the use of neuroimaging techniques in neurology.
        - Clarify any doubts or challenges students may have had with interpreting the imaging results during case studies.
    - **Conclusion:**
        - Summarize key takeaways about the appropriate use and interpretation of CT, MRI, and PET scans in neurology.
        - Discuss how these techniques work together to provide a comprehensive understanding of neurological disorders.

Experiential-Learning Learning 24.3: Pain characteristics in patients with varied *Mizaj*

Duration:

4 hours

Learning Objectives:

By the end of this session, students will be able to:

1. Understand the relationship between pain characteristics and Unani Mizaj (temperament).
2. Observe and document different pain presentations in patients with varying Mizaj types.
3. Analyze how Mizaj influences pain perception, intensity, and response to treatment.
4. Integrate Unani concepts of Mizaj with modern clinical pain assessment.
5. Learn to correlate clinical findings with Unani diagnostic principles in the management of pain.

Structure of the Experiential Session (4 hours)

1. **Introduction to Mizaj and Pain Characteristics (30 minutes)**
    - **Overview of Mizaj:**
        - Brief review of the four primary Mizaj (temperaments): **Damwi (Sanguine)**, **Balghami (Phlegmatic)**, **Safrawi (Choleric)**, and **Saudawi (Melancholic)**.
        - Discussion of how each Mizaj type is associated with unique physical and emotional characteristics.
        - Connection between Mizaj and pain perception in Unani medicine (e.g., hot/cold, moist/dry balance).
    - **Pain in Unani Medicine:**
        - Explanation of how pain is understood in Unani (due to imbalance of humors or disturbed Mizaj).
        - The role of Mizaj in influencing pain intensity, localization, and response to treatment.
        - Modern clinical perspectives on pain perception and its variability based on individual constitution.
2. **Patient Observation and Documentation (2 hours)**
    - **Patient Interaction:**
        - Students will observe a variety of patients with different Mizaj, as identified by the healthcare providers or through initial assessments.
        - Focus will be on observing and documenting the following pain characteristics:
            - **Pain Type:** Acute vs. Chronic pain
            - **Pain Intensity:** Mild, moderate, severe
            - **Pain Location:** Localized or diffuse

        - **Pain Quality:** Sharp, dull, throbbing, burning, etc.
        - **Pain Trigger:** What exacerbates or alleviates the pain (e.g., environmental factors, physical activity, emotional state).
    - **Documenting Pain Characteristics:**
        - Students will use observation sheets to document detailed pain characteristics.
        - Observe how patients express pain (verbally, physically, etc.), and whether their pain response aligns with their Mizaj type (e.g., a hot-tempered patient may experience burning sensations or a choleric temperament may report sharp pain).
        - Pay attention to non-verbal cues such as facial expressions, posture, and physiological responses (sweating, flushing, etc.).

3. **Case Correlation and Mizaj Analysis (1 hour)**
    - **Group Discussion:**
        - After observing and documenting, students will come together in small groups to discuss their findings.
        - Compare pain characteristics observed in patients with different Mizaj.
        - Discuss how each Mizaj may influence pain experience:
            - **Damwi (Sanguine):** Tends to experience acute pain, often associated with heat or inflammation.
            - **Balghami (Phlegmatic):** Pain might be dull and more chronic, often associated with cold and moisture imbalance.
            - **Safrawi (Choleric):** Likely to experience sharp, intense pain, often exacerbated by heat or stress.
            - **Saudawi (Melancholic):** May report deep, aching pain, often associated with cold or dryness.
    - **Linking Unani and Modern Medicine:**
        - Discuss how modern clinical pain scales (e.g., Visual Analog Scale, McGill Pain Questionnaire) can be used alongside Unani assessments for a more comprehensive understanding of pain.
        - Discuss the implications of Mizaj analysis on treatment strategies (e.g., cooling or warming treatments for different temperaments).
4. **Q&A, Feedback, and Wrap-Up (30 minutes)**
    - **Open Discussion:**
        - Students will have the opportunity to ask questions and clarify any doubts related to the session.
        - Discuss how patients with different Mizaj may require tailored pain management strategies in both modern and Unani frameworks.

        - Reflect on how the concept of Mizaj can enhance personalized patient care.
    - **Feedback from Instructor:**
        - Instructor provides feedback on students' observation techniques and documentation.
        - Discuss any discrepancies observed and offer corrective insights on analyzing pain characteristics in the context of Unani temperaments.

Resources Required:

- Patient consent for observation (ensure ethical and privacy protocols are followed).
- Observation sheets for documenting pain characteristics and Mizaj assessments.
- Case examples or real patients with known Mizaj characteristics (with permission).
- Access to basic clinical tools for pain assessment (e.g., Visual Analog Scale, McGill Pain Questionnaire).
- Instructor-led materials on Mizaj and pain correlations.

Additional Notes:

- Students should be instructed on the importance of patient confidentiality and the ethical considerations when observing and documenting clinical cases.
- Ensure a diverse set of patients for observation, representing different Mizaj and pain conditions.
- If real patients are unavailable, simulated cases (based on patient history and Mizaj analysis) can be used for this session.

Experiential-Learning Learning 24.4: Assessment of chronic pain and neuralgia cases

Total Duration: 4 hours

1. **Introduction to Chronic Pain and Neuralgia (30 minutes)**
    - **Overview of Chronic Pain:**
        - Definition of chronic pain and its impact on quality of life.
        - Common causes and types of chronic pain (e.g., nociceptive, neuropathic, mixed).
    - **Neuralgia Overview:**
        - Explanation of neuralgia (e.g., trigeminal neuralgia, post-herpetic neuralgia).

        - Etiology, pathophysiology, and common presentation of neuralgia.
    - **Unani Perspective on Pain:**
        - How chronic pain and neuralgia are understood in Unani medicine, considering Mizaj and humoral imbalances.
        - Pain as a symptom of a disturbed balance of hot/cold, moist/dry qualities in the body.

2. **Patient Interaction and Pain Assessment (2 hours)**
    - **Patient Interviews:**
        - Students will observe or participate in conducting interviews with patients presenting with chronic pain or neuralgia.
        - Focus on gathering a comprehensive pain history, including:
            - Duration, intensity, and nature of pain (sharp, dull, burning, throbbing, etc.).
            - Pain onset, aggravating and relieving factors, and associated symptoms (e.g., numbness, tingling).
            - Impact on daily activities and quality of life.
        - Explore relevant medical history (e.g., previous treatments, comorbid conditions, medication history).
    - **Physical Examination:**
        - Students will observe or assist in performing a physical exam focused on identifying the type of pain and potential nerve involvement.
        - Key examination techniques:
            - Sensory testing (light touch, pinprick, temperature sensation).
            - Motor testing (muscle strength, reflexes).
            - Palpation of affected areas (e.g., tenderness, allodynia).
            - Neurological assessment (e.g., cranial nerve exam for trigeminal neuralgia).
        - Observation of abnormal signs or responses (e.g., hyperalgesia, allodynia).
    - **Pain Scales and Questionnaires:**
        - Students will participate in using standardized pain assessment tools, such as the Visual Analog Scale (VAS), McGill Pain Questionnaire, and Neuropathic Pain Symptom Inventory (NPSI).
        - Discussion of how these tools aid in quantifying pain intensity and quality.

3. **Case Discussion and Diagnostic Approach (30 minutes)**
    - **Case Presentation:**
        - After patient assessments, students will observe or participate in discussing the case with the supervising clinician.
        - Key discussion points:
            - Differential diagnosis (chronic pain vs. neuralgia vs. other pathologies).
            - Common diagnostic tests (e.g., MRI for neuralgia, blood tests, nerve conduction studies).
            - Treatment options (e.g., pharmacological, physical therapy, nerve blocks, Unani interventions).
    - **Unani Diagnostic Correlation:**
        - Discussion of how Unani concepts of Mizaj can inform the treatment approach for chronic pain and neuralgia.
        - Example: A hot-tempered (Safrawi) patient might require cooling treatments, while a cold-tempered (Balghami) patient may benefit from warming therapies.
4. **Treatment Planning and Follow-Up (1 hour)**
    - **Treatment Modalities:**
        - Observe or assist in formulating treatment plans for chronic pain and neuralgia, considering both biomedical and Unani perspectives.
        - Biomedical treatments may include medications (e.g., analgesics, anticonvulsants for neuralgia), physical therapy, and lifestyle modifications.
        - Unani treatments may include herbal remedies, dietary adjustments, and the use of therapeutic methods like cupping or massage based on Mizaj.
    - **Patient Education:**
        - Students will observe how clinicians educate patients about pain management strategies, lifestyle changes, and coping mechanisms.
        - Discuss the role of patient compliance in chronic pain management and the importance of multidisciplinary care.
    - **Follow-Up and Monitoring:**
        - Discussion on how follow-up care is essential in chronic pain management.
        - Observe how clinicians discuss the need for monitoring progress, adjusting treatment, and re-assessing pain levels over time.

Experiential-Learning Learning 24.5: Neurological clinical presentations in classical Unani texts

Total Duration: 4 hours

1. **Introduction to Classical Unani Texts and Neurology (30 minutes)**
    - **Overview of Classical Unani Medicine:**
        - Introduction to key classical Unani texts relevant to neurology.
        - Focus on how the brain, nerves, and neurological disorders were understood in classical Unani medical philosophy.
        - Core concepts in Unani related to the nervous system: *Mizaj* (temperament), the role of the brain, and nerve function (*Al-ʿAṣab*).
    - **Unani Perspective on Neurological Disorders:**
        - Discussion on the classification of neurological diseases in Unani medicine (e.g., paralyses, apoplexy, fits, headaches).
        - Identification of conditions like hemiplegia, facial palsy, and epilepsy in classical texts and their descriptions based on Unani humoral imbalances.
2. **Group Review of Classical Unani Texts (1 hour 30 minutes)**
    - **Textual Analysis and Group Work:**
        - Students will be assigned different classical texts or sections dealing with neurological conditions.
        - Task: Identify the Unani descriptions of neurological clinical presentations such as paralysis, epilepsy, and neuropathy.
        - **Analysis Focus:**
            - The pathophysiology of neurological conditions as described in Unani texts (e.g., how imbalances of *Dam* (blood), *Balgham* (phlegm), *Safra* (yellow bile), and *Sauda* (black bile) contribute to neurological symptoms).
            - The classification of neurological diseases: What conditions are attributed to cold, hot, dry, or moist imbalances in the body?
            - Identification of treatments mentioned in the texts for managing neurological disorders (e.g., herbal remedies, dietary recommendations, physical therapies like cupping, massage, or baths).
        - **Discussion:**
            - Each group will present their analysis, highlighting key findings from the text, how it correlates to modern neurological understanding, and the therapeutic interventions suggested.

        - Explore the Unani descriptions of symptoms like "weakness of the limbs," "numbness," "paralysis," and "fainting fits" and their potential alignment with modern diagnoses (e.g., stroke, neuropathy, epilepsy).

3. **Comparative Analysis: Unani vs. Modern Understanding of Neurological Disorders (1 hour 30 minutes)**
    - **Modern Neurology Overview:**
        - Brief overview of modern biomedical understanding of common neurological disorders (stroke, epilepsy, neuropathies, paralysis).
        - Pathophysiology of these conditions from a biomedical perspective.
    - **Discussion of Clinical Presentations:**
        - Compare and contrast classical Unani descriptions with modern clinical presentations.
        - For example:
            - **Stroke:** Unani terms for stroke-like symptoms (e.g., "shaking of the limbs," "numbness," "loss of function") and the humoral imbalance believed to cause it (e.g., excess Safra, dam imbalance).
            - **Epilepsy:** Compare the Unani view of "fits" or "seizures" with the modern understanding of epilepsy, including triggers and management strategies.
        - **Nerve Pain and Paralysis:** Discuss how Unani texts describe nerve damage and weakness and how it aligns with modern neuroanatomy and pathophysiology.
    - **Integrating Unani and Modern Perspectives:**
        - Discuss potential integrations between Unani and modern treatments for neurological conditions, such as using Unani diagnostic methods (e.g., Mizaj analysis) alongside modern clinical tests (e.g., MRI, nerve conduction studies).
4. **Case Studies and Application (30 minutes)**
    - **Case Presentations:**
        - Present hypothetical or real cases of neurological disorders (e.g., hemiplegia, neuropathy, epilepsy) to students.
        - Task: Based on the classical Unani text analysis and modern understanding, students should propose diagnostic approaches and treatment plans for each case.
        - Encourage students to incorporate Unani concepts such as *Mizaj*, the Four Humors, and *Quwate Nafsania* while formulating their plans.

- **Group Discussion:**
  - After presenting their proposed solutions, students will engage in a group discussion about the potential benefits and limitations of using Unani treatments in the modern clinical context.
  - Explore how integrating both systems might enhance patient outcomes.

Experiential-Learning Learning 24.6: EEG during sleep cycles

Total Duration: 4 hours

1. **Introduction to EEG and Sleep Cycles (30 minutes)**
   - **Overview of EEG Technology:**
     - Basic principles of EEG: how it works, electrode placement, and the types of brainwave patterns it records (e.g., alpha, beta, delta, theta).
     - **EEG and Sleep:**
       - Understanding the relationship between EEG patterns and different sleep stages (NREM stages 1, 2, 3, 4, and REM sleep).
       - The role of EEG in diagnosing sleep disorders (e.g., sleep apnea, insomnia, narcolepsy, parasomnias).
   - **Sleep Cycle Overview:**
     - Explanation of the 90-minute sleep cycle, including how NREM and REM sleep alternate during the night.
     - Differences in EEG patterns across different sleep stages:
       - **Stage 1 (Light sleep):** Theta waves.
       - **Stage 2 (Deeper light sleep):** Sleep spindles and K-complexes.
       - **Stages 3 and 4 (Deep sleep):** Delta waves.
       - **REM Sleep:** Low voltage mixed frequency waves resembling waking EEG.
2. **Lab Observation: Setting Up and Preparing for EEG Recording (30 minutes)**
   - **Introduction to the Lab Setup:**
     - Overview of the EEG equipment and the process of setting up electrodes on a patient for sleep cycle monitoring.
     - Safety protocols and patient preparation for an EEG sleep study.

        - Understanding the role of the technologist or clinical staff in conducting the study.
    - **Understanding Sleep Monitoring:**
        - Observe how the EEG data is recorded in a controlled sleep lab environment.
        - Note the equipment involved: EEG machine, electrodes, and the patient monitoring system.
        - Observe the environment designed to encourage natural sleep, including lighting, temperature, and noise control.
3. **Live Observation of EEG During Sleep Cycles (2 hours)**
    - **Observing Sleep Stages:**
        - Watch live EEG recordings during sleep, focusing on the transitions between different sleep stages (from Stage 1 to REM).
        - Identify the EEG waveforms characteristic of each sleep stage.
        - Observe the time taken for different stages of sleep to appear and how they cycle throughout the monitoring period.
    - **Clinical Observations:**
        - Focus on how EEG is used to monitor patients with suspected sleep disorders.
        - Watch for disruptions in the sleep cycle, such as abnormal awakenings, pauses in breathing (sleep apnea), or periods of mixed sleep stages.
        - Observe how the technologist marks events or abnormal findings in the EEG (e.g., sleep spindles, K-complexes, or REM activity).
        - Discuss the clinical relevance of these patterns in diagnosing sleep disorders.
4. **Interactive Discussion and Analysis (1 hour)**
    - **Real-Time Data Interpretation:**
        - Discuss the real-time EEG data as it is recorded and analyzed by the clinical staff.
        - Learn how to interpret common sleep disturbances (e.g., fragmented sleep, sleep apnea, periodic limb movement disorder) based on EEG findings.
        - Observe how sleep stage transitions are tracked and recorded on the EEG monitor.
    - **Case Study Discussion:**

- Review a sample sleep study case from the lab: how the EEG was used to diagnose a specific sleep disorder, such as narcolepsy, insomnia, or REM sleep behavior disorder.
- Discuss the clinical features, treatment options, and how the EEG data contributed to the diagnosis and management plan.

- **Q&A with Lab Technologists or Neurologists:**
  - Students will have the opportunity to ask questions directly to lab staff or neurologists interpreting the EEG data.
  - Focus on clarifying the role of EEG in sleep medicine and its limitations and strengths in clinical practice.

Adaptations: If Lab facilities are not available virtual videos can be used.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Quiz (10 Marks): Types of nerve injuries and describe nerve degeneration-regeneration processes. Self-assessment (15 marks): From the start of the module the student will prepare a self-assessment record on the comprehension of the following topics. The candidates may grade their comprehension on the scale of 0 to 10. - Neurological examination techniques for CNS and PNS- State Sleep patterns and insomnia-related case studies - Underlying principles of diagnostic tests including EEG, EMG, and GCS - Mechanisms and types of pain including clinical manifestations OSCE (25 Marks): Demonstrate interpretation of diagnostic tests including EEG, EMG, and GCS (Glasgow Coma Scale). or OSCE (25 Marks): Perform pain threshold testing and nerve injury case simulations. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Paper No : 4(تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances)

Semester No : 3

Module 25 : طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Comprehend the classical concept of physiology, its evolution and how it differs from current scientific knowledge.
2. Comprehend the extent of Manfeul Aza description in in Al Qanoon.
3. Compare Pre Ibn Sina and Post Ibn Sina description of Manafeul aza.

Unit 1 منافع الاعضاء کا کلاسیکی تصور Classical concept of Manafeul Aza

25.1.1 یونانی فعلیات کا ایک جائزہ

An overview of Unani Physiology

25.1.2 کلاسیکی ادب میں منافع الاعضاء کا بیان

Description of *Manafeul Aza* in classical literature

25.1.3 منافع الاعضاء کے بنیادی ماخذ

Primary Sources of *Manafeul Aza*

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,24

3A	3B	3C	3D	3E	3F	3G
CO1	Comprehend Unani Physiology Enumerate classical literature of Manafeul Aza Enlist Primary Sources of Manafeul Aza	3	Lecture	CC	Knows-how	BL,L&PPT ,C_L,DIS,L&GD

CO1	Collect classical Literature including manuscripts	10	Experiential-Learning25.1	CS	Does	DIS,FV,IBL,RLE,LS

Unit 2 کلاسیکی ادب کا تقابلی تجزی Comparative analysis of classical Literature

القانون میں منافع الاعضاء 25.2.1

Manfeul Aza in *Al Qanoon*

ابن سینا سے قبل اور ابن سینا کے بعد منافع الاعضاء کا بیان 25.2.2

Pre Ibn Sina and Post Ibn Sina description of *Manafeul aza*

ادبی تجزیہ: کامل الصناعۃ، مائۃ مسیحی، القانون فی الطب، فردوس الحکمت، کتاب الکلیات (ابن رشد) اور دیگر کلاسیکی ادب 25.2.3

Literature analysis: *Kamilus Sana, Miat Masihi, Al Qanoon fit Tib, Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd) and other classical literature*

References: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,20

3A	3B	3C	3D	3E	3F	3G
CO1	Comprehend the extent of Manafeul Aza description in in Al Qanoon Compare Pre Ibn Sina and Post Ibn Sina description of Manafeul aza	7	Lecture	CAN	Know	L&GD,JC,SDL,LS
CO1	Demonstrate analysis of Literature: Kamilus Sana, Miat Masihi, Al Qanoon fit Tib	10	Practical25.1	PSY-SET	Shows-how	SDL,PER,DIS,LS,C_L
CO1	Demonstrate analysis of Literature: Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd)	10	Practical25.2	PSY-SET	Shows-how	DIS,C_L,SDL,PER,LS
CO1	Perform analysis and present a comprehensive understanding of the literature	6	Experiential-Learning25.2	CAP	Does	BS,DIS,LS,SDL,C_L
CO1,CO5	Perform analysis and Communicate the Literature	10	Experiential-Learning25.3	CAP	Does	Mnt,LS,SDL,DIS,JC

Practical Training Activity

Practical Training 25.1 Literature analysis of Kamilus Sana, Miat Masihi, Al Qanoon fit Tib

Total Duration: 10 Hours

Activity 1: Orientation & Introduction to Literature Analysis by facilitator (1 Hour)

- Brief introduction to:
    - Importance of literature analysis in Unani Medicine.
    - Overview of *Kamilus Sana*, *Miat Masihi*, *Al Qanoon fit Tib*.
    - Basic structure & writing style of classical texts.
- Provide literature analysis framework covering:
    - Author & Background
    - Structure of the Book
    - Key Themes
    - Terminologies Used
    - Treatment Philosophies
    - Innovations & Contributions

Activity 2: Division of Groups & Allocation of Texts

- Divide students into 3 groups or each student may be given the task separately:
    - Group A → *Kamilus Sana*
    - Group B → *Miat Masihi*
    - Group C → *Al Qanoon fit Tib*
- Provide guidelines for exploration.
- Distribute literature analysis worksheets.

Activity 3: Reading, Exploration & Note-Making (4.5 Hours)

- Students will read assigned portions of texts.
- Note key aspects:
    - Terminologies
    - Chapters & Contents
    - Methods of Diagnosis & Treatment
    - Pharmacological Concepts
    - Any unique features
- Students can use library resources or online references for clarification.

Activity 4: Comparative Analysis & Preparation of Reports (2 Hours)

- Students compare findings within groups.
- Prepare a report highlighting:
    - Structure of the book
    - Author's perspective
    - Significant contributions
    - Unique terminologies
    - Relevance to modern practice

Activity 5: Presentation by Groups (1 Hour 30 Minutes)

- Each group/ student presents their analysis (20-25 minutes per group).
- Use charts, PPT, or visual aids.
- Highlight similarities & differences among the three books.

Activity 6: Group Discussion & Faculty Feedback (1 Hour)

- Open discussion on:
    - Relevance of classical literature in present-day practice.
    - Challenges in interpretation.

- Integration of traditional knowledge with modern science.
- Faculty provides critical feedback on each group's presentation.

Practical Training 25.2 Literature Analysis: Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd)

Total Duration: 10 Hours

Activity 1: Introduction & Orientation by facilitator (1 Hour)

- Overview of classical literature in Unani medicine.
- Brief introduction of:
  - *Firdousul Hikmat* (by Ali Ibn Rabban Tabari)
  - *Kitabul Kulliyat* (by Ibn Rushd)
- Purpose & importance of literature analysis.
- Distribution of Literature Analysis Format:
  - Author's Background
  - Structure & Content of the Book
  - Philosophical Approach
  - Major Contributions
  - Unique Features
  - Terminologies Used
  - Relevance to Contemporary Practice

Activity 2: Formation of Groups & Allocation of Texts (30 Minutes)

- Group A → *Firdousul Hikmat*
- Group B → *Kitabul Kulliyat* (Ibn Rushd)
- Explanation of guidelines for analysis.

Activity 3: Independent Reading & Note-making (4 Hours)

- Deep reading of assigned text sections.
- Identification of key elements:
    - Structure of chapters
    - Health concepts
    - Diagnostic & Treatment Methods
    - Pharmacological aspects
- Compilation of notes as per literature analysis format.
- Refer to additional resources if needed.

Activity 4: Intra-Group Discussion & Preparation of Report (2 Hours)

- Group-wise internal discussion.
- Exchange of findings.
- Preparation of:
    - Written Report
    - Presentation using Charts / PPT / Visuals

Activity 5: Group Presentations (1 Hour 30 Minutes)

- Group A → *Firdousul Hikmat* Presentation
- Group B → *Kitabul Kulliyat* Presentation
- Highlight important findings and unique features.
- Comparative discussion encouraged.

Activity 6: Faculty Feedback & Open Discussion (1 Hour)

- Faculty comments on each presentation.
- Group Discussion on:
    - Challenges faced during analysis
    - Relevance of classical texts in modern context

- Integrating classical wisdom with present-day medical knowledge

Experiential Learning Activity

Experiential-Learning Learning 25.1: Visit to library for manuscripts and preparation of report

Total Duration: 10 Hours

Activity 1: Orientation & Pre-Visit Guidelines (1 Hour)

- Briefing by faculty regarding:
  - Importance of Manuscripts in Unani Medicine
  - Historical Value & Preservation Need
  - Ethics and Discipline while visiting Manuscript Section
- Preparation of Interview Questions for Librarian, like:
  - Number & Types of Manuscripts
  - Prominent Authors
  - Languages Used
  - Preservation Techniques
  - Challenges in Preservation

Activity 2: Library Visit – Exploration of Manuscripts Section (4 Hours)

- Physical Visit to a Library having Unani Manuscripts
- Observing:
  - Manuscript Storage Area
  - Cataloguing Techniques
  - Handling Procedures
  - Preservation Tools & Techniques
- Recording details of available manuscripts like:

- Titles
- Authors
- Language
- Subject Categories (Medicine, Surgery, Pharmacology etc.)

Activity 3: Interaction with Librarian/Manuscript Expert (2 Hours)

- Group interaction with the Librarian or Manuscript Expert.
- Discussion Points:
  - History of Manuscript Collection
  - Process of Manuscript Acquisition
  - Challenges in Conservation
  - Future of Manuscript Digitization
  - Insights into Manuscript Science

Activity 4: Report Writing & Documentation (2 Hours)

Students will prepare a report including:

- Introduction to the Library Visited
- Total Number of Manuscripts Available on Unani Medicine
- Authors of Prominent Manuscripts
- Languages of Manuscripts
- Storage and Preservation Techniques Used
- Librarian's Insights on Manuscript Science
- Photographs (if allowed)
- Conclusion and Reflections

Activity 5: Presentation & Submission (1 Hour)

- Oral Presentation (15 minutes per student/group)

- Submission of Hard Copy/Soft Copy of Report to Faculty
- Feedback from Faculty

Experiential-Learning Learning 25.2: Group Discussion on evolution of Manafeul Aza

Total Duration: 6 Hours

Activity 1: Orientation & Introduction (30 Minutes)

- Introduction to the concept of *Manafeul Aza* (Functions of Organs).
- Brief overview of historical timelines:
    - Greek Period
    - Transition to Arabic Period
- Importance of analyzing literary evolution.

Activity 2: Group Formation & Task Assignment (30 Minutes)

- Formation of 3 Groups/ or individual student:
    - Group A: *Greek Period Literature Analysis* (Hippocrates, Galen, Rufus)
    - Group B: *Translation Movement & its Impact* (House of Wisdom, Baghdad, Role of translators)
    - Group C: *Arabic Period Literature Analysis* (Ibn Sina, Al-Zahrawi, Ibn Nafis)
- Distribution of Literature Analysis Format:
    - Author & Time
    - Key Contributions
    - Concepts of Manafeul Aza
    - Methodology of Explanation
    - Changes & Continuity
    - Influence on Later Scholars

Activity 3: Literature Exploration & Note Making (2 Hours)

- Visit to library / online search.
- Study of assigned literature.
- Compilation of findings using the Analysis Format.
- Note specific terminologies, anatomical concepts, and new additions introduced in the Arabic period.

Activity 4: Group Discussion & Synthesis of Findings (1.5 Hours)

- Intra-group discussion to synthesize findings.
- Preparation of Presentation Material:
    - Charts
    - PPT slides
    - Comparative Tables
    - Timelines

Activity 5: Group Presentations (1 Hour)

- Each group presents their findings (15-20 minutes per group).
- Focus on Evolution, Key Contributions, and Transition of Knowledge.
- Highlight comparative elements between Greek and Arabic concepts of *Manafeul Aza*.

Activity 6: Faculty Feedback & Reflection Discussion (30 Minutes)

- Feedback on content & presentation style.
- Open reflection discussion on:
    - Learnings from the activity
    - Challenges faced in literature analysis
    - Relevance of historical evolution in current teaching of *Manafeul Aza*

Experiential-Learning Learning 25.3: Preparing an Article on Classical Literature

Total Duration: 10 Hours

Activity 1: Orientation & Guidelines for Article Writing (1 Hour)

- Introduction to the importance of writing articles based on Classical Literature.
- Discuss essential components of an academic article:
    - Abstract
    - Introduction
    - Literature Review
    - Discussion
    - Conclusion
    - References
- Provide guidelines for selecting the topic from Classical Literature (like *Kamilus Sana*, *Miat Masihi*, *Al-Qanoon fit Tib*, *Kitabul Kulliyat*, *Firdousul Hikmat* etc.)

Activity 2: Topic Selection & Approval (30 min)

- Individual selection of a topic based on any Classical Text.
- Faculty review and approval of topics.
- Finalization of title and scope of the article.

Activity 3: Literature Search and Compilation (3.5 Hours)

- Search for primary references from Classical Texts.
- Supplementary search from secondary sources (Commentaries, Reviews, Modern Interpretations).
- Note down key points, terminologies, historical context, and important contributions.
- Organizing notes thematically.

Activity 4: Writing of First Draft (3 Hours)

- Structuring the article as per academic format.
- Writing different sections of the article:
    - Introduction: Background & Rationale

- Review of Literature from Classical Sources
- Discussion on Key Findings & Relevance
- Conclusion
- References/Citations

- Focus on originality and clarity of ideas.

Activity 5: Peer Review & Refinement (1 Hour)

- Exchange articles with peers for review.
- Peer feedback on:
  - Clarity
  - Organization
  - Quality of content
  - Language
- Incorporating peer feedback for improvement.

Activity 6: Final Submission & Presentation (1 Hour)

- Submission of final article to faculty.
- Oral presentation (10 minutes) by each student highlighting:
  - Chosen Topic
  - Key Literature Analyzed
  - Findings & Importance of Classical Literature
- Faculty feedback and appreciation of effort.

Modular Assessment

Assessment	**Hour**

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. LAQ (10 Marks): On Classical literature of Manafeul Aza. LAQ (10 Marks): On Comprehend the extent of Manafeul Aza description in in Al Qanoon. Compilation (15 marks): Analysis of Literature: Kamilus Sana, Miat Masihi, Al Qanoon fit Tib. Debate (15 marks): A debate may be organised on the topic “analysis of Literature: Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd)”. Assessment shall be done on the basis of performance. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Module 26 : یونانی تصور ریاضت اور اس کا اسپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the physiological responses of the human body to exercise and sports.
2. Apply concepts of sports physiology to enhance physical performance in individuals using Unani approaches.
3. Demonstrate assessments and design training programs based on physiological principles.
4. Integrate Unani system of medicine with contemporary exercise science.
5. Apply exercise physiology principles to rehabilitation and sports medicine within Unani practices.

Unit 1 لیاقتِ بدنیہ کا جائزہ Assessment of Physical Fitness

26.1.1 ایک فرد کی لیاقتِ بدنیہ کا تعیُّن

Determination of Physical Fitness of a subject

26.1.2 لیاقتِ بدنیہ کے سرٹیفکیٹ کا خاکہ/فارمیٹ

Format for Physical Fitness Certificate

26.1.3 لیاقتِ بدنیہ کے سرٹیفکیٹ جاری کرنے سے متعلق قانونی مسائل

Legal issues pertaining to issuing Physical Fitness Certificate

References: 86,96,97,98,99

3A	3B	3C	3D	3E	3F	3G
CO4	Measure the Physical Fitness of a subject	6	Experiential-Learning26.1	PSY-MEC	Does	CBL,SDL,RLE,D
CO3,CO4	Prepare Physical Fitness Certificate	2	Practical26.1	CAP	Shows-how	Mnt,BL,C_L,SDL,RP
CO4	Interpret Legal issues pertaining to issuing Physical Fitness Certificate.	1	Lecture	CAN	Knows-how	SDL,DIS,L&GD,Mnt

Unit 2 ریاضت کے فزیولوجیکل تکیُفات Physiological adaptations to Exercise

26.2.1 ریاضت کا فعلیاتی تکیُف

Physiological adaptations to exercise

26.2.2 وہ فزیالوجی عوامل جو ریاضت کی کارکردگی کو محدود کرتے ہیں

Physiological factors that limit exercise performance

References: 46,48,87,88,89,90,94,96

3A	3B	3C	3D	3E	3F	3G
CO4	Extrapolate Physiological factors that limit exercise performance	3	Lecture	CC	Knows-how	PER,L&PPT ,SDL,PBL,TUT

CO2,CO3	Discuss acute and chronic adaptations to different forms of physical activity (endurance vs. resistance training).	2	Lecture	CC	Knows-how	L&GD,C_L,DIS,SDL
CO3	Demonstrate the role of Exercise in Health and Disease prevention	4	Experiential-Learning26.2	PSY-ORG	Does	D,RLE,SDL,FV
CO3,CO4	Measure Pulmonary responses during different intensities of exercise	6	Practical26.2	PSY-MEC	Shows-how	CBL,PT,D,DL
CO3,CO4	Measure energy production during exercise	6	Practical26.3	PSY-MEC	Shows-how	FV,PT,SIM,CBL,RLE

Unit 3 Exercise Physiology ریاضت کی فعلیات

26.3.1 ریاضت کے دوران قلبی وعائی اور تنفّسی فعلیات

Cardiovascular and Respiratory Physiology during Exercise

26.3.2 ریاضت کا یونانی تصور اور اس کا کھیلوں پر اطلاق

Unani Conceprt of Riyazat and its application to Sports

References: 91,92,93,94,95

3A	3B	3C	3D	3E	3F	3G
CO3,CO4	Interpret Riyāzat as described in Unani texts and examine its utility in promoting physical fitness and endurance	2	Lecture	CAP	Knows-how	L&GD,JC,DIS,TUT
CO1,CO3	Describe Historical perspective of exercise science in traditional medicine.	2	Lecture	CC	Knows-how	C_L,L&GD,TUT
CO3,CO4	Demonstrate Cardiovascular adaptation to exercise	6	Practical26.4	PSY-SET	Shows-how	PT,D,DL,SDL,SIM

CO1,CO3	Adapt Unani Concept of *Riyazat* in Sports	10	Experiential-Learning26.3	PSY-ADT	Does	CD,CBL,D,Mnt,C_L
CO1,CO3	Combine Unani Concept of Riyazat and its application to Sports	6	Experiential-Learning26.4	PSY-ORG	Does	BS,LS,DIS,CBL,PrBL

Practical Training Activity

Practical Training 26.1 Physical Fitness Certificate

Total Duration: 2 Hours

Activity 1: Orientation & Guidelines on Physical Fitness Certificate (30 Minutes)

- Discussion on:
  - Importance & Purpose of Physical Fitness Certificate
  - Essential Components of a Certificate:
    - Name of the Subject
    - Age/Sex
    - Purpose of Certificate
    - Medical/Fitness Examination Details
    - Findings & Conclusion
    - Signature & Seal of Certifying Authority
    - Date & Place
- Discussion on scenarios where fitness certificates are required:
  - For Employment
  - For Sports Participation
  - For Academic/Hostel Admission

- For Driving License
- For Adventure Sports/Gym Membership etc.

Activity 2: Designing & Preparation of Different Formats (1 Hour)

Students shall prepare at least 3 different formats of Physical Fitness Certificates based on different scenarios using:

- Real-life inspired or imaginary cases.
- Proper structure, language, and certification terms.
- Use of official format elements (Header, Footer, Signature area, etc.)

Suggested Scenarios for Certificate Preparation:

1. Fitness Certificate for School/College Admission
2. Fitness Certificate for Sports Event Participation
3. Fitness Certificate for Joining Gym/Adventure Sports
4. Fitness Certificate for Driving License
5. Fitness Certificate for Employment in Defense/Police
6. Fitness Certificate after COVID-19 Recovery
7. Fitness Certificate for Hostel Residency

Activity 3: Presentation & Discussion of Formats (30 Minutes)

- Presentation by students of their prepared certificates.
- Faculty feedback and discussion on:
  - Correctness of Content
  - Language & Presentation
  - Legal & Ethical Considerations

Practical Training 26.2 Spirometry to assess respiratory function during and after exercise

Duration: 6 Hours

Activity 1: Teacher Demonstration of Spirometry (1 Hour)

- Demonstration of procedure for:
    - Measuring Forced Vital Capacity (FVC)
    - Forced Expiratory Volume in 1 sec (FEV1)
    - Peak Expiratory Flow Rate (PEFR)
- Instructions on:
    - Handling of Spirometer
    - Safety & Hygiene protocols
    - Recording and Interpretation of values
    - Precautions during exercise spirometry

Activity 2: Student Hands-on Practice of Spirometry (2 Hours)

- Students will perform spirometry on:
    1. Resting condition
    2. Immediately after exercise (moderate intensity)
    3. 5-10 minutes after exercise (recovery phase)
- Parameters to be recorded:
    - FVC
    - FEV1
    - FEV1/FVC ratio
    - PEFR

Activity 3: Data Collection and Analysis (2 Hours)

- Compilation of Data from multiple subjects.
- Calculation of:
    - Pre-exercise vs Post-exercise changes.

- Recovery pattern of respiratory function.
- Tabulation and Graphical representation of data.

Activity 4: Presentation of Results & Discussion (1 Hour)

- Students will prepare short group-wise presentations on:
  - Methodology
  - Observations
  - Analysis of data
  - Interpretation of results
  - Clinical/Physiological significance of findings.
- Faculty Feedback and Clarification of doubts.

Practical Training 26.3 Use of indirect calorimetry and other tools to measure energy expenditure during exercise

Duration: 6 Hours

Activity 1: Demonstration by Teacher (1 Hour)

- Explanation of:
  - Concept and Principle of Indirect Calorimetry.
  - Procedure for measuring energy expenditure.
  - Safety and Precautions.
  - Method of calculating energy expenditure from oxygen consumption (VO_2) and carbon dioxide production (VCO_2).
- Demonstration of:
  - Calibration of equipment.
  - Procedure of measurement during rest and activity.
  - Data recording methods.

Activity 2: Student Hands-on Measurement of Energy Expenditure (3 Hours)

- Students (individually or in small groups) will measure energy expenditure in different conditions such as:
    - Resting state
    - Walking
    - Running
    - Cycling
    - Skipping
    - Playing a specific sport (e.g., badminton, basketball, football, etc.)
- Parameters to Record:
    - VO_2 consumption
    - VCO_2 production
    - Duration of activity
    - Estimated Energy Expenditure (kcal/min)

Activity 3: **Compilation and Comparative Analysis of Data (1 Hour)**

- Data compilation of different sports/activities.
- Calculation and comparison of energy expenditure values.
- Preparation of tables and graphs showing:
    - Activity vs Energy Expenditure
    - Intensity of activity vs Energy Cost

Activity 4: Presentation of Report and Group Discussion (1 Hour)

- Group-wise Presentation of:
    - Methodology
    - Data Collected
    - Analysis & Interpretation
    - Comparative Results

- Physiological and Practical Significance
- Teacher Feedback & Discussion.

Practical Training 26.4 Hands-on measurement of ECG, heart rate and heart rate variability in response to exercise

Total Duration: 6 Hours

Activity 1: Introduction and Demonstration (1 Hour)

- Brief discussion on:
  - Basics of ECG: Leads, Waves, and Interpretation
  - Definition and Importance of Heart Rate (HR)
  - Heart Rate Variability (HRV) – Meaning & Significance
- Instructor led Demonstration of:
  - ECG Machine handling & recording process
  - HR Monitoring techniques
  - HRV analysis using software or apps

Activity 2: Baseline Measurement (1 Hour)

- Record Resting ECG for all participants (3-5 minutes each)
- Measure and record resting heart rate manually or digitally
- HRV recording at resting state (using app/software)
- Note down baseline parameters:
  - PR interval, QRS duration, QT interval
  - Heart Rate
  - HRV indices

Activity 3: Exercise Intervention (2 Hours)

- Type of Exercise: Walking, Jogging, Cycling, or Step-ups (as per feasibility)

- Duration of Exercise: 10-15 minutes moderate intensity
- Immediately after exercise:
    - Record ECG
    - Measure Heart Rate
    - Measure HRV
- Recovery Measurement:
    - 5-10 minutes after exercise, repeat ECG & HR & HRV

Activity 4: Data Analysis and Interpretation (1 Hour)

- Compare pre-exercise, post-exercise, and recovery data
- Identify and discuss:
    - Changes in heart rate
    - ECG pattern variations
    - HRV fluctuations
- Discuss physiological mechanisms behind the changes observed.

Activity 5: Group Discussion and Presentation (1 Hour)

- Divide students into small groups for:
    - Discussion on observations
    - Preparation of a short presentation/report
- Each group will present:
    - Their findings
    - Interpretation of changes observed
    - Learning outcomes

Experiential Learning Activity

Experiential-Learning Learning 26.1: Determination of Physical fitness

Total Duration: 6 Hours

Materials Required:

- Measuring Tape
- Weighing Machine
- Stadiometer (Height Measurement)
- Stopwatch
- BP Apparatus
- Skinfold Calipers (Optional)
- Fitness Assessment Form
- BMI Chart
- Pulse Oximeter
- Flexibility Measuring Instruments (Sit & Reach Box)
- Hand Grip Dynamometer
- Basic First Aid Kit

Activity 1: Orientation & Introduction to Physical Fitness Components (1 Hour)

- Faculty briefing about:
    - Concept of Physical Fitness
    - Components of Fitness:
        - Body Composition
        - Cardiovascular Endurance
        - Muscular Strength
        - Muscular Endurance
        - Flexibility

- Ethical Considerations while dealing with subjects
- Safety Measures during assessment

Activity 2: Selection & Preparation of Subject (30 Minutes)

- Selection of a volunteer subject from among students or outside.
- Recording of basic information:
  - Name
  - Age
  - Gender
  - Occupation
  - Medical History (if any)
- Obtaining consent for assessment.

Activity 3: Conducting Physical Fitness Tests (2.5 Hours)

Perform following tests practically under supervision:

BMI, Resting Heart Rate & BP, 3-Minute Step Test, Sit & Reach Test, Hand Grip Test, Push-up/Sit-up Test, Waist-Hip Ratio.

Activity 4: Data Interpretation & Analysis (1 Hour)

- Recording all measured values.
- Comparing values with standard norms based on age and gender.
- Identifying areas of fitness strength & weakness.
- Interpreting findings using charts, graphs or tables.

Activity 5: Report Writing (30 Minutes)

Students shall prepare a report including:

- Introduction
- Subject Profile
- Methods Used for Assessment

- Results of Each Test
- Interpretation of Fitness Level
- Recommendations for Improvement
- Conclusion

Activity 6: Presentation & Reflection (30 Minutes)

- Presentation of findings by each student/group.
- Discussion on challenges faced during assessment.
- Reflection on learning outcomes and ethical handling of subjects.

Experiential-Learning Learning 26.2: Field visit to a sports science or rehabilitation center to observe practical applications of exercise physiology.

Duration: 4 Hours

Activity 1: Orientation Session Before Visit (30 Minutes)

- Briefing about:
    - Objectives of the visit
    - Expected learning outcomes
    - Code of conduct at the center
    - Important areas to observe during the visit:
        - Fitness Assessment Techniques
        - Rehabilitation Protocols
        - Use of Exercise Physiology Equipment
        - Role of Sports Scientists/Physiotherapists

Activity 2: Field Visit & Observation at the Sports Science or Rehabilitation Center (2 Hours 30 Minutes)

- Guided tour of the center.
- Observation of:

    - Physiological Testing & Assessment (like VO2 max, flexibility, strength testing, balance testing etc.)
    - Exercise Prescription Techniques for different conditions
    - Rehabilitation exercises for musculoskeletal or sports injuries
    - Usage of modern tools & equipment
    - Techniques for performance enhancement & recovery
- Interaction with:
    - Sports Scientists
    - Physiotherapists
    - Trainers
- Q&A session with experts.

Activity 3: Debriefing & Group Discussion Post Visit (30 Minutes)

- Students will share:
    - Their observations
    - Learning points
    - Key Takeaways
- Faculty will facilitate discussion linking observations with exercise physiology principles.

Activity 4: Report Writing & Submission (30 Minutes)

Report Should Include:

- Brief Introduction of the Center
- Services Offered
- Observations Related to Exercise Physiology Applications
- Interaction Summary
- Reflection on Learning Experience
- Suggestions or Recommendations

Experiential-Learning Learning 26.3: Developing individualized and Tailored exercise programs based on *Mizaj* for health, fitness, and performance improvement

Total Duration: 10 Hours

Activity 1: Introduction & Conceptual Orientation (1 Hour)

- Brief lecture/discussion on:
    - Concept of Mizaj in Unani Medicine.
    - Mizaj and its influence on physical activity and performance.
    - Importance of tailoring exercise programs based on Mizaj types.
    - Exercise recommendations for different Mizaj categories (Damvi, Balghami, Safravi, Saudavi).

Activity 2: Assessment of Mizaj & Baseline Fitness Parameters (2 Hours)

- Students will:
    - Perform Mizaj assessment of subjects using standard tools.
    - Record Baseline Health and Fitness Parameters:
        - Weight, Height, BMI
        - Blood Pressure, Pulse Rate
        - Endurance Test (Walking/Step Test)
        - Flexibility & Strength Assessment
- Prepare Individual Profiles for exercise planning.

Activity 3: Designing Tailored Exercise Programs (3 Hours)

- Students (individually or in groups) will:
    - Design personalized exercise plans based on:
        - Mizaj Type
        - Physical fitness status
        - Health conditions or specific goals (weight loss, endurance, strength building, stress management etc.)
    - Include:

- Type of Exercises
- Duration & Frequency
- Progression Plan
- Precautions Specific to Mizaj

Activity 4: Presentation of Exercise Plans (2 Hours)

- Each student/group will present:
  - Mizaj analysis of their subject
  - Exercise plan developed
  - Justification for each component of the plan
- Peer and instructor feedback.

Activity 5: Group Discussion & Reflection (2 Hours)

- Group discussion on:
  - Challenges faced in Mizaj-based exercise planning.
  - How Mizaj influences exercise tolerance and response.
  - Role of Unani principles in modern fitness programs.
- Reflection note writing by students on their learning experience.

Experiential-Learning Learning 26.4: Case Scenario – Sports Performance enhancement using Unani System

Duration: 6 Hours

Activity 1: Introduction & Brief Lecture on Unani Concepts for Sports Performance (1 Hour)

- Concepts of *Mizaj (Temperament)* and Sports Performance.
- Role of *Asbab-e-Sitta Zarooriya* (Six essential factors for health).
- Importance of *Ilaj bil Tadbeer* (Regimenal Therapy) like:
  - Dalak (Massage)

- Riyazat (Exercise)
- Hammam (Bathing)
- Nutritive & Lifestyle guidelines

- Herbs and Formulations from Unani Medicine for enhancing strength, stamina, endurance, and recovery.

Activity 2: Group Discussion on Case Scenarios (2 Hours)

- Division of students into small groups.
- Each group provided with a different case scenario:
  - Athletes with stamina issues
  - Players with recovery delays
  - Fitness challenges in different Mizaj types
- Tasks for groups:
  - Assess Mizaj of the given athlete.
  - Suggest Unani-based regimens for performance enhancement.
  - Recommend suitable diets, drugs, or therapies from Unani system.

Activity 3: Preparation of Sports Performance Enhancement Plan (2 Hours)

- Each group will design a performance enhancement plan using Unani principles.
- Elements to include:
  - Mizaj-based Exercise Program
  - Dietary recommendations
  - Herbal or pharmacological support
  - Regimenal Therapies
  - Preventive and Recovery Measures
- Plan to be presented in chart or PPT format.

Activity 4: Group Presentations & Faculty Feedback (1 Hour)

Details:

- Each group will present their Sports Performance Enhancement Plan.
- Faculty will provide feedback linking it with Unani classical references and modern applicability.
- Discussion on real-life applications and feasibility in sports medicine.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (5 Marks): on the topic- Interpret Legal issues pertaining to issuing Physical Fitness Certificate. LAQ (10 Marks): Unani Concept of Riyazat and its application to Sports. Trainers Report (10 Marks): on experiential topic - Adapt Unani Concept of *Riyazat* in Sports may be taken as assessment. OSCE (25 Marks): Measure the Physical Fitness of a subject. OR (25 Marks): Prepare Physical Fitness Certificate Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 4

Module 27 : موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the key concepts of climate change, including greenhouse gases, global warming, and climate variability.

2. Describe how different organisms (plants, animals, and humans) physiologically respond to climate change stressors such as temperature extremes, altered precipitation patterns, and increased CO2 levels.

3. Assess the impact of climate change on human health, focusing on respiratory issues, heat-related illnesses, and vector-borne diseases.

4. Analyze the impact of Asbabe Sitta Zarooriya on human health.

Unit 1 موسمیاتی تبدیلی کا تعارف Introduction to Climate Change

27.1.1 موسمیاتی تبدیلی کے بنیادی اصول

Basics of climate change

27.1.2 تاریخی موسمیاتی انداز اور مستقبل کی پیش گوئیاں

Historical climate patterns and future projections

27.1.3 سافٹ ویئر آلات (ایکسل، آر) کا استعمال کرتے ہوئے موسمیاتی ڈیٹا کے رُجحانات کا تجزیہ

Analyzing climate data trends using software tools (Excel, R)

References: 100,101,102,103

3A	3B	3C	3D	3E	3F	3G
CO3	Describe basics of climate change Discuss Historical climate patterns and future projections	3	Lecture	CC	Knows-how	L&PPT ,ML,FC,SDL
CO3	Analyze climate data trends using software tools (Excel, R)	6	Practical27.1	CAN	Shows-how	LRI,BL,PT,D,DIS
CO3	Identify and document plant and animal species through field-based biodiversity assessment in a selected ecosystem	7	Practical27.2	CAN	Shows-how	BL,Mnt,SDL,IBL,FV
CO3	Measure photosynthetic rates under different light and CO2 conditions	7	Practical27.3	PSY-MEC	Shows-how	DIS,DL,PT,Mnt

Unit 2 انسانی فزیالوجی اور موسمیاتی تبدیلی Human Physiology and Climate Change

27.2.1 موسمیاتی تبدیلی کا تولید اور نشوونما پر اثر

Impact of climate change on reproduction and development

27.2.2 حرارتی دباؤ اور اس کے انسانی جسم پر فعلیاتی اثرات

Heat stress and its physiological effects on the human body

27.2.3 موسمیاتی تبدیلی سے متعلق تنفّسی اور قلبی وعائی امراض

Climate change-related respiratory and cardiovascular diseases

27.2.4 اسبابِ ستّہ ضروریہ کا انسانی صحت پر اثر

Effect of Asbabe Sitta Zarooriya on Human health

References: 1,8,11,14,15,19,20,24,104,105,106,107,108,109,110,111,112,113,114

3A	3B	3C	3D	3E	3F	3G
CO1,CO2, CO3,CO4	Identify the Impact of climate change on reproduction and development Analyze Heat stress and its physiological effects on the human body Appraise Climate change-related respiratory and cardiovascular diseases Analyze the effect of *Asbabe Sitta Zarooriya* on Human health.	4	Lecture	CAN	Knows-how	TUT,L&GD,DIS
CO3	Identify and Compose local impacts of climate change on a specific ecosystem	10	Experiential-Learning27.1	PSY-ORG	Does	SDL,RLE,FV,PrBL,CBL

Unit 3 تحقیق اور مستقبل کے اِتّجاہات Research and Future Directions

27.3.1 موسمیاتی اقدامات میں پالیسی اور کمیونٹی کی شمولیت کا کردار

Role of policy and community engagement in climate action

27.3.2 موسمیاتی فعلیات میں موجودہ تحقیقی رُجحانات اور طریقہ ہائے کار

Current research trends and methodologies in climate physiology

موسمیاتی سائنس میں مستقبل کی تحقیقی ضروریات اور پیشہ ورانہ راستے 27.3.3

Future research needs and career paths in climate science

References: 115,116,117,118,119,120

3A	3B	3C	3D	3E	3F	3G
CO3	Analyze the role of policy and community engagement in climate action Identify current research trends and methodologies in climate physiology Explore future research needs and career paths in climate science	3	Lecture	CAN	Knows-how	JC,C_L,L&GD,DIS,PER
CO3,CO6	Organize awareness activities highlighting the links between regional climate patterns, health outcomes, and agricultural changes.	9	Experiential-Learning27.2	AFT-SET	Does	RLE,FV,DIS,Mnt,C_L
CO3,CO6	Develop educational materials for local schools or organizations	7	Experiential-Learning27.3	CS	Does	TPW,DIS,SDL,BL,C_L

Practical Training Activity

Practical Training 27.1 Climate Data analysis Using Excel and R

Total Duration: 6 Hours

Activity 1: Introduction & Demonstration by Teacher (1 Hour)

- Introduction to:
  - Types of climate data
  - Importance of climate data analysis
  - Overview of Excel and R for data analysis
- Demonstration of:
  - Importing data into Excel and R

- Cleaning and organizing climate data
- Basic statistical operations in Excel & R
- Visualization tools in Excel and R (charts, graphs, plots)

Activity 2: Hands-on Activity: Climate Data Analysis Using Excel (2 Hours)

- Import the given climate data into Excel.
- Perform:
  - Sorting and Filtering
  - Descriptive Statistics (Mean, Median, Mode, SD)
  - Trend Analysis using Charts (Line Graph, Bar Graph)
  - Calculation of seasonal and annual averages
- Generate Visualizations:
  - Temperature trends over years
  - Rainfall pattern analysis
  - Humidity variations

Activity 3: Hands-on Activity: Climate Data Analysis Using R (2 Hours)

- Import the same dataset into R.
- Perform:
  - Data Cleaning using R
  - Descriptive Statistics using summary functions
  - Data Visualization using ggplot2 or base R
  - Create:
    - Line plots for temperature trends
    - Bar charts for rainfall
    - Boxplots for seasonal comparison

- Interpretation of Outputs

Activity 4: Comparative Discussion, Report Preparation & Presentation (1 Hour)

- Compare the ease and power of Excel vs R in data analysis.
- Preparation of a report including:
    - Objective
    - Methodology
    - Screenshots of analysis
    - Graphs/Charts output
    - Interpretation of results
- Presentation of findings by student groups.
- Group Discussion and Teacher Feedback.

Practical Training 27.2 Biodiversity survey in a local ecosystem

Total Duration: 7 Hours

Activity 1: Orientation and Methodology Briefing (1 Hour)

- Briefing by the teacher on:
    - Importance of biodiversity and its conservation.
    - Methodologies for biodiversity survey:
        - Quadrat Sampling
        - Line Transect Method
        - Direct Observation
        - Photographic Documentation
    - Safety precautions and ethical considerations during fieldwork.

Activity 2: Field Visit and Site Selection (1 Hour)

- Visit to a local ecosystem like:
    - Garden, Park, Lake area, Forest patch, Hill slope, Wetland, or Agricultural field.
- Site demarcation for sampling.

Activity 3: Biodiversity Data Collection (3 Hours)

Students will perform:

- Identification and recording of:
    - Plant species
    - Insect species
    - Bird and animal species
    - Signs of biodiversity (nests, droppings, tracks)

Parameters to record:

- Name of species (Common/Scientific)
- Number of individuals
- Habitat type
- Special observations (endangered, invasive, rare species)

Activity 4: Compilation, Data Analysis, and Report Preparation (1 Hour)

- Prepare species list.
- Calculate Biodiversity Indices (if applicable).
- Discuss ecosystem characteristics, threats, and conservation status.

Activity 5: Group Discussion & Presentation (1 Hour)

- Each group presents:
    - Biodiversity recorded
    - Observations
    - Conservation suggestions

- Feedback from peers and teachers.

Practical Training 27.3 Photosynthetic rates under different light and CO2 conditions

Total Duration: 7 Hours

Materials & Resources Required:

- Photosynthesis Measurement System (Infrared Gas Analyzer / Portable Photosynthesis System)

  or

- Alternative Low-cost Methods (Oxygen Bubble Count using Aquatic Plants like Hydrilla)

Additional materials:

- Aquatic Plant Specimens (like Hydrilla/Elodea)
- Beakers, Water, Sodium Bicarbonate (source of CO_2)
- Light Sources with variable intensities
- Lux Meter (optional)
- Stopwatch
- Graph Paper / Excel / Statistical Software for data analysis

Activity 1: Introduction & Demonstration (1 Hour)

- Teacher explains:
  - Principle of Photosynthesis Measurement
  - Factors affecting Photosynthesis: Light Intensity, CO_2 Concentration, Temperature
  - Working of Instruments / Experimental Setup
- Demonstration of Procedure.

Activity 2: Experimental Setup (1 Hour)

Students in groups will:

- Set up aquatic plant (Hydrilla) in water with varying CO_2 concentrations (adding Sodium Bicarbonate).

- Adjust different light intensities using light source (lamp, sunlight, filters).
- Prepare observation table.

Activity 3: Data Collection & Experiment (3 Hours)

Students will:

- Measure the rate of photosynthesis by counting oxygen bubbles per minute under:
    - Different Light Intensities (Low, Medium, High)
    - Different CO_2 Concentrations (Low, Medium, High)

OR

- Use Infrared Gas Analyzer for recording CO_2 uptake rates if available.

Record:

- Light Intensity
- CO_2 Concentration
- Number of Oxygen Bubbles / CO_2 Uptake
- Temperature

Activity 4: Data Analysis & Graph Preparation (1 Hour)

- Prepare graphs showing:
    - Photosynthetic Rate vs Light Intensity
    - Photosynthetic Rate vs CO_2 Concentration
- Analyze:
    - Optimum conditions for photosynthesis
    - Limiting factors
    - Any anomalies or observations

Activity 5: Group Presentation & Discussion (1 Hour)

- Group-wise Presentation of:

- Methodology
- Data Collected
- Graphs & Interpretation
- Conclusions & Learning

Peer discussion on variability of results and significance of findings.

Experiential Learning Activity

Experiential-Learning Learning 27.1: **Project:** Investigating local impacts of climate change on a human population living at high altitude

Total Duration: 10 Hours

Activity 1: Orientation & Planning (1 Hour)

- Teacher will explain:
  - Project objectives & scope
  - Ethical aspects of data collection
  - Guidelines for primary and secondary data collection
- Formation of individual or small groups
- Selection of target population/region (Example: Ladakh, Kashmir, Himachal, Uttarakhand, Nepal etc.)

Activity 2: Designing the Survey/Research Approach (1 Hour)

- Students will prepare:
  - Survey questionnaire (if direct contact possible)
  - List of data points to be collected (environmental, social, health, livelihood aspects)
  - Search strategy for online resources (Videos, Pictures, Articles, Reports)

Activity 3: Data Collection (3 Hours)

- Direct Survey (Telephonic/Online/Field Visit - Optional)
- Searching authentic online resources for:

        - Documentary videos
        - Research articles
        - News reports
        - Government data
- Collection of pictures/videos (with source acknowledgment)

Activity 4: Data Analysis & Interpretation (2 Hours)

- Identification of key impacts of climate change like:
    - Changing weather patterns
    - Health issues
    - Agriculture & Livelihood impacts
    - Migration issues
    - Loss of biodiversity
    - Water scarcity
- Regional adaptation or coping strategies

Activity 5: Project Report Preparation (2 Hours)

Report shall include:

- Introduction
- Methodology
- Details of Region and Population Studied
- Data Collected (Tables/Charts/Pictures/Videos)
- Analysis of Findings
- Impacts of Climate Change Observed
- Adaptation Measures
- Conclusion & Recommendations

- References

Activity 6: Presentation & Discussion (1 Hour)

- Presentation of project findings (10-15 minutes per student/group)
- Sharing experience of the survey/research
- Teacher feedback & discussion

Experiential-Learning Learning 27.2: Community Engagement to raise awareness about local climate issues and physiological impacts on health and agriculture

Total Duration: 9 Hours

Activity 1: Orientation & Planning (1 Hour)

- Teacher will guide the students about:
    - Importance of community engagement.
    - Communication strategies for local populations.
    - Key climate issues relevant to the local area.
    - Health and agricultural impacts to focus on.
- Group formation & Allocation of tasks:
    - Content creators
    - Visual aid designers
    - Communication & interaction team

Activity 2: Preparation of Awareness Material (2 Hours)

Students will prepare:

- Posters, Charts, Brochures
- Slogans, Messages
- Brief presentations on:
    - Climate change & its signs locally

- Impact on human health (Respiratory, Heat Stress, Nutrition, Vector-borne diseases)
- Impact on agriculture (Crop loss, Changing patterns, Soil degradation)
- Simple adaptation & mitigation strategies

Activity 3: Community Visit / Interaction (3 Hours)

Students shall visit a nearby community (rural or urban), schools, farmers' groups, or market places for awareness interaction.

Activities to be done:

- Interactive sessions with locals
- Distribution of awareness material
- Discussion about their experiences & observations
- Collect feedback and local insights on climate issues
- Address queries regarding health & agriculture impacts

Activity 4: Data Compilation & Analysis (1 Hour)

Students will compile:

- Feedback from community members
- Key concerns raised by the public
- Suggestions received
- Observations on awareness levels of the community

Activity 5: Report Preparation (1 Hour)

Students shall prepare a report including:

- Objectives
- Preparation Process
- Activities conducted
- Observations & Feedback from Community
- Reflection on their own learning

- Conclusion & Suggestions

Activity 6: Presentation & Reflection (1 Hour)

- Each group/student will present their report and experiences.
- Discussion on challenges faced during engagement.
- Teacher's feedback and overall reflection on the activity.

Experiential-Learning Learning 27.3: Educational materials for local schools or organizations

Total Duration: 7 Hours

Activity 1: Orientation & Topic Finalization (1 Hour)

- Teacher will brief students on:
    - Importance of climate change awareness at the school/community level.
    - Target audience understanding (age, language, simplicity).
    - Formats of awareness material (Posters, Leaflets, Booklets, Infographics, Videos, PPTs).
- Finalization of themes:
    - Causes of climate change
    - Impact on environment, human health, and agriculture
    - Role of students & community
    - Mitigation and adaptation strategies

Activity 2: Research and Content Collection (2 Hours)

Students will collect information from:

- Authentic sources (IPCC, UN, Government portals, Research articles)
- Case studies from the local area
- Relevant pictures, graphs, or statistics for visual appeal

Activity 3: Designing and Preparation of Awareness Material (3 Hours)

- Posters / Brochures / Flyers
- PowerPoint presentations
- Short videos or animations
- Infographics
- Booklet or Activity Worksheets for school children

Key features of the material:

- Simple language
- Attractive visuals
- Age-appropriate content
- Call to action or Tips for climate-friendly behavior

Activity 4: Presentation and Feedback (1 Hour)

- Students will present the prepared material before peers and faculty.
- Teacher and students will provide constructive feedback on:
    - Clarity
    - Creativity
    - Relevance to audience
    - Effectiveness of communication

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.	4

Portfolio: (25 marks): Prepared on the topic- Develop educational materials for local schools or organizations shall be taken as assessment. DOPS (25 marks): Measure photosynthetic rates under different light and CO2 conditions. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Module 28 : ارتقائی فزیالوجی Evolutionary Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe fundamental concepts of evolution, including natural selection, adaptation, and speciation.
2. Describe how physiological traits evolve in response to environmental pressures across different species.
3. Analyze physiological mechanisms across diverse taxa, highlighting evolutionary relationships.
4. Evaluate how evolutionary processes influence physiological systems and health

Unit 1 ارتقائی اصولوں کا تعارف Introduction to Evolutionary Principles

28.1.1 ارتقاء کے کلیدی مفاہیم: قدرتی انتخاب، جینیاتی انجراف، جین کا بہاؤ

Key concepts in evolution: natural selection, genetic drift, gene flow

28.1.2 ارتقاء میں تغیر (میوٹیشن) کا کردار

The role of mutation in evolution

28.1.3 سافٹ ویئر کا استعمال کرتے ہوئے ارتقاء کا تجزیہ

Analyzing evolutionary trees using software

References: 121,122,123,124,125,126,127,128

3A	3B	3C	3D	3E	3F	3G

CO3,CO4	Describe fundamental concepts of evolution, including natural selection, adaptation, and speciation	5	Lecture	CC	Knows-how	SDL,L&PPT ,TUT
CO3	Describe the role of mutation in evolution	2	Lecture	CC	Knows-how	BL,L&PPT ,DIS
CO3	Construct evolutionary trees using software	5	Practical28.1	PSY-ORG	Shows-how	BL,Mnt,D,SIM,D-M

Unit 2 تقابلی فعلیات Comparative Physiology

28.2.1 فقاریہ اور غیر فقاریہ حیوانات کے درمیان فعلیاتی نظاموں کا تقابل

Comparing physiological systems among vertebrates and invertebrates

28.2.2 فعلیاتی اختلافات کی ارتقائی اہمیت

The evolutionary significance of physiological differences

28.2.3 ماحولیاتی تبدیلیوں کے جواب میں سلوکی اور فعلیاتی تکیُفات

Behavioral and physiological adaptations in response to environmental changes

References: 129,130,131,132,133,134

3A	3B	3C	3D	3E	3F	3G
CO3	Compare physiological systems among vertebrates and invertebrates.	1	Lecture	CAN	Knows-how	L&PPT ,FC,TUT,PER,C_L
CO3	Demonstrate by comparison the circulatory system of Fish and Earthworm	2	Practical28.2	PSY-SET	Shows-how	SDL,DIS,BL,D-M
CO3	Discuss Physiological adaptations in response to environmental changes	6	Practical28.3	CC	Shows-how	DIS,RLE,D,TUT,FV

CO2,CO3	Analyze behavioural adaptation in response to environmental changes	7	Experiential-Learning28.1	CAN	Does	ML,FV,JC,C_L,PrBL
CO2,CO3	Explore the evolutionary significance of physiological differences.	1	Lecture	CAN	Knows-how	BL,FC,SDL,L&GD

Unit 3 انسانی صحت میں ارتقائی فعلیات Evolutionary Physiology in Human Health

28.3.1 انسانی فعلیات اور امراض پر ارتقائی نقطہ ہائے نظر

Evolutionary perspectives on human physiology and diseases

28.3.2 صحت کے مسائل کو سمجھنے میں ارتقائی طب کا کردار

The role of evolutionary medicine in understanding health issues

28.3.3 ارتقائی فعلیاتی تحقیق میں موجودہ رُجحانات اور طریقہ ہائے کار

Current trends and methodologies in evolutionary physiology research

References: 135,136,137,138,139,140,141

3A	3B	3C	3D	3E	3F	3G
CO2,CO3	Describe evolutionary perspectives on human physiology and diseases	1	Lecture	CC	Knows-how	PL,SDL,L_VC,DIS,EDU
CO2,CO3	Adapt the concepts of evolutionary medicine in understanding health issues	7	Practical28.4	PSY-ADT	Shows-how	TUT,JC,CBL,DIS,IBL
CO3	Discuss current trends and methodologies in evolutionary physiology research -I	6	Experiential-Learning28.2	CC	Does	TUT,PER,SY,W
CO3	Discuss current trends and methodologies in evolutionary physiology research - II	6	Experiential-Learning28.3	CC	Does	PER,CBL,JC,TBL,DIS

CO3	Identify current trends and methodologies in evolutionary physiology research - III	7	Experiential-Learning28.4	CAN	Does	TPW,BL,PrBL,Mnt,C_L

Practical Training Activity

Practical Training 28.1 Evolutionary trees

Total Duration: 5 Hours

Materials & Resources Required:

- Computers/Laptops with MEGA Software installed.
- Sample DNA/Protein sequence data (FASTA format) — provided or downloaded from NCBI GenBank.
- Internet Access for Database Search (optional).
- Handouts/Manual for MEGA Software Usage.
- Projector for demonstration.

Activity 1: Introduction & Demonstration (1 Hour)

- Brief Introduction to:
    - Phylogenetics & Importance of Evolutionary Trees.
    - Types of Phylogenetic Trees: Cladograms, Phylograms, Dendrograms.
    - Overview of MEGA Software Interface & Tools.
- Demonstration by Teacher:
    - Importing Sequences.
    - Alignment of Sequences.
    - Construction of Phylogenetic Trees using methods like:
        - Neighbor Joining (NJ)
        - Maximum Likelihood (ML)
        - UPGMA

Activity 2: Hands-on Data Analysis using MEGA (2 Hours)

Students in small groups will:

- Import given sequence data into MEGA.
- Perform Sequence Alignment (using ClustalW or Muscle in MEGA).
- Construct Phylogenetic Tree.
- Modify tree appearance: bootstrap values, branch lengths, labeling.
- Export Tree images for reporting.

Alternate to activity 2:

An evolutionary/phylogenetic trees image may be downloaded from the online sources and explained to the students. Or simulations and animations may be used.

Activity 3: Interpretation and Analysis (1 Hour)

- Interpret the evolutionary relationships shown in their tree.
- Identify common ancestors, closely related species, and evolutionary divergence.
- Discuss any interesting findings from their analysis.

Activity 4: Presentation & Report Submission (1 Hour)

- Each group will briefly present:
    - Their phylogenetic tree.
    - Steps followed.
    - Key interpretations and conclusions.
- Submit a short Practical Report containing:
    - Introduction.
    - Methodology.
    - Phylogenetic Tree Image.
    - Interpretation of Results.
    - Conclusion.

Practical Training 28.2 Circulatory systems of Fish and Earthworm

Total Duration: 2 Hours

Activity 1: Guided Exploration (30 minutes)

- Teacher will guide students on:
  - The circulatory system in Fish (Closed, Single Circulation).
  - The circulatory system in Earthworm (Closed, Dorsal & Ventral Blood Vessels).
- Students will search online for:
  - Diagrams.
  - Videos of blood circulation.
  - Key functional details of both systems.

Activity 2: Comparative Analysis & Chart Preparation (45 minutes)

Students will prepare a comparison chart covering:

Fish (Vertebrate) Earthworm (Invertebrate)

Type of Circulation

Heart

Blood Vessels

Oxygenation Process

Number of Circuits

Special Adaptations

Activity 3: Presentation & Discussion (30 minutes)

- Students will present their charts or posters.
- Open Discussion on:
    - Evolutionary significance of differences.
    - Efficiency of circulation in both organisms.
    - Adaptation to habitat.

Activity 4: Summary & Teacher Feedback (15 minutes)

- Teacher summarizes key points.
- Provides feedback on students' work.
- Suggests further reading resources.

Practical Training 28.3 Field Visit and Case Study Analysis on Environmental Stressors and Their Physiological Impact on Flora and Fauna

Total Duration: 6 Hours

Activity 1: Pre-Field Trip Briefing by Mentor (30 minutes)

- Introduction to Environmental Stressors:
    - High/Cold Temperature Effects
    - Air/Water/Soil Pollution Effects
- Expected Observations in Flora and Fauna.
- Safety Guidelines for Field Visit.

Activity 2: Field Visit & Observation (2.5 Hours)

- Visit to a location affected by environmental stressors (e.g., polluted site, high-altitude region, or urban/rural area with climate extremes).

Students Will:

- Observe visible stress symptoms in plants/animals like:
    - Leaf discoloration, wilting, stunted growth (Flora)

- Behavioral changes, migration, disease symptoms (Fauna)
- Record Temperature, Pollution level (if possible).
- Take photographs or make sketches for documentation.

Activity 3: Study of 5 Case Studies (2 Hours)

Students will individually or in groups:

- Study 5 documented case studies highlighting:
  - Effects of environmental stressors on physiology of flora/fauna.
  - Adaptation mechanisms.
  - Conservation strategies if applicable.

Activity 4: Report Compilation (1 Hour)

Students will prepare a structured report covering:

1. Introduction to Environmental Stressors.
2. Observations from Field Visit.
3. Case Study Analysis (Summary of 5 case studies).
4. Discussion on Physiological Responses.
5. Conclusion & Suggestions.
6. Photographic Documentation.

Practical Training 28.4 Case study analysis on evolutionary medicine

Total Duration: 7 Hours

Activity 1: Introduction to Evolutionary Medicine (1 Hour)

- Mentor will provide an overview of:
  - Concept of Evolutionary Medicine
  - Principles of Natural Selection, Adaptation & Mismatch Diseases

- Relevance of Evolutionary Perspective in Understanding Modern Health Issues

Activity 2: Case Study Analysis (3 Hours)

Students will be divided into small groups (3-5 students each). Each group will be assigned or choose 2-3 health issues to study from an evolutionary perspective.

Suggested Case Studies:

- Sickle Cell Anemia & Malaria Resistance
- Lactose Intolerance & Genetic Evolution
- Antibiotic Resistance
- Obesity & Thrifty Gene Hypothesis
- Autoimmune Disorders & Hygiene Hypothesis
- Mental Health Evolutionary Explanations
- Skin Pigmentation and Vitamin D Deficiency

Each group will:

- Analyze the evolutionary background of the selected issue.
- Identify evolutionary benefits vs modern health challenges.
- Prepare key points for presentation.

Activity 3: Group Discussion & Presentation (2 Hours)

- Each group will present their findings in 10-15 minutes.
- Open house discussion moderated by the mentor.
- Cross-questioning and peer interaction.

Activity 4: Reflection & Report Writing (1 Hour)

Each student will individually submit a brief report covering:

- The role of Evolutionary Medicine in the studied health issues.
- Key learnings from the group discussion.
- Reflection on the importance of evolutionary understanding in healthcare.

Experiential Learning Activity

Experiential-Learning Learning 28.1: Behavioral Adaptation to Environmental Changes

Total Duration: 7 Hours

Activity 1: Orientation and Briefing Session (1 Hour)

- Mentor will explain:
    - Concept of Behavioral Adaptation.
    - Environmental Factors influencing human behavior.
    - Examples from different climatic regions.

Activity 2: Field Trip / Online Exploration & Observation (3 Hours)

Students may:

- Visit local areas or communities living under specific climatic conditions OR
- Watch online documentaries, interviews, and read research articles related to:

Cold Regions: Clothing habits, housing style, dietary habits, social practices.

Hot/Desert Regions: Water conservation habits, siesta culture, clothing, food preferences.

Coastal Areas: Fishing lifestyle, housing structure, diet rich in seafood.

High Altitude: Breathing patterns, physical activity level, cultural practices.

Humid/Tropical Areas: Adaptation in daily routines, hygiene practices, clothing, agriculture methods.

Activity 3: Data Analysis & Discussion (2 Hours)

- Group discussion among students to share findings.
- Comparative analysis of different behavioral adaptations.
- Identify unique adaptations in different regions.
- Relating behavior to environmental stressors.

Activity 4: Report Preparation (1 Hour)

Students will prepare a report covering:

1. Introduction to Behavioral Adaptation.
2. Methodology: Field Visit / Online Resource Analysis.
3. Observations from Different Climatic Zones.
4. Analysis of Behavioral Changes & Adaptation.
5. Conclusion.
6. Supporting images or videos (optional).

Experiential-Learning Learning 28.2: Guest lectures from experts in evolutionary biology and physiology

Total duration: 6 hours

The department shall organize various lectures on this topic by experts in the subject.

Experiential-Learning Learning 28.3: Case studies & GD: Current trends and methodologies in evolutionary physiology research

Total Duration: 6 Hours

Activity 1: Orientation & Introduction by Mentor (1 Hour)

- Briefing on:
    - Concept of Evolutionary Physiology
    - Importance of Evolutionary Perspective in Physiology
    - Key Methodologies used in Research:
        - Comparative Physiology
        - Field Studies & Laboratory Experiments
        - Molecular and Genetic Approaches
        - Use of Modern Tools like Bioinformatics, Imaging, Simulation
        - Climate and Environment-based Physiological Studies

- Ecological & Behavioral Physiology Trends

Activity 2: Group Discussion on Recent Research Trends (2 Hours)

Students (in groups) will:

- Explore and discuss research articles (last 5-10 years) on:
  - Adaptations to environment
  - Evolution of metabolic pathways
  - Physiological adaptations in extreme environments
  - Genomics in evolutionary physiology
  - Evolution of stress responses

Each group presents:

- Key Findings
- Methodologies Used
- Trends Observed
- Limitations & Future Prospects

Activity 3: Case Study Analysis (2 Hours)

- Mentor will provide 3-5 recent research case studies in evolutionary physiology.
- Students will analyze:
  - Research Objectives
  - Study Design & Methodology
  - Tools and Techniques used
  - Outcomes and Significance in Evolutionary Physiology

Activity 4: Compilation of Report & Reflection (1 Hour)

Each student/group will prepare a brief report covering:

1. Summary of Trends & Methodologies Identified

2. Reflection on their Learning Experience
3. Relevance of Evolutionary Physiology in Modern Research
4. Suggestions for Future Research Areas

Experiential-Learning Learning 28.4: Group project: Recognizing Current Trends and Methodologies in Evolutionary Physiology Research

Total Duration: 7 Hours

Activity 1: Introduction by Mentor & Group Formation (1 Hour)

- Orientation on:
  - Importance of evolutionary physiology in modern science.
  - Recent advancements and research methodologies used in the field.
  - Examples of current research projects globally.
- Formation of 2-3 groups (depending on class strength).
- Each group is assigned or selects a sub-topic related to:
  - Environmental Adaptations
  - Physiological Evolution of Specific Organisms
  - Technological Tools in Evolutionary Research
  - Role of Molecular & Genetic Methods
  - Climate Impact on Evolutionary Physiology

Activity 2: Group Project Work (3 Hours)

Each group will:

- Search for 3-5 recent (past 10 years) research studies.
- Analyze:
  - Research Objectives
  - Tools & Methodologies Used

- Emerging Trends
- Applications & Implications in Modern Physiology

- Prepare a visual presentation or poster summarizing their findings.

Activity 3: Group Presentations (2 Hours)

- Each group will present their project (10-15 minutes per group).
- Peer interaction and question-answer session.
- Mentor will provide feedback.

Activity 4: Reflection & Submission of Project Report (1 Hour)

Each group will submit a brief report consisting of:

- Topic Overview
- Summary of Literature Reviewed
- Methodologies Highlighted
- Trends Identified
- Conclusion & Future Scope
- Group Members' Reflection on Learning

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Open Book Test (10 marks): The students may be given an open book test on fundamental concepts of evolution, including natural selection, adaptation, and speciation. Structured LAQ (10 Marks): on Compare physiological systems among vertebrates and invertebrates.	4

Class Presentation (15 Marks): on the topic Behavioural adaptation in response to environmental changes. Assessment shall be based on performance. Practical Viva (15 Marks): Physiological adaptations in response to environmental changes. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Semester No : 5

Module 29 : طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Physiological Tools for Validation of Unani Medicine

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Interpret classical Unani principles through the lens of recent advances in biomedical science.
2. Describe how physiological tools can be used to validate classical concepts of Unani Medicine.
3. Analyze recent scientific advances to upgrade the Unani knowledge base.
4. Follow ethics in Research

Unit 1 طبِ یونانی کے بنیادی تصوّرات کی تصدیق Validation of Core Concepts of Unani

29.1.1 بنیادی تصوّرات اور ان کی سائنسی تاَویل

Core Concepts and their scientific interpretation

29.1.2 طبِ یونانی کی تصدیق میں فعلیاتی آلات/وسائل

Physiological Tools in Validation of Unani Medicine

29.1.3 علم کی تصدیق اور علم کا اضافہ

Knowledge validation and Knowledge addition

29.1.4 طبِ یونانی میں مستقبل کی تحقیق

Future research in Unani Medicine

References: 18,19,20,21,22,23,25,145,146

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe Core Concepts of Unani Medicine and their scientific interpretation.	3	Lecture	CC	Knows-how	PER,SDL,L&PPT ,FC,DIS
CO1,CO3	Adopt and value Physiological Tools in Validation of Unani Medicine	6	Practical29.1	AFT-SET	Shows-how	SDL,PL,C_L,PSM,DIS
CO3,CO5	Appraise Knowledge Validation and Knowledge addition	4	Experiential-Learning29.1	AFT-SET	Does	IBL,BS,SDL,DIS,CBL
CO1,CO3, CO5	Appraise future research scope in Unani Medicine	6	Experiential-Learning29.2	AFT-SET	Does	BS,PER,DIS,C_L,JC
CO1,CO3	Adapt various diagnostic tools in validation of *Mizaj*	4	Practical29.2	AFT-SET	Shows-how	DIS,PT,D,BS

Unit 2 نظامِ صحت کاادغام Integration of Health Systems

29.2.1 نظامِ صحت کاادغام

Integration of Health systems

29.2.2 اِدغام کے ماڈل

Models for Integration

29.2.3 اِدغام میں حدوداور چیلنجز

Limitations and Challenges in Integration

References: 147,148,149,150

3A	3B	3C	3D	3E	3F	3G

CO1,CO4, CO5	Describe Integration of Health systems	1	Lecture	CC	Knows-how	L&GD,SDL,DIS
CO1,CO4, CO5	Prepare Models for Integration	6	Practical29.3	CAP	Shows-how	BS,TBL,PL,PrBL,DIS
CO1,CO4, CO5	Illustrate Limitations and Challenges in Integration	2	Lecture	CC	Knows-how	L&PPT ,SDL,DIS
CO1,CO4, CO5	Adapt Integration of Health Systems	3	Experiential-Learning29.3	PSY-ADT	Does	SIM,BS,CBL,DIS,TBL
CO1,CO4, CO5	Design Integration Models	4	Experiential-Learning29.4	PSY-ORG	Does	PrBL,BS,PSM,DIS,CBL
CO1,CO4, CO5	Justify potential barriers to integration and strategize solutions	3	Experiential-Learning29.5	PSY-MEC	Does	PSM,RP,BS,DIS

Unit 3 توثیق کا عمل Validation Process

29.3.1 توثیق کی ضرورت

Need for Validation

29.3.2 تحقیق کے ترجیحی شعبے

Priority areas of Research

29.3.3 توثیق کا عمل

Validation Process

29.3.4 تحقیقی اخلاقیات-یونانی اور جدید نقطہ نظر

Research Ethics- Unani and Modern View

References: 142,143,144,151,152

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Discuss need for Validation	1	Lecture	CC	Knows-how	L,BL
CO1,CO3, CO4,CO5	Analyze priority areas of Research	2	Lecture	CAN	Knows-how	TUT,DIS,FC,L&GD
CO5,CO6	Practice Research Ethics	1	Lecture	CAP	Knows-how	L&GD,TUT,DIS,C_L,SDL
CO1,CO5	Identify priority Areas of Research in Unani Medicine	2	Experiential-Learning29.6	CAN	Does	CBL,C_L,PrBL,BS
CO1,CO3, CO5	Discuss validation Process of Traditional Medicine Concepts	2	Experiential-Learning29.7	CC	Does	RP,CBL,DIS,TBL
CO5,CO6	Differentiate Research Ethics – Unani and Modern View	2	Experiential-Learning29.8	CAN	Does	RP,DIS,BS
CO1,CO3, CO5,CO6	Demonstrate Research & Validation Techniques in Unani Medicine	4	Practical29.4	PSY-SET	Shows-how	BL,LS,CBL,D,PT
Practical Training Activity						
Practical Training 29.1 Physiological tools and recent advances in validation of Unani Medicine						
Total Duration: 6 Hours **Activity 1: Introduction and Orientation (1 Hour)** Mentor will:						

- Introduce the need and importance of scientific validation in Unani Medicine.
- Discuss examples of validated and non-validated concepts.
- Highlight recent physiological tools and technologies used in research.

Activity 2: Identification of Unani Concepts for Validation (2 Hours)

Individual or Group Activity:

- Students will refer to classical Unani literature and identify 4-5 concepts that require scientific validation.

Suggested Areas:

- Mizaj (Temperament)
- Usoole Ilaj (Principles of Treatment)
- Ilaj-bit-Tadbeer (Regimenal Therapy)
- Concept of Akhlat (Humours)
- Organs' Functionality (Aza-e-Raeesa)
- Drug Actions based on Mizaj

Activity 3: Enlisting of Physiological Tools/Technologies (2 Hours)

- Students will search for suitable modern tools and recent technologies for validation of identified Unani concepts.

Suggested Tools/Technologies:

- ECG, HRV, Spirometry, Body Composition Analyzer
- Hormonal Assays
- Genetic Testing
- Wearable Devices
- Imaging Techniques (MRI, USG, DEXA)
- Metabolomics & Proteomics
- Stress and Sleep Monitors
- Calorimetry

- Biochemical Markers

Students will justify the selection of tools corresponding to each concept.

Activity 4: Presentation & Compilation of Report (1 Hour)

- Each student/group will present their identified concepts and proposed tools.
- Mentor will give feedback.
- Final report to be submitted summarizing:
    - Selected Unani Concepts
    - Rationale for their Validation
    - Proposed Tools/Technologies for each
    - Expected Outcomes of Validation Studies

Practical Training 29.2 Diagnostic tools in validation of *Mizaj*

Total Duration: 4 Hours

Activity 1: Introduction & Overview by Mentor (30 Minutes)

Mentor will provide an overview of:

- Concept of *Mizaj* in Unani Medicine
- Importance of its scientific validation
- Tools currently used or proposed for *Mizaj* assessment

Examples of Diagnostic Tools:

- Pulse Analysis Devices
- Skin & Body Temperature Analysis
- Bioelectrical Impedance Analysis (BIA)
- Body Composition Analyzers
- Heart Rate Variability Monitors

- Psychological Assessment Tools
- Questionnaire based Tools
- AI-based Diagnostic Apps

Activity 2: Demonstration & Exploration of Tools (1.5 Hours)

Mentor will demonstrate working of selected tools (real or through videos/simulations).

Students will:

- Explore each tool
- Understand its principle
- Discuss possible relevance in *Mizaj* assessment

Activity 3: Group Discussion & Critical Analysis (1 Hour)

Students (in groups) will discuss:

- Which tools are most applicable for *Mizaj* validation?
- What are the limitations & challenges?
- Integration of modern diagnostics with Unani concepts.

Activity 4: Report Preparation & Submission (1 Hour)

Students will prepare a brief report (2-3 pages) including:

- List of tools explored
- Working principles
- Applicability in Mizaj assessment
- Limitations & Suggestions

Practical Training 29.3 Models for Integration

Total Duration: 6 Hours

Activity 1: Orientation & Concept Discussion (1 Hour)

Mentor will discuss:

- Concept of Healthcare Integration
- Global examples of Integrated Healthcare Models
- Government of India initiatives (like AYUSH Integration in Primary Healthcare)
- Challenges and Opportunities in Integrating Systems

Activity 2: Group Division & Brainstorming (1 Hour)

Students will form small groups and:

- Brainstorm possible models for integration.
- Identify objectives, stakeholders, and strategy of integration.
- Select a specific healthcare scenario (Hospital, Community Health Centre, Wellness Centre, Primary Health Centre etc.)

Activity 3: Model Designing & Development (2 Hours)

Each group will prepare their model either by:

- Drawing Flowcharts/Diagrams
- Conceptual Frameworks
- Layered Models
- Patient Flow Models
- Integration at Diagnostic, Treatment, Rehabilitation levels.

Activity 4: Group Presentation of Models (1 Hour)

Each group will present:

- Title of the Model
- Structure & Components
- Implementation Strategy
- Strengths & Challenges
- Expected Outcomes

Activity 5: Peer Review & Discussion (1 Hour)

- Students and Mentor will give feedback on each model.
- Suggestions for improvement.
- Feasibility and Practicality Discussion.

Practical Training 29.4 Hands-on Research & Validation Techniques in Unani Medicine

Total Duration: 4 hours

Activity 1: Literature Review & Database Search (1 Hour)

- Participants use PubMed, AYUSH Research Portal, and Unani manuscripts to find existing studies.
- Identify gaps in Unani research.

Activity 2: Standardization & Phytochemical Analysis (1.5 Hours)

- Hands-on session in a lab on phytochemical screening of a Unani formulation.
- Techniques include Thin-Layer Chromatography (TLC), HPLC, and microscopy.

Activity 3: Ethical Documentation & Case Report Writing (1.5 Hours)

- Participants practice writing an informed consent form and an ethics application for a Unani research study.
- Develop a mini case report on a Unani treatment protocol.

Experiential Learning Activity

Experiential-Learning Learning 29.1: Knowledge Validation Vs Knowledge Addition

Total Duration: 4 Hours

Activity 1: Orientation and Conceptual Discussion (1 Hour)

Mentor will explain:

- Definition of Knowledge Validation (Testing existing knowledge with evidence or tools).
- Definition of Knowledge Addition (Generating new knowledge through research/innovation).

- Importance of both in the growth of any medical system including Unani Medicine.

Discussion Points:

- Are all classical concepts validated?
- Is new knowledge addition required in Unani Medicine?
- Can modern research add new dimensions to traditional knowledge?

Activity 2: Group Discussion and Identification of Examples (1 Hour)

Students will be divided into small groups and will:

- Discuss examples from Unani literature or modern research where:
    - Knowledge was validated
    - Knowledge was added (new findings or concepts)

Sample Examples:

Validation of Mizaj by physiological parameters

Discovery of new pharmacological action of a traditional drug

Clinical trials on Ilaj-bit-Tadbeer

Integration of modern nutrition science in Unani dietetics

Activity 3: Case Study Analysis (1 Hour)

Each group will be given a case study related to Unani or modern medicine.

Examples:

- Validation of Regimenal Therapy (Ilaj-bit-Tadbeer)
- Addition of new herbal drug formulations
- Modern tools validating Humoural Theory
- Discovery of microbiome's impact on health

Students will analyze:

- Whether the case represents knowledge validation or addition.

- Tools/methodologies used.
- Implications of the research.

Activity 4: Presentation and Reflection (1 Hour)

- Each group will present their findings (5-7 minutes each).
- Open House Discussion.
- Mentor will give feedback and summarize key learning points.

Experiential-Learning Learning 29.2: Future research in Unani Medicine

Total Duration: 6 Hours

Activity 1: Orientation & Guidelines by Mentor (30 minutes)

Mentor will explain:

- Sources of literature search (PubMed, AYUSH Research Portal, ResearchGate, Google Scholar, CCRUM website, etc.)
- Guidelines for searching recent research (Last 5-10 years)
- Focus Areas:
    - Drug Research
    - Disease Management
    - New Methodologies
    - Technology Integration
    - Preventive and Lifestyle Medicine

Activity 2: Literature Search & Review (2 Hours)

Students will:

- Search and collect recent research (AYUSH & Modern Medical Sciences)
- Identify research topics, methodologies, and outcomes
- Classify research under AYUSH and Modern Medicine

Activity 3: Comparative Analysis & Identifying Potential Application (2 Hours)

Students will:

- Compare AYUSH research trends with research in other medical sciences
- Identify any innovative approaches, techniques, or findings from other systems that may be applicable or adaptable in Unani Medicine.

Examples:

- Artificial Intelligence in Diagnosis
- Phytochemical Research
- Nanotechnology in Herbal Medicine
- Clinical Trials on Traditional Therapies
- Integration of Genomics with Mizaj assessment

Activity 4: Report Preparation & Presentation (1 Hours)

Students will prepare a report and presentation highlighting:

- Key research trends in AYUSH
- Key research trends in Modern Medicine
- Potential applications in Unani Medicine
- Suggestions for future research

Activity 5: Open Discussion & Feedback (60 Minutes)

- Presentation by Students
- Open House Discussion
- Mentor Feedback and Summary

Experiential-Learning Learning 29.3: Benefits of Integration of health Systems

Total Duration: 3 hours

1. **Activity (30 min):**

- Participants brainstorm and list existing health systems in India and globally.
- Small groups discuss their perceptions of integration.

2. **Case Study Analysis (1 hour):**
   - Groups analyze successful integration examples (e.g. Germany's Naturopathy Integration).
   - Presentation of findings and discussion.
3. **Simulation Exercise (1.5 hours):**
   - Participants role-play as practitioners, policymakers, and patients in a scenario where integration is being proposed in a region.
   - Each role presents their perspectives, benefits, and concerns in a debate-style format.

Experiential-Learning Learning 29.4: Integration Model designing

Total duration: 4 hours

1. **Interactive Discussion (30 minutes):**
   - Overview of parallel, collaborative, and fully integrated models using real-world examples.
2. **Reflections on Models (30 minutes)**
   - Participants reflect on which model suits the Indian healthcare system.
3. **Group Task - Model Design Challenge (3 hours):**
   - Groups design a hypothetical integrated healthcare system for a region.
   - They define the service delivery model, collaboration strategies, and referral mechanisms between modern and AYUSH systems.
   - Presentation and peer feedback.
   - Participants engage in a Q&A session.

Experiential-Learning Learning 29.5: Limitations and Challenges in Integration

Total Duration: 3 hours

1. **Role-Playing Debate (1.5 hours):**

- Participants are assigned roles (government officials, AYUSH practitioners, allopathic doctors, patients, insurers).
- Debate on financial, regulatory, cultural, and evidence-based challenges in integration.

2. **Problem-Solving Workshop (1 hour):**
   - Groups brainstorm solutions to key barriers such as lack of standardization, training gaps, and funding constraints.
3. **Reflection & Action Plan (30 min):**
   - Participants write an individual reflection on key takeaways.
   - Each participant prepares a short action plan for promoting integration in their work/study environment.

Experiential-Learning Learning 29.6: Priority Areas of Research in Unani Medicine

Total duration: 2 Hours

1. **Brainstorming & Group Discussion (30 min)**
   - Participants list existing and emerging research areas in Unani medicine.
   - Compare these with WHO's Traditional Medicine Strategy.
2. **Case Study Analysis (45 min)**
   - Groups analyze successful Unani research projects (e.g., projects by CCRUM).
   - Discussion on their impact on public health.
3. **Research Proposal Development Exercise (45 min)**
   - Participants draft a brief research proposal on an emerging Unani research area.

Experiential-Learning Learning 29.7: Validation Process of Traditional Medicine Concepts

Total Duration: 2 Hours

1. **Role-Playing Exercise – "The Scientist vs. The Hakim" (1 Hour)**
   - One group presents traditional Unani medicine concepts.
   - The other group, as modern scientists, challenges them with scientific queries.

- Discussion on how standardization, clinical trials, and experimental validation can bridge the gap.

2. **Interactive Case Discussion (1 Hour)**
    - Groups analyze examples where Unani medicine has undergone scientific validation (e.g., clinical trials on Various Unani Formulations).

Discussion on challenges and best practices.

Experiential-Learning Learning 29.8: Research Ethics – Unani and Modern View

Total Duration: 2 Hours

1. **Ethics Dilemma Role-Play (1 Hour)**
    - Participants act as Unani researchers, ethics committee members, and trial participants in a scenario involving a new herbal drug trial.
    - Debate ethical concerns (informed consent, safety, patient rights).
2. **Guidelines Comparison & Discussion (1 Hour)**
    - Participants compare Unani ethical guidelines with ICMR and WHO research ethics.
    - Discussion on ethical challenges in animal trials, human subjects, and intellectual property rights.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Viva (20 marks): shall be conducted on topics like Core Concepts of Unani Medicine and their scientific interpretation, Integration of Health systems, Research Ethics. Log Book (15 marks): Practical on - Adapt various diagnostic tools in validation of *Mizaj* recorded in Log book shall be evaluated. Creative Writing (15 marks): on the topic- Knowledge Validation and Knowledge addition. Or Any practical in converted form can be taken for assessment (25 marks).	4

and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Module 30 : طبی تعلیمی ٹیکنالوجی Medical Education Technology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Discuss the foundational concepts of education technology.
2. Implement various teaching/learning methods using technology.
3. Evaluate and utilize the latest educational tools.
4. Recognize and address the limitations of technology in educational settings.
5. Apply the principles of communication in effective teaching.

Unit 1 تعلیمی ٹیکنالوجی کے بنیادی اصول Basics of Education Technology

30.1.1 تعلیمی ٹیکنالوجی کی تعریف اور دائرہ کار

Definition and scope of Education Technology

30.1.2 تاریخی ارتقاء اور اہمیت

Historical evolution and significance

30.1.3 کلیدی مفاہیم: ڈیجیٹل خواندگی، ای-لرننگ، بلینڈڈ لرننگ

Key concepts: Digital Literacy, e-Learning, Blended Learning

30.1.4 بنیادی تعلیمی آلات (ایل ایم ایس، ویڈیو کانفرنسنگ) ترتیب دینا

Setting up basic educational tools (LMS, video conferencing)

30.1.5 مقبول تعلیمی پلیٹ فارمز پر اکاؤنٹس بنانا

Creating accounts on popular educational platforms

30.1.6 ڈیجیٹل تعلیمی ماحول میں نیویگیٹ کرنا

Navigating digital learning environments

References: 66,67,68,69,70,71,83

3A	3B	3C	3D	3E	3F	3G
CO6	Elaborate the definition and scope of Education Technology	1	Lecture	CC	Knows-how	TUT,SDL,L&PPT
CO6	Demonstrate basic Educational tools	1	Practical30.1	PSY-SET	Shows-how	ML,PT,D
CO6	Create accounts on popular educational platforms	2	Practical30.2	PSY-ORG	Shows-how	PT,Mnt,BL,D
CO6	Discuss historical evolution and significance of Education Technology	1	Lecture	CC	Knows-how	L&GD,DIS,TUT
CO6	Describe Key concepts: Digital Literacy, e-Learning, Blended Learning	1	Lecture	CC	Knows-how	TUT,L&PPT ,BL
CO6	Demonstrate digital learning environments	1	Practical30.3	PSY-SET	Does	EDU,Mnt,D,PT
CO6	Apply technology in teaching	8	Experiential-Learning30.1	PSY-ADT	Does	PT,SIM,ML,RLE,EDU

Unit 2 تدریس و تعلّم کے طریقے اور تکنیکیں Teaching/Learning Methods & Techniques

30.2.1 روایتی بمقابلہ ٹیکنالوجی سے مزین تدریسی طریقوں کا جائزہ

Overview of traditional vs. technology-enhanced teaching methods

30.2.2 باہمی تعاونی تعلّم، فلپڈ کلاس روم، گیمیفیکیشن

Collaborative Learning, Flipped Classroom, Gamification

ٹیکنالوجی میں ترقی یافتہ ماحول میں تفریقی ہدایات30.2.3

Differentiated Instruction in a tech-rich environment

ٹیکنالوجی کو شامل کرتے ہوئے سبق کا منصوبہ ڈیزائن کرنا30.2.4

Designing a lesson plan incorporating technology

باہمی تعاونی منصوبوں کے لیے آلات (گوگل ڈاکس، پیڈلیٹ) کا استعمال30.2.5

Using tools for collaborative projects (Google Docs, Padlet)

کثیر الوسائط پریزنٹیشنز تیار کرنا30.2.6

Creating multimedia presentations

References: 72,73,75,76,77

3A	3B	3C	3D	3E	3F	3G
CO6	Compare traditional vs. technology-enhanced teaching methods Describe Collaborative Learning, Flipped Classroom, Gamification	3	Lecture	CE	Knows-how	L_VC,SDL,BL
CO6	Design a lesson plan incorporating technology Use tools for collaborative projects (Google Docs, Padlet) Create multimedia presentations	5	Practical30.4	PSY-ORG	Shows-how	PT,D,C_L,PrBL,DIS
CO6	Demonstrate continuous learning in Edu Tech (Education technology)	6	Experiential-Learning30.2	PSY-GUD	Does	DIS,Mnt,PER,W

Unit 3 تعلیمی ٹیکنالوجی کے جدید ترین ٹولز Latest Tools of Education Technology

ابھرتی ہوئی ٹیکنالوجیز (اے آر/وی آر، تعلیم میں مصنوعی ذہانت) کا جائزہ30.3.1

Overview of emerging technologies (AR/VR, AI in Education)

جانچ اور فیڈبیک کے آلات (کوئیزز، کاہوٹ)30.3.2

Tools for assessment and feedback (Quizziz, Kahoot!)

30.3.3 تعلیم میں ڈیٹا اینالیٹکس کی اہمیت

Importance of data analytics in education

30.3.4 مختلف تعلیمی ایپس کے ساتھ عملی تجربہ

Hands-on experience with various educational apps

30.3.5 آن لائن آلات کا استعمال کرتے ہوئے تقیمات اتیار کرنا

Creating assessments using online tools

30.3.6 تعلیمی سیاق و سباق میں اے آر/وی آر ایپلیکیشنز کی کھوج

Exploring AR/VR applications in educational contexts

References: 78,79,80,81,82,84

3A	3B	3C	3D	3E	3F	3G
CO6	Describe emerging technologies (Augmented Reality (AR)/ virtual Reality (VR), Artificial Intelligence (AI) in Education Identify Tools for assessment and feedback (Quizziz, Kahoot!) Discuss Importance of data analytics in education	2	Lecture	CC	Knows-how	DIS,IBL,L&GD,SY
CO6	Use various educational apps Create assessments using online tools Explore AR/VR applications in educational contexts	5	Practical30.5	CAN	Shows-how	TUT,W,DIS,EDU,PT
CO6	Measure the limitations in the use of Education Technology	6	Experiential-Learning30.3	PSY-MEC	Does	DIS,Mnt,BS,SIM,CBL

Unit 4 تعلیمی ٹیکنالوجی کی حدود Limitations of Education Technology

30.4.1 ڈیجیٹل تقسیم

The digital divide

30.4.2 تعلیمی ٹیکنالوجی میں رازداری اور تحفظ کے مسائل

Privacy and security issues in educational technology

30.4.3 اساتذہ کے درمیان ٹیکنالوجی کے خلاف مزاحمت کا چیلنج

The challenge of technology resistance among educators

30.4.4 ٹیکنالوجی سے متعلق مسائل کو کم کرنا

Mitigating tech-related issues

30.4.5 مؤثر تدریس و تعلّم کے لیے ابلاغی مہارتیں

Communication Skills for effective teaching/Learning

References: 84,85,153,154,155

3A	3B	3C	3D	3E	3F	3G
CO6	Describe the digital divide Enumerate Privacy and security issues in educational technology Analyze the challenge of technology resistance among educators	2	Lecture	CC	Knows-how	TUT,L&PPT ,BL,SDL
CO6	Prepare Case studies on failed tech implementations in education	2	Practical30.6	CAP	Shows-how	PrBL,CBL,Mnt,SDL,BS
CO6	Measure and mitigate tech-related issues	4	Practical30.7	PSY-MEC	Does	DIS,CBL,BS
CO6	Use and value technology in creating virtual classrooms	6	Experiential-Learning30.4	AFT-SET	Does	BL,EDU,D,PER,PT

Practical Training Activity

Practical Training 30.1 Setting up basic educational tools (LMS, video conferencing)

Total Duration: 1 Hour

The teacher will demonstrate the steps (15 min)

The student shall set up basic educational tool like LMS and Video conferencing (45 min)

Practical Training 30.2 Accounts on popular educational platforms

Total Duration: 2 Hours

Introduction to Educational Platforms (10 minutes)

- Welcome participants and introduce the topic: Why educational platforms are important.
- Briefly introduce the 2-3 platforms that will be discussed.
  - Examples: Bisag-edu, Coursera, Khan Academy, edX, Duolingo, Udemy, etc.
  - Highlight the types of courses they offer, the user experience, and the educational opportunities.
- Share any prerequisites or account types they need to know about (e.g., free vs. premium).

Activity 1: Signing Up for a Platform (20 minutes)

- **Step 1:** Demonstrate the account creation process on the first platform (e.g., Coursera or edX) using the projector.
  - Walk through the process of entering details: Name, email, password, agreeing to terms, etc.
- **Step 2:** Have participants sign up for the same platform on their own devices.
  - Encourage participants to follow along with the demonstration and ask questions if needed.
- **Step 3:** Provide support as participants complete their sign-up.
  - Answer any issues or challenges participants might face.

Activity 2: Exploring the Platform Features (25 minutes)

- **Step 1:** Once everyone has created an account, demonstrate how to explore different sections of the platform:
  - How to navigate to the courses or subjects.
  - How to enroll in a course or program.
  - Where to find the profile settings and update personal information.

- **Step 2:** Allow participants to explore the platform individually for 10 minutes.
  - Encourage them to search for a course they are interested in and try enrolling in a free course.
  - Ask them to update their profiles with a profile picture or bio, if applicable.
- **Step 3:** After exploration, gather feedback from participants on what they found most interesting or confusing.

Activity 3: Signing Up on Another Platform (20 minutes)

- **Step 1:** Demonstrate how to create an account on the second platform (e.g., Khan Academy or Duolingo).
  - Walk through the sign-up steps and any specific features of this platform.
- **Step 2:** Have participants sign up on their own devices for the second platform.
  - Provide assistance and answer any questions that arise during the process.

Activity 4: Comparing Platforms (15 minutes)

- **Step 1:** Have participants compare the two platforms they signed up for.
  - What features did they like the most on each platform?
  - Which platform seems most user-friendly to them?
  - What type of content is available on each platform (e.g., video courses, interactive lessons, certifications)?
- **Step 2:** Discuss as a group, allowing participants to share their thoughts.
  - Facilitate a discussion about the different platforms and which ones are best suited for various types of learners (e.g., visual learners, self-paced learners).

Activity 5: Common Account Management Tips (15 minutes)

- **Step 1:** Discuss best practices for managing educational platform accounts.
  - How to secure your account (using strong passwords, enabling two-factor authentication, etc.).
  - How to manage email preferences and notifications.
  - How to track progress in courses.
- **Step 2:** Discuss how to access certifications or grades once courses are completed.
  - Show participants how they can download certificates or check course progress.

Wrap-Up and Q&A (15 minutes)

- Summarize the steps for creating accounts on popular educational platforms.
- Review key features discussed during the session.
- Open the floor for any additional questions.
- Provide any additional resources (e.g., video tutorials, guides, etc.) to help participants continue exploring platforms on their own.

Practical Training 30.3 Digital learning environments

Total Duration: 1 Hour

1. Introduction to Digital Learning Environments (10 minutes)

- Briefly introduce digital learning environments (e.g., Google Classroom, Moodle).
- Explain their purpose: organizing learning content, interacting with instructors, tracking progress, etc.

2. Activity 1: Exploring the Platform (15 minutes)

- **Demonstration (5 minutes):** Show participants how to log into and navigate the platform.
  - Highlight key sections: dashboard, courses, assignments, notifications.
- **Exploration (10 minutes):** Allow participants to log into the platform and explore on their own. Encourage them to:
  - Find a course.
  - View course materials or assignments.
  - Navigate to the settings or profile area.

3. Activity 2: Interacting with Content and Tools (15 minutes)

- **Demonstration (5 minutes):** Show how to interact with content (e.g., submitting assignments, participating in discussions, or watching videos).
- **Practice (10 minutes):** Have participants:
  - Submit a practice assignment (or a sample).
  - Post a discussion comment or reply to a peer.

4. Activity 3: Managing Notifications and Settings (10 minutes)

- **Demonstration (5 minutes):** Show how to manage notifications and account settings.
    - Change notification preferences (e.g., email alerts for new assignments).
    - Update profile settings.
- **Practice (5 minutes):** Have participants adjust their notification settings and check their profiles.

5. Wrap-Up and Q&A (10 minutes)

- Recap key points: navigating the platform, interacting with content, and managing settings.
- Open the floor for any final questions.

Practical Training 30.4 Designing a lesson plan incorporating technology

Total Duration: 5 Hours

Introduction to Technology in Lesson Planning (30 minutes)

- Introduce the topic: Why integrating technology in lesson planning is important.
- Discuss key benefits: student engagement, collaboration, accessibility, creativity.
- Provide examples of tools used in tech-integrated lesson plans: Google Docs, Padlet, Canva, Slides, Kahoot, etc.
- Share essential components of a technology-driven lesson plan.

Activity 1: Designing a Lesson Plan Incorporating Technology (60 minutes)

Step 1: Demonstration (20 minutes)

- Explain structure & key elements of a technology-integrated lesson plan.
- Show a sample lesson plan template.

Step 2: Individual Activity (45 minutes)

- Participants will draft their own lesson plan using Google Docs (shared template).

Step 3: Sharing & Feedback (10 minutes)

- Select participants to share their plans briefly.
- Peer and facilitator feedback.

Activity 2: Using Tools for Collaborative Projects - Google Docs & Padlet (45 minutes)

Step 1: Demonstration (20 minutes)

- Demonstrate features of Google Docs for real-time collaboration.
- Demonstrate Padlet: creating a board, adding resources, commenting.

Step 2: Hands-on Activity (20 minutes)

- Participants will collaboratively create a Padlet wall for sharing teaching resources.
- In small groups, collaboratively edit a document on Google Docs.

Step 3: Reflection (5 minutes)

- Discuss participant experiences and uses in classroom settings.

Activity 3: Creating Multimedia Presentations (45 minutes)

Step 1: Demonstration (20 minutes)

- Showcase best practices in presentation design.
- Demonstrate using Canva and Google Slides for creating engaging multimedia content.

Step 2: Hands-on Practice (20 minutes)

- Participants will create a short multimedia presentation on any topic using Canva/Slides.

Step 3: Sharing (5 minutes)

- Volunteers present their slides briefly.

Activity 4: Group Presentations & Peer Review (30 minutes)

Step 1: Group Presentation (20 minutes)

- Participants present their designed lesson plans and multimedia presentations.

Step 2: Peer Review & Feedback (10 minutes)

- Participants give constructive feedback to each other.

Activity 5: Tips for Effective Technology Integration (30 minutes)

- Discuss common challenges & solutions in using technology in the classroom.

- Share tips on:
    - Choosing the right tool for the objective.
    - Ensuring accessibility.
    - Encouraging student collaboration & creativity.
- Provide resources & tutorials for further learning.

Wrap-Up and Q&A (15 minutes)

- Summarize key takeaways from the session:
    - Designing tech-integrated lesson plans.
    - Using collaborative tools effectively.
    - Creating multimedia presentations.
- Share additional resources (templates, video guides, useful links).

Practical Training 30.5 Hands-on experience with various educational apps

Total Duration: 5 Hours

Materials Needed:

- Laptop/Computer with internet access
- Smartphones/Tablets with pre-installed AR/VR apps (optional)
- Projector and screen (for demonstrations)
- Access to various educational apps (Kahoot, Quizizz, Mentimeter, Nearpod, Google Forms, Edmodo etc.)
- Access to AR/VR tools (Google Expeditions, 360-degree videos, Merge Cube, CoSpaces Edu, etc.)
- Handouts or guides with app instructions
- QR Codes for quick access to apps
- VR Headsets (optional)

Introduction to Educational Technology Tools (30 minutes)

- Introduce the importance of using educational apps and AR/VR in teaching-learning processes.
- Discuss:
    - How apps and tools engage learners.
    - Benefits of AR/VR in enhancing visualization and conceptual clarity.
- Provide examples of popular educational tools and AR/VR applications.

Activity 1: Hands-on with Educational Apps (60 minutes)

Step 1: Demonstration (15 minutes)

- Live demonstration of top educational apps:
    - Kahoot (quiz-based learning)
    - Quizizz (gamified quizzes)
    - Mentimeter (interactive polls)
    - Nearpod (interactive lessons)

Step 2: Participant Activity (45 minutes)

- Participants will create a quiz or poll on any one platform (Kahoot / Quizizz / Mentimeter).
- Attempt each other's quizzes.

Step 3: Reflection (15 minutes)

- Discuss usability, advantages, and classroom applicability of these apps.

Activity 2: Creating Assessments Using Online Tools (60 minutes)

Step 1: Demonstration (20 minutes)

- Demonstrate how to create assessments using:
    - Google Forms (Quizzes with auto-grading)
    - Microsoft Forms
    - Edmodo Assignments

Step 2: Hands-on Practice (30 minutes)

- Participants will create a short online assessment (MCQs, short answers, feedback form) using Google Forms or Microsoft Forms.

Step 3: Sharing & Feedback (10 minutes)

- Participants attempt each other's assessment links and give feedback.

Activity 3: Exploring AR/VR Applications in Education (60 minutes)

Step 1: Demonstration (20 minutes)

- Showcase AR/VR tools:
    - Google Expeditions
    - CoSpaces Edu
    - Merge Cube Apps
    - 360-degree YouTube videos for education
    - Use of QR codes to experience AR

Step 2: Hands-on Exploration (30 minutes)

- Participants will explore AR/VR apps on their devices.
- Experience a virtual field trip, science lab, or anatomy visualization using AR/VR tools.

Step 3: Reflection (10 minutes)

- Discuss how AR/VR can be integrated into lesson planning.
- Challenges and opportunities of AR/VR in education.

Activity 4: Designing a Mini Tech-Integrated Learning Activity (45 minutes)

Step 1: Group Work (30 minutes)

- In groups, participants will design a mini learning activity or lesson integrating:
    - An educational app (Quiz or Poll)
    - An online assessment tool
    - An AR/VR component

Step 2: Group Presentation (15 minutes)

- Each group presents their tech-integrated learning activity.

Activity 5: Tips, Best Practices & Resources (45 minutes)

- Discuss effective strategies for:
    - Selecting appropriate technology tools.
    - Engaging students through apps and AR/VR tools.
    - Addressing challenges (accessibility, internet issues, student engagement).
- Provide a curated list of resources, tutorials, and platforms for further exploration.

Practical Training 30.6 Case studies on failed tech implementations in education

Total Duration: 2 Hours

Introduction to the Session (10 minutes)

- Introduce the theme:

  "Not all technology integrations in education succeed — why is that?"
- Discuss the importance of learning from failures to ensure successful future implementations.
- Outline session flow.

Activity 1: Presentation of Selected Case Studies (30 minutes)

- Present 2-3 real-world case studies of failed tech integration in education (through PowerPoint/Video/Handouts).

Suggested Examples:

1. *Los Angeles iPad Program Failure*
2. *One Laptop per Child (OLPC) Project in Developing Countries*
3. *Virtual Schooling Failures during COVID-19 (various regions)*

Highlight for each:

- Objectives of the project
- Investment & Technology used

- What went wrong?
- Impact on students, teachers, and institutions

Activity 2: Group Discussion & Analysis (30 minutes)

Step 1: Group Formation (5 minutes)

- Divide participants into small groups.
- Assign one case study to each group.

Step 2: Group Discussion (20 minutes)

- Provide Case Study Analysis Template with guiding questions:
    - What were the main reasons for failure?
    - Could the failure have been prevented? How?
    - What were the key lessons learned?
    - What alternative approach would you suggest?

Step 3: Preparation for Presentation (5 minutes)

- Groups prepare a brief summary of their findings.

Activity 3: Group Presentations (30 minutes)

- Each group presents their case analysis (5-7 minutes per group).
- Encourage cross-questioning and discussion.
- Note common themes & recurring issues on the whiteboard.

Activity 4: Deriving Lessons & Best Practices (20 minutes)

Facilitator summarizes key takeaways:

- Common reasons for failure:
    - Lack of teacher training
    - Infrastructure issues
    - Ignoring user needs

- Poor planning & unrealistic expectations

- Best Practices for Successful Tech Integration:
  - Needs Assessment
  - Teacher Involvement & Training
  - Pilot Testing
  - Technical Support
  - Scalability & Sustainability Planning

Practical Training 30.7 Case studies and Group discussion on mitigating tech-related issues

Total Duration: 4 Hours

Activity 1: Introduction (15 minutes)

- Brief overview of the topic.
- Ask participants: *"What kind of tech issues have you experienced in your teaching-learning environment?"*
- Note common responses on the board.

Activity 2: Case Study Discussion 1 (45 minutes)

Case Study: *"Failure of an Online Learning Platform Due to Unanticipated User Load"*

- Distribute case study handout to each group.
- Provide guiding questions:
  - What went wrong?
  - How could it have been prevented?
  - What strategies would you recommend?

Group Discussion (25 minutes)

- Groups discuss and note key points.

Presentation (20 minutes)

- Each group shares their insights.
- Facilitator summarizes common themes.

Activity 3: Case Study Discussion 2 (45 minutes)

Case Study: *"Data Privacy Breach in an Educational Institution"*

- Distribute case study handout.
- Guiding questions for discussion:
    - What were the critical mistakes?
    - How did this impact stakeholders?
    - What mitigation measures should have been in place?

Group Discussion (25 minutes)

- Groups deliberate and prepare suggestions.

Presentation (20 minutes)

- Group presentations followed by facilitator's summary.

Activity 4: Group Discussion – Identifying Tech Issues & Solutions in Their Context (60 minutes)

- Divide participants into groups

Task:

- Each group discusses:
    - Major tech-related issues faced in their own context.
    - Methods currently used to measure these issues.
    - Proposed solutions or mitigation strategies.

Output:

- Groups prepare a brief presentation or poster highlighting:
    - Top 3 Issues
    - Impact

- Mitigation Plan

Group Presentations (10 minutes per group)

Activity 5: Case Study Discussion 3 (45 minutes)

Case Study: *"Unsuccessful Implementation of AR/VR in Classrooms"*

- Share real-life example where AR/VR tools failed due to lack of infrastructure, training, or relevance.

Discussion Points:

- What were the gaps in planning?
- How could the impact of failure have been reduced?
- How to better prepare for future tech implementations?

Group Discussion (25 minutes)

Presentations & Facilitator Summary (20 minutes)

Wrap-Up & Reflection (30 minutes)

- Open House Discussion:
  - What have you learned about managing tech-related issues?
  - Key takeaways from the case studies?
- Facilitator summarizes best practices for:
  - Measuring Issues
  - Reporting Mechanisms
  - Mitigation Strategies

Experiential Learning Activity

Experiential-Learning Learning 30.1: Tech-integrated lesson plan development and implementation it in a classroom setting

Total Duration: 8 Hours

Materials Needed:

- Access to online tools (Google Docs, Canva, Kahoot, Padlet, Mentimeter, YouTube, AR/VR tools etc.)
- Lesson Plan Template
- Rubrics for Evaluation

Activity 1: Introduction & Orientation (30 minutes)

- Overview of session objectives.
- Importance of integrating technology in lesson planning.
- Discuss key principles of tech-integrated pedagogy.
- Sharing examples of good tech-integrated lesson plans.

Activity 2: Exploring Digital Tools for Classroom (1 Hour)

- Demonstration of various educational technology tools for:
    - Content Creation (Canva, YouTube, AR/VR)
    - Collaboration (Google Docs, Padlet, Jamboard)
    - Assessment (Kahoot, Quizizz, Mentimeter)
    - Classroom Management (Google Classroom, Edmodo)

Hands-on Exploration (Participants use tools individually or in pairs)

Activity 3: Group Discussion – Planning the Lesson (45 minutes)

- Divide participants into small subject-wise or interest-wise groups.
- Task: Identify a topic from their curriculum where technology can be integrated effectively.
- Discuss how different tools can be incorporated for:
    - Engagement
    - Collaboration
    - Assessment
- Groups draft rough ideas.

Activity 4: Designing Tech-Integrated Lesson Plan (1 Hour 30 minutes)

- Provide structured Lesson Plan Template (with technology component).
- Participants prepare their detailed lesson plan including:
    - Learning Objectives
    - Tools/Apps to be used
    - Teaching-Learning Activities
    - Assessment Methods
    - Time Allocation

Facilitators support groups during planning.

Activity 5: Presentation of Lesson Plans (1 Hour 30 minutes)

- Each group presents their tech-integrated lesson plan.
- Presentation should cover:
    - Topic Chosen
    - Technology Used
    - Teaching Process
    - Expected Outcomes
    - Challenges Foreseen

Facilitator and peers give feedback.

Activity 6: Mock Implementation / Simulation in Classroom Setting (1 Hour 30 minutes)

- Selected groups simulate the classroom teaching using their lesson plan and tools.
- Role Play: Rest of the participants act as students.
- Demonstration of use of technology live.

Activity 7: Group Discussion – Reflection on Implementation (45 minutes)

- Discuss the following:
    - Challenges faced during simulation.

- What worked well?
- Scope for improvement?
- Readiness for real classroom scenario.

Facilitator to summarize key learnings.

Activity 8: Wrap-Up & Feedback (30 minutes)

- Recap of the whole process.
- Sharing of Best Lesson Plans.
- Open house for feedback and reflections.
- Distribution of sample e-resources & tools list for future use.

Experiential-Learning Learning 30.2: Attend Workshops/Seminars on Education Technology

Total Duration: 6 Hours

The student will participate in workshops or webinars on the latest trends in education technology. The Institute may also organize such workshops.

Experiential-Learning Learning 30.3: Feedback assessment on the use of Education Technology

Total Duration: 6 Hours

Activity 1: Introduction & Objectives by facilitator (30 Minutes)

- Introduction to the session objectives.
- Importance of feedback in assessing EdTech tools.
- Discuss types of feedback:
  - Learner Feedback
  - Teacher Feedback
  - Institutional Feedback

Activity 2: Case Study Presentation (45 Minutes)

- Share 2-3 Case Studies (successful & failed use of EdTech)
- Highlight how feedback helped or could have helped in these cases.
- Discuss:
    - What was done well?
    - What went wrong?
    - Role of feedback in each case.

Activity 3: Group Discussion – Designing Feedback Tools (1 Hour 15 Minutes)

- Participants divided into small groups.
- Task: Each group designs feedback tools for EdTech use in classrooms like:
    - Google Forms
    - Open-ended Questionnaires
    - Rating Scales
    - Poll Questions

Groups discuss parameters like:

- User Experience
- Ease of Access
- Engagement
- Learning Outcome
- Technical Challenges

Each group shares their designed feedback tool.

Activity 4: Administering Feedback Tools (1 Hour)

- Participants use the created feedback tools within the group or for other groups.
- Collect responses using Google Forms / Poll Tools / Printed Sheets.
- Conduct Quick Polls using Mentimeter or Slido for fun & engagement.

Activity 5: Feedback Analysis & Interpretation (1 Hour 15 Minutes)

- Demonstrate how to analyze feedback using Google Sheets / Excel.
- Group Task: Analyze the feedback received using:
    - Charts
    - Graphs
    - Summary Statements

Facilitator guides in identifying key findings:

- Positive Indicators
- Areas of Improvement
- Suggestions Received

Activity 6: Group Presentation & Discussion on Findings (1 Hour)

- Each group presents:
    - Their tool
    - Responses collected
    - Analysis findings
    - Suggestions for improving EdTech usage based on feedback

Facilitator provides insights and connects all findings to classroom realities.

Activity 7: Wrap-up & Reflection (15 Minutes)

- Open Discussion:
    - How useful was the feedback assessment process?
    - Will they use it in their own classrooms?
    - Reflection on EdTech Strengths & Limitations.

Experiential-Learning Learning 30.4: Shadow classroom teaching using technology

Total Duration: 6 Hours

Activity 1: Orientation & Guidelines for Shadowing (45 Minutes)

- Brief introduction about the purpose of shadowing a teacher using EdTech.
- Explain observation focus areas:
    - Types of technology used
    - Teacher's role while using technology
    - Students' engagement
    - Challenges faced
    - Teaching-learning impact
- Distribute observation sheets/checklists to students.
- Discuss code of conduct during classroom shadowing.

Activity 2: Shadowing a Teacher Using Technology (2 Hours 30 Minutes)

- Students individually or in pairs shadow a teacher in a live classroom using educational technology like:
    - Smartboards
    - Google Classroom
    - AR/VR tools
    - Kahoot/Quizizz
    - Multimedia Presentations
    - Online Assessments
- Students silently observe and note down:
    - EdTech tools used
    - Interaction style
    - Technical challenges faced
    - Students' response to technology

- Strengths and limitations observed

Activity 3: Reflection & Report Writing (1 Hour 15 Minutes)

- Students reflect individually and prepare a report on:
  - What did they observe?
  - What worked well in the class?
  - Any difficulties or gaps noticed?
  - How did technology impact student engagement & learning?
  - Suggestions for improvement

Provide a reflection template with specific questions to guide their writing.

Activity 4: Group Discussion & Sharing Experience (1 Hour)

- Students share their shadowing experiences in groups.
- Discuss:
  - Best practices observed
  - Common challenges faced by teachers
  - Creative uses of EdTech noticed
  - Solutions or ideas for better use of technology

Facilitator moderates the discussion and connects observations with pedagogical theories.

Activity 5: Feedback & Conclusion (30 Minutes)

- Students fill a feedback form about their shadowing experience.
- Facilitator summarizes key learnings from all participants.
- Discuss the importance of reflective practice in adopting technology effectively.
- Provide additional resources for classroom technology integration.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. App Based Question (20 Marks): An App Based Question shall be prepared on any of the Topics covered through lectures (Cognitive domain). Practical Viva (15 Marks): for the practical - Measure and mitigate tech-related issues. Class Presentation (15 Marks): on the topic - Use technology in creating virtual classrooms shall be taken as assessment. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Semester No : 6

Module 31 : برمائی وفقاری فزیالوجی Vertebrate and Amphibian Physiology

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe the Physiology of vertebrates and Amphibians.
2. Compare vertebrate physiology principles.
3. Apply this knowledge in better comprehension of animal experimentaion results.
4. Conduct research by leveraging vertebrate and Amphibian physiology.
5. Apply Ethical and Regulatory Frameworks in Animal Research

Unit 1 فقاریہ حیوانات کی فعلیات کے عمومی اصول General Principles of Vertebrate Physiology

31.1.1 فقاریہ اور دوزیست فعلیات کا تعارف

Introduction to Vertebrate and AmphibianPhysiology

31.1.2علیحدہ اعضائی ماڈلز میں فعلیاتی ردِعمل

Physiological Responses in Isolated Organ Models

31.1.3بڑے اعضائی نظاموں کی تقابلی فعلیات

Comparative Physiology of Major Organ Systems

References: 156,157,158,159,160,161

3A	3B	3C	3D	3E	3F	3G
CO3	Describe Vertebrate and Amphibian Physiology	1	Lecture	CC	Know	L&PPT ,SDL,TUT
CO3	Measure Physiological Responses in Isolated Organ Models	4	Practical31.1	PSY-MEC	Shows-how	DA,DL,PT
CO3	Demonstrate Animal Behavior and Reflexes	4	Experiential-Learning31.1	PSY-SET	Does	D,PT,SIM,DL
CO3	Identify Vertebrate Organ Functions	4	Experiential-Learning31.2	CAN	Does	D,D-M,TUT,SIM
CO3	Summarize Comparative Physiology of Major Organ Systems	2	Lecture	CC	Knows-how	DIS,L_VC,FC
CO3,CO5, CO6	Demonstrate Cell Culture-Based Physiological Assays	3	Practical31.2	PSY-SET	Shows-how	W,PT,SIM,DL,D

Unit 2 عام تجرباتی جانوروں کی فعلیات Physiology of Common Lab Animals

31.2.1مینڈک کی فعلیات

Physiology of Frog

چوہےاور گنی پگ کی فعلیات31.2.2

Physiology of Mouse and Guinea Pig

References: 163,165,166,167

3A	3B	3C	3D	3E	3F	3G
CO3	Characterize Comparative Physiology of Frog, Mouse, and Guinea Pig	2	Lecture	CC	Knows-how	DIS,L&PPT
CO3	Describe Nervous, Cardiovascular, and Digestive Systems in Amphibians and Mammals	3	Lecture	CC	Knows-how	L&PPT ,DIS,SDL
CO3	Measure Drug Response in Small Mammals	4	Practical31.3	PSY-MEC	Shows-how	SIM,DA,PT,D-M,Mnt
CO3	Demonstrate virtually Frog Cardiac and Neuromuscular Physiology	4	Experiential-Learning31.3	PSY-SET	Does	D-M,D,EDU,SIM
CO3	Design Experimental Models in AYUSH Research	4	Experiential-Learning31.4	PSY-ORG	Does	CBL,SDL,PrBL,DIS,JC
CO3	Demonstrate Frog Heart and Muscle Physiology	4	Practical31.4	PSY-SET	Shows-how	PT,DIS,SIM,SDL,D-M

Unit 3 حیوانی تجربات کاتبادل Alternate to Animal Experimentation

حیوانی تحقیق میں اخلاقی اور انضباطی ڈھانچے31.3.1

Ethical and Regulatory Frameworks in Animal Research

یر حیوانی جانچ کے ماڈلز میں پیش رفت31.3.2

Advances in Non-Animal Testing Models 31.3. 3فعلیاتی مطالعات کے لیے اِن سلیکو ماڈلنگ

In Silico Modeling for Physiological Studies

لیاتی کلچر پر مبنی فعلیاتی پرکھ31.3.4

Cell Culture-Based Physiological Assays

References: 168,169,170,171,172,173,174,175

3A	3B	3C	3D	3E	3F	3G
CO3,CO6	Describe Ethical and Regulatory Frameworks in Animal Research	1	Lecture	AFT-VAL	Knows-how	RP,L,DIS,Mnt
CO3,CO5, CO6	Review advances in Non-Animal Testing Models	1	Lecture	CC	Knows-how	W,DIS,L&GD,TUT
CO3	Illustrate In Silico Modeling for Physiological Studies	3	Practical31.5	CC	Shows-how	EDU,W,SDL,D-M,D
CO3,CO5, CO6	Demonstrate Organ-on-a-Chip Technology	2	Practical31.6	PSY-SET	Shows-how	DIS,CBL,W,SIM,DL
CO3	Adapt and value successful Alternatives in Research	2	Experiential-Learning31.5	AFT-SET	Does	CBL,LS,BS,C_L,DIS
CO3,CO6	Discuss future Directions in Non-Animal Testing	4	Experiential-Learning31.6	CC	Does	SDL,BS,DIS,SY
CO3,CO5, CO6	Perform Virtual Lab Simulations on Pharmacological and Toxicological Studies	4	Experiential-Learning31.7	PSY-MEC	Does	D,ML,EDU,PT,SIM

Practical Training Activity

Practical Training 31.1 Physiological Responses in Isolated Organ Models

Total Duration: 4 Hours

1. Demonstration by Teacher (1 Hour)

- Introduction to the isolated organ bath setup.
- Preparation of physiological solution.
- Mounting of tissue in organ bath.
- Calibration and setting of recording system.

2. Student Practical Activity (2 Hours)

- Mounting the isolated tissue.
- Application of different stimuli/drugs.
- Observation and recording of:
    - Contraction or relaxation patterns.
    - Amplitude and frequency of responses.
    - Latency period and duration of responses.

Example Stimuli/Drugs:

Tissue	Drug/Stimulus	Observed Response
Frog Heart	Adrenaline	Increased heart rate
Guinea Pig Ileum	Acetylcholine	Increased contraction
Frog Muscle	Electrical Stimulation	Muscle contraction

3. Data Collection & Analysis (30 Minutes)

- Graphical representation of responses.
- Dose-response curve plotting (if applicable).

- Calculation of parameters like EC50, Maximum Response.

4. Report Preparation & Discussion (30 Minutes)

Report to include:

- Aim and Objective
- Materials and Methods
- Observations
- Graphs/Charts
- Interpretation of results
- Physiological mechanism behind responses
- Conclusion

Practical Training 31.2 Cell Culture-Based Physiological Assays

Total Duration: 3 Hours

1. Introduction by Teacher (30 Minutes)

- What is Cell Culture?
- Applications in Physiology, Pharmacology, and AYUSH Research.
- Importance of In Vitro Assays:
    - Cytotoxicity Assay
    - Cell Proliferation Assay
    - Anti-oxidant Assay
    - Anti-inflammatory Assay
- Equipment & Biosafety Considerations.

2. Demonstration (45 Minutes)

- Preparation of Cell Culture Media.

- Maintenance of Cell Lines.
- Performing a basic physiological assay (Example):
    - MTT Assay for Cell Viability.
    - Trypan Blue Exclusion Test.
    - ROS (Reactive Oxygen Species) Generation Assay.
    - Observation of Morphological Changes under Inverted Microscope.

3. Hands-on Practice by Students (1 Hour)

- Students will:
    - Handle cultured cells (Demonstration/Virtual Simulation depending on facility availability).
    - Add test substances (e.g., Unani drug extract or known drug) to cell culture.
    - Measure cell viability or other responses.
    - Record observations.

4. Data Analysis & Discussion (45 Minutes)

- Plotting of Results.
- Interpretation of cell viability or other assay outputs.
- Discussion on:
    - Relevance to Unani Pharmacology.
    - Future research potential.
    - Ethical aspects of cell culture-based research.

Suggested Resources:

- Online Simulation of Cell Culture
- Protocols for Cell Culture & Assays (NCBI/ResearchGate)
- Research Articles on Cell Culture in AYUSH Medicine Validation.

Practical Training 31.3 Organ Bath Studies for Drug Response in Small Mammals

Total Duration: 4 Hours

Materials and Equipment:

- Organ Bath Apparatus with lever system
- Kymograph or Data Acquisition System
- Isolated tissue (rat ileum, guinea pig ileum, frog muscle, etc.)
- Physiological solution (Tyrode's or Ringer's solution)
- Aeration system (Oxygen/Carbogen supply)
- Drugs for experimentation (Acetylcholine, Adrenaline, Histamine, Unani drugs/extracts)

1. Introduction and Demonstration by Mentor (45 minutes)

- Principle of Organ Bath studies.
- Types of tissues commonly used.
- Safety and ethical considerations.
- Demonstration of:
    - Mounting of tissue.
    - Aeration and temperature maintenance.
    - Drug administration and recording.

2. Hands-on Practical by Students (2.5 Hours)

Students will:

- Prepare tissue for the organ bath.
- Mount the tissue correctly.
- Administer increasing doses of a standard drug.
- Record contractions/relaxations.
- Plot the dose-response curve.
- Compare response with an Unani drug extract (if feasible).

3. Discussion and Interpretation (30 minutes)

- Analysis of tissue response.
- Understanding agonist vs antagonist actions.
- Dose-response relationship.
- Relevance to Unani pharmacology (Afaal-e-Advia & Mizaj).

4. Report Writing (15 minutes)

- Principle
- Procedure
- Observations
- Dose-response curve
- Discussion
- Conclusion

Ethical Considerations:

- Emphasis on animal ethics and replacement with simulation models where possible.
- Alternatively, demonstration videos/simulations may be used.

Suggested Simulation Alternatives (if animal experiments not permitted):

- Virtual Pharmacology Lab Simulations
- Amrita VLAB: Organ Bath Simulation
- PharmaCALC Dose Response Simulator

Practical Training 31.4 Frog Heart and Muscle Physiology Experiments

Total Duration: 4 Hours

1. Demonstration by Teacher (1 Hour)

- Handling and Preparation of Frog for experiments.

- Setting up Muscle Physiology Apparatus (Kymograph or Virtual Lab).
- Frog Heart Preparation — Exposure of heart and mounting for recording.

2. Experiments to be Demonstrated & Performed by Students (2 Hours)

A. Frog Heart Experiments

- Recording Normal Cardiac Cycle.
- Effect of:
    - Temperature (Warm & Cold Ringer's Solution)
    - Adrenaline & Acetylcholine
    - Ions like Ca^{2+} and K^{+}
- Stannius Ligature experiments (to demonstrate pacemaker activity).

B. Frog Muscle Experiments

- Recording Simple Muscle Twitch.
- Effect of:
    - Temperature
    - Strength of stimulus (Threshold, Maximal, Submaximal)
- Phenomenon of:
    - Muscle Fatigue
    - Tetanus (Repeated Stimuli)

3. Data Collection, Analysis & Interpretation (30 Minutes)

- Recording Graphs of heart and muscle contractions.
- Analysis of:
    - Latent Period
    - Contraction & Relaxation Time
    - Effect of various agents on force and frequency.

- Interpretation of physiological mechanisms involved.

4. Correlation & Discussion (30 Minutes)

- Discussion on application of experimental findings in:
    - Drug Testing
    - Cardiac Physiology
    - Neuromuscular Disorders
- Relating findings with Unani concepts:
    - Quwat-e-Qabizah (Contractile Power)
    - Quwat-e-Dafiah (Expulsive Power)
    - Tabiyat and Heart Function

Practical Training 31.5 In Silico Modeling for Physiological Studies

Total Duration: 3 Hours

1. Introduction & Demonstration by Teacher (30 Minutes)

- Concept of In Silico Modelling.
- Applications in:
    - Cardiovascular Physiology
    - Respiratory Physiology
    - Endocrine Systems
    - Pharmacokinetics & Pharmacodynamics
- Importance in AYUSH & Unani Medicine Research.

2. Hands-on Practice by Students (2 Hours)

A. Familiarization with Modelling Tools

Examples of commonly used tools:

- Cell Designer
- Virtual Cell (V-Cell)
- COPASI (Complex Pathway Simulator)
- Physiome Model Repository
- AYUSH Research Software (if available)

B. Activities

- Building a Simple Physiological Model (e.g., Glucose-Insulin Regulation, Cardiac Cycle Simulation).
- Running Simulations with varying parameters (drug doses, environmental conditions, physiological variables).
- Analyzing output graphs — heart rate, hormone levels, enzyme kinetics, etc.

3. Data Analysis & Discussion (30 Minutes)

- Interpretation of simulation results.
- Relevance to:
    - Disease Modelling
    - Herbal Drug Action Mechanism
    - Personalized Medicine
- Advantages & Limitations of In Silico Models.
- Ethical considerations and reduction of animal usage in research.

Suggested Resources:

- Virtual Cell
- Cell Designer
- COPASI
- Physiome Model Repository
- Research Articles on In Silico Modelling in AYUSH Systems.

Practical Training 31.6 Organ-on-a-Chip Technology Demonstration

Total Duration: 2 Hours

1. Introduction Lecture by Teacher (30 Minutes)

- Evolution from Cell Culture to Organ-on-a-Chip.
- Basic Concept: Microfluidics + Living Cells = Miniature Functional Organ Model.
- Types of Organ-on-a-Chip:
    - Lung-on-a-Chip
    - Liver-on-a-Chip
    - Gut-on-a-Chip
    - Heart-on-a-Chip
- Applications in:
    - Disease Modelling
    - Drug Toxicity Testing
    - Personalized Medicine
    - Integrative AYUSH Research.

2. Demonstration (30 Minutes)

- Virtual/Video Demonstration of an Organ-on-a-Chip Model.
- Showing working mechanism using animation or simulation.
- Components of OoC:
    - Microchannels
    - Living cells
    - Pumps & Sensors
- Data Output: What can be measured?

(Recommended Resource: Video Demonstrations from Wyss Institute, Harvard, or Labster Simulations)

3. Student Group Activity (30 Minutes)

- Discussion:
    - Identify any disease or physiological process that could be studied using OoC in AYUSH/Unani research.
- Brainstorm:
    - How could Unani drug extracts be tested for toxicity or efficacy using OoC models?
- Prepare a brief group presentation.

4. Conclusion & Q/A (30 Minutes)

- Summarizing key learning points.
- Real-life examples of Organ-on-a-Chip in pharmaceutical and AYUSH research.
- Discussion on future potential.

Suggested Resources:

- Organ-on-a-Chip Overview
- Labster Virtual Simulation: Organ-on-a-Chip Technology.

Experiential Learning Activity

Experiential-Learning Learning 31.1: Live Demonstration of Animal Behavior and Reflexes

Total Duration: 4 Hours

Suggested Animals for Observation (depending on ethical approvals and availability):

- Frog
- Fish
- Earthworm
- Insect Models (e.g., cockroach)
- Small Mammals (like white rats/mice - if available)

1. Demonstration of Reflex Actions (2 Hours)

Examples:

Animal	Observation	Reflex
Frog Limb	Withdrawal upon pinching	Withdrawal Reflex
Frog/Fish	Animal regains upright position after displacement	Righting Reflex
Earthworm	Rapid contraction and movement away from stimulus	Escape Response
Insect	Movement of antenna when touched	Antennal Reflex
Fish	Moving away or towards light source	Light Response

2. Demonstration of Behavioral Responses (1 Hour)

Examples:

- Taxis: Movement in response to light, heat or chemical (positive or negative response).
- Habituation: Repeated stimulation with no significant response after time.
- Feeding Behavior: Observing feeding patterns.
- Exploration Behavior: Response of an animal in a new environment.

3. Discussion and Interaction (30 Minutes)

- Mechanism of reflexes: Receptor → Sensory Neuron → CNS → Motor Neuron → Effector.
- Classification of Behavior: Innate vs Learned.
- Role of Nervous System in coordinating behavior.
- Adaptation significance of reflexes and behavior.

4. Report Preparation (30 Minutes)

Students will prepare a report including:

- Title of activity
- Objective
- Methodology
- Observations
- Discussion on physiological mechanism

- Conclusion

Optional:

If live animals are not available → Use Online Resources, Videos, or Simulation Software for:

- Reflex Demonstration
- Behavior Observation
- Virtual Lab Platforms

Experiential-Learning Learning 31.2: Simulation-based Learning on Organ Functions

Total Duration: 4 Hours

Suggested Organs for Simulation:

Organ/System	Functionality to Simulate
Heart	ECG generation, heart rate, blood pressure control, effects of exercise/drugs
Lungs	Spirometry simulation, gas exchange, lung volumes, respiratory rate
Kidney	Filtration rate, urine formation, electrolyte balance
Liver	Detoxification, metabolism of substances
Stomach/Digestive system	Enzyme activity, digestion process
Brain & Nervous System	Reflex actions, sensory-motor integration

Simulation Tools/Software (Suggested):

- PhysioEx (Virtual Physiology Lab)
- Visible Body
- Virtual Labs by Amrita Vishwa Vidyapeetham
- PhET Simulations
- BioDigital Human
- Virtual Heart Simulation

1. Introduction by Mentor (30 Minutes)

- Overview of Organ Functions.
- Importance of Simulation in Physiology Learning.
- Ethical and Safety advantages.

2. Simulation-Based Practical (2.5 Hours)

- Simulation of normal physiological functions of selected organs.
- Introduction of specific variables (e.g., exercise, stress, drugs) and observing changes.
- Virtual experiments like:
    - ECG recording
    - Spirometry
    - Glomerular Filtration Rate simulation
    - Heart Rate Variability
    - Gas exchange in lungs

3. Discussion & Interpretation (30 Minutes)

- Interpretation of Simulation Results.
- Correlation with real-life conditions & Unani concepts.
- Discussion on diagnostic relevance.

4. Report Writing (30 Minutes)

Students will prepare a report consisting of:

- Introduction
- Tools/software used
- Simulated Organ Functions
- Observations
- Interpretation

- Conclusion & Relevance to Clinical Practice

Experiential-Learning Learning 31.3: Virtual Lab on Frog Cardiac and Neuromuscular Physiology

Total Duration: 4 Hours

Platform/Resources:

- *Amrita Virtual Lab*
- *PhET Interactive Simulations*
- Video Demonstrations
- Simulation Software (if available in the institution)

1. Introduction and Orientation (30 minutes)

- Basic anatomy and physiology of frog heart & neuromuscular junction.
- Importance of frog models in experimental physiology.
- Introduction to virtual lab interface.
- Discussion on ethical aspects of replacing live animal experiments with simulations.

2. Virtual Experiments (2.5 Hours)

A. Frog Heart Experiments (Cardiac Physiology)

- Recording normal heart rate and force.
- Effect of temperature on heart activity.
- Effect of ions (K+, Ca++).
- Effect of drugs (Adrenaline, Acetylcholine, Pilocarpine).
- Study of cardiac inhibition and recovery.

B. Frog Neuromuscular Physiology

- Virtual setup for frog nerve-muscle preparation.
- Recording simple muscle twitch.

- Effect of temperature on contraction.
- Effect of fatigue.
- Summation and tetanus phenomena.
- Effect of drugs on neuromuscular transmission.

3. Data Recording and Analysis (30 minutes)

Students will:

- Record observations.
- Compare the effect of different variables.
- Plot graphs (HR vs Temperature, Muscle contraction vs Stimulus).

4. Report Preparation (30 minutes)

Students will submit a report containing:

- Aim and Objective
- Materials (Virtual tools)
- Procedure
- Observations
- Graphs
- Discussion & Interpretation
- Conclusion
- Application in Unani Medicine context (if applicable)

Experiential-Learning Learning 31.4: Case-Based Learning on Experimental Models in AYUSH Research

Total Duration: 4 Hours

1. Introduction (30 Minutes)

- Brief overview of experimental research in AYUSH.

- Importance of in-vitro, in-vivo, ex-vivo, and in-silico models.
- Scope of experimental validation of Unani concepts like Mizaj, drug action, or disease models.

2. Case Presentation (1.5 Hours)

Faculty will present 3-4 Case Studies highlighting:

- Selection of Experimental Model
- Study Design
- AYUSH Principle Targeted
- Tools and Techniques used
- Observations and Outcomes
- Challenges and Ethical Concerns

Example Case Studies:

1. *Experimental Validation of Unani concept of Mizaj through HRV and other Physiological Tools.*
2. *Animal Model for Anti-inflammatory Activity of a Unani Drug.*
3. *Cell Line Studies to Evaluate Hepatoprotective Effect of a Herbal Formulation.*
4. *Use of Molecular Docking in Identification of Active Compounds from a Unani Plant.*

3. Group Activity (1 Hour)

- Students will be divided into small groups.
- Each group will be given a case scenario related to AYUSH research.
- Task: Identify experimental model ⟶ Justify its selection ⟶ Outline brief methodology.

4. Presentation & Discussion (30 Minutes)

- Group-wise Presentation of their selected model and plan.
- Interactive discussion on:
    - Strengths & Limitations
    - Ethical considerations

- Translational potential
- Relevance to Unani or other AYUSH systems

Experiential-Learning Learning 31.5: Case-Based Discussion on Successful Alternatives in Research

Total Duration: 2 Hours

1. Introductory Talk by Mentor (20 Minutes)

- Ethics in animal research.
- 3Rs Principle: Replacement, Reduction, and Refinement.
- Need for alternatives to animal experimentation.
- Regulatory guidelines in India and globally.

2. Presentation & Discussion of Case Studies (50 Minutes)

Case Study 1: *Organ-on-a-Chip Technology*

- How human organ simulation on chips replaced animal testing in drug testing.

Case Study 2: *Computer-based Simulation (In-silico Models)*

- Use of software to simulate physiological processes (e.g., Virtual Frog Lab, Human Physiology Models).

Case Study 3: *Cell and Tissue Culture Techniques*

- Use of isolated cells for drug testing reducing animal use.

Case Study 4: *3D Bioprinting & Organoids*

- Artificial tissues mimicking human organ responses.

Case Study 5: *Historical Example from Ayurveda/Unani*

- Herbal safety validation without animal use (clinical observation-based studies).

3. Group Discussion and Reflection (30 Minutes)

Guided discussion with students on:

- What are the strengths and limitations of each alternative?

- Can these methods be used in AYUSH research?
- What is the future of animal-free research in medicine?

Discussion Questions:

- Are alternatives always feasible?
- How can AYUSH researchers adapt these alternatives?
- Can integration of traditional knowledge reduce animal testing?

4. Conclusion & Summary (20 Minutes)

- Key learning points.
- Emerging trends in animal-free research.
- Role of researchers in adopting ethical alternatives.

Experiential-Learning Learning 31.6: Group Seminar on Future Directions in Non-Animal Testing

Total Duration: 4 Hours

1. Introductory Lecture by Mentor (60 Minutes)

- History and Need for Non-Animal Testing.
- 3Rs Principle (Replacement, Reduction, Refinement).
- Global initiatives like NC3Rs, ECVAM, ICCVAM.
- Relevance of non-animal testing in AYUSH research.

2. Group Seminar Preparation (60 Minutes)

- Students will be divided into small groups (or individual student).
- Each group/ student will select/assign a specific topic related to future directions in non-animal testing.

Suggested Seminar Topics:

Group Topic: 1. Organ-on-a-Chip Technology & Microfluidics 2. 3D Bioprinting and Organoid Culture 3. In-silico Models & Computer Simulations 4. Stem Cell-based Testing 5. Artificial Intelligence & Machine Learning in Toxicology 6. Ethical & Regulatory Perspectives of Non-Animal Research 7. Potential of Non-Animal Methods in AYUSH/Unani Research

3. Seminar Presentations by Students (90 Minutes)

- Each group/student will present for 10-15 minutes.
- Open floor for Q&A after every presentation.

4. Concluding Remarks by Mentor (30 Minutes)

- Summary of key learning points.
- Discussion on challenges and opportunities for AYUSH researchers in adopting non-animal testing.
- Future research possibilities.

Experiential-Learning Learning 31.7: Virtual Lab Simulations on Pharmacological and Toxicological Studies

Total Duration: 4 Hours

1. Introduction to Virtual Labs (30 Minutes)

- Brief discussion by Mentor on:
    - Importance of virtual labs.
    - Advantages in pharmacology & toxicology studies.
    - Applications in AYUSH and Unani Medicine research.

Suggested Virtual Lab Platforms:

- *Pharmacology Virtual Lab – Amrita Vishwa Vidyapeetham*
- *IIT Virtual Labs – Pharmacology & Toxicology Module*
- *Harvard LabXchange – Toxicology Simulations*
- *Merlot Virtual Labs*
- *OECD QSAR Toolbox – Toxicology Prediction Tools*

2. Hands-on Exploration of Simulations (2 Hours)

Students will explore and perform the different virtual experiments on Pharmacology and Toxicology suggested by the mentor.

3. Analysis & Report Preparation (45 Minutes)

- Students will analyze the results of simulations.
- Prepare a short report highlighting:
    - Aim of Experiment
    - Methodology
    - Observations
    - Inference
    - Applications in AYUSH research

4. Group Discussion & Feedback (45 Minutes)

- Each group/student will briefly share their learning.
- Discussion on how virtual lab simulations can be integrated into AYUSH curriculum.
- Explore limitations and future scope.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. SAQ (5 Marks each)- 02 SAQs: Two SAQs on any topics from cognitive domain of this module shall be given for assessment- Trainers Report (15 Marks): on experiential learning topic- Design Experimental Models in AYUSH Research shall be taken for assessment. DOAP (25 Marks): Measure Physiological Responses in Isolated Organ Models.	4

Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	

Module 32 : جدید اضافات Recent Advances

Module Learning Objectives

(At the end of the module, the students should be able to)

1. Describe new genetic tools, AI, and immersive technologies in healthcare.
2. Apply modern technology to Unani therapies.
3. Comprehend Ethical considerations in technology-driven healthcare innovations.
4. Integrate recent technologies into personalized and evidence-based Unani medical practice.

Unit 1 جینومکس اور شخصی طب Genomics and Personalized Medicine

32.1.1 جین ایڈیٹنگ کے آلات- کرسپر

Gene editing tools - CRISPR

32.1.2 کینسر کے علاج میں ہدف شدہ تھراپیز اور حسب ضرورت علاج

Targeted Therapies and tailored treatments in cancer care

32.1.3 بیماری کی پیش گوئی اور علاج میں جینومکس کا کردار

Role of Genomics in Disease Prediction and Treatment

32.1.4 مزاج اور شخصی طب اور اس کا جینومکس کے ساتھ اِدغام

Mizaj and Personalized Medicine and its integration with genomics

References: 18,176,177,178,179

3A	3B	3C	3D	3E	3F	3G

CO3,CO5	Elaborate the role of Genomics in Disease Prediction and Treatment	1	Lecture	CC	Knows-how	L,TUT,DIS
CO3,CO5	Justify Integration of Genomics with Traditional Unani Practices	2	Lecture	CE	Knows-how	FC,L&GD,DIS
CO3,CO5	Demonstrate DNA Extraction and PCR Techniques	6	Practical32.1	PSY-SET	Shows-how	W,DL,PT,SIM
CO3,CO5	Adapt Personalized Treatment Approaches	2	Practical32.2	PSY-ADT	Shows-how	CBL,DIS,PER
CO3,CO5	Demonstrate Genome Sequencing Techniques	4	Experiential-Learning32.1	PSY-GUD	Does	SDL,SIM,DL,EDU
CO3,CO5, CO6	Conform Ethical and Regulatory Aspects of Personalized Medicine	2	Experiential-Learning32.2	AFT-RES	Does	Mnt,TUT,CBL,DIS
CO3,CO5	Perform Unani Genomic Counseling	2	Experiential-Learning32.3	PSY-MEC	Does	DIS,GBL,RP,SDL

Unit 2 مصنوعی ذہانت (اے آئی) اور مشین لرننگ Artificial Intelligence (AI) and Machine Learning

32.2.1 مصنوعی ذہانت اور مشین لرننگ کے بنیادی اصول

Basics of Artificial Intelligence and Machine Learning

32.2.2 طب یونانی اور طبی تشخیص میں اے آئی کے اطلاقات

Applications of AI in Unani Medicine and Healthcare Diagnostics

32.2.3 طب یونانی میں پیش قیاسی تجزیہ کا استعمال

Use of Predictive analysis in Unani Medicine

اے آئی پر مبنی فیصلہ سازی میں اخلاقی تقاضے اور تعصب 32.2.4 Ethical Considerations and Bias in AI-based Decision Making **References:** 180,181,182						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO3	Describe Artificial Intelligence and Machine Learning	1	Lecture	CC	Knows-how	LS,L&PPT ,TUT
CO3	Examine applications of AI in AYUSH and Healthcare Diagnostics	1	Lecture	CAN	Knows-how	L&GD,DIS
CO3,CO6	Examine Ethical Considerations and Bias in AI-based Decision Making	2	Lecture	CAP	Knows-how	FC,Mnt,TUT,DIS,L
CO3	Demonstrate AI Tools for Medical Imaging Analysis	2	Practical32.3	PSY-GUD	Shows-how	DIS,TUT,W,DL
CO3	Demonstrate Machine Learning Algorithms for Disease Prediction	2	Practical32.4	PSY-GUD	Shows-how	BS,DIS,SIM,DL
CO3	Discuss AI-assisted Unani Therapies	4	Practical32.5	PSY-SET	Shows-how	PER,CBL,TUT,DIS
CO3	Demonstrate AI-powered Chatbots for Unani Consultations	4	Experiential-Learning32.4	PSY-SET	Does	SIM,PT,W,D,DIS
CO3	Identify future of AI in Unani Medicine	2	Experiential-Learning32.5	CAN	Does	PER,DIS,IBL,BS,W

Unit 3 3تھری ڈی پرنٹنگ اور ورچوئل رئیلٹی (وی آر) اور آگمینٹڈ رئیلٹی (اے آر) 3D Printing and Virtual Reality (VR) and Augmented Reality (AR)

32.3.1 نظام صحت اور مصنوعی اعضاء میں تھری ڈی پرنٹنگ کے بنیادی اصول

Basics of 3D Printing in Healthcare and Prosthetics

32.3.2 بائیو پرنٹنگ ٹشوز: پیوند کاری کے لیے ٹشوز اور اعضاء کی تشکیل

Bioprinting Tissues: for creating tissues and organs for transplantation

32.3.3 طبی تعلیم میں ورچوئل رئیلٹی (وی آر) اور آگمینٹڈ رئیلٹی (اے آر)

Virtual Reality (VR) and Augmented Reality (AR) in Medical Education

32.3.4 مریضوں کی بحالی میں اے آر/وی آر کے آیوش پر مبنی اِطلاقات

Applications of AR/VR in AYUSH-based Patient Rehabilitation

References: 183,184,185,186,187

3A	3B	3C	3D	3E	3F	3G
CO3	Discuss basics of 3D Printing in Healthcare and Prosthetics	1	Lecture	CC	Knows-how	FC,TUT,SDL,L_VC
CO3,CO6	Examine the role of Virtual Reality (VR) and Augmented Reality (AR) in Medical Education	1	Lecture	CAN	Knows-how	L&GD,SDL,DIS
CO3	Determine the applications of AR/VR in AYUSH-based Patient Rehabilitation	1	Lecture	CE	Knows-how	FC,L_VC,DIS
CO3	Design and Print 3D medical Models	4	Practical32.6	PSY-ORG	Shows-how	PT,W,DIS,DL,SIM
CO3	Explore 3D-Printed Prosthetics	4	Experiential-Learning32.6	CAN	Does	DIS,CBL

CO3,CO6	Discuss Augmented reality (AR)/Virtual reality (VR) in Unani Medical Training	4	Experiential-Learning32.7	CC	Does	SY,PL,BS,DIS
CO3,CO6	Explore future trends in 3D and Immersive Technologies for Healthcare	4	Experiential-Learning32.8	PSY-ADT	Does	BS,PL,TBL,DIS

Practical Training Activity

Practical Training 32.1 DNA Extraction and PCR Techniques

Total Duration: 6 Hours

The practical activity is divided into the following sessions:

1. ***Introduction and Theoretical Background*** **(Duration: 1 hour)**

   This session will cover the explanation of DNA structure, its importance in research, the principle of DNA extraction, and the PCR technique. Special emphasis will be given to the applications of these techniques in AYUSH research.

2. ***Demonstration of DNA Extraction*** **(Duration: 2 hours)**

   A step-by-step demonstration of DNA isolation from plant leaves or buccal cells will be conducted using standard laboratory protocols.

3. ***Hands-on Practice of DNA Extraction*** **(Duration: 1 hour)**

   Students will perform DNA extraction themselves in small groups under the guidance of the instructor.

4. ***Demonstration of PCR Technique*** **(Duration: 1 hour)**

   This session will include explanation of PCR components, preparation of the reaction mixture, thermal cycling, and visualization of amplified DNA using agarose gel electrophoresis (if facilities are available).

5. ***Group Discussion and Application in AYUSH Research*** **(Duration: 1 hour)**

   A discussion session will be held focusing on the application of DNA extraction and PCR techniques in AYUSH research. Topics may include validation of medicinal plants, species identification, detection of genetic markers, and studies related to Mizaj (temperament).

Materials Required:

- Plant leaves / Buccal swab / Commercial DNA extraction kit
- Mortar & pestle / Centrifuge tubes
- Ethanol / Isopropanol
- PCR Machine (Thermal Cycler)
- Agarose Gel Electrophoresis set-up (Optional)
- DNA Ladder / Primers / Taq Polymerase
- Micropipettes / Gloves / Buffer solutions

1. Applications in AYUSH / Unani Medicine
2. Conclusion
3. References

Suggested Applications in AYUSH & Unani Medicine:

- Authentication of medicinal plants used in formulations.
- Molecular identification of species.
- Study of genetic variation linked with Mizaj (temperament).
- Identification of active components at genetic level.
- Validation of Unani Pharmacognosy.

Practical Training 32.2 Personalized Treatment Approaches

Total Duration: 2 Hours

1. **Introduction to Personalized Medicine (Duration: 30 minutes)**

   Explanation of the concept, its importance, current trends in modern and traditional medicine, and its relevance in AYUSH systems.

2. **Presentation of Case Studies (Duration: 30 minutes)**

   Selected case studies will be presented illustrating personalized treatment strategies based on genetic profiling, lifestyle assessment, and patient-specific factors.

3. **Group Discussion and Analysis (Duration: 30 minutes)**

   Students will be divided into small groups to analyze the case studies and discuss possible personalized approaches from a Unani perspective.

4. **Presentations by Students (Duration: 30 minutes)**

   Each group will briefly present their analysis and proposed personalized treatment strategy, integrating modern and Unani approaches.

Suggested Applications in AYUSH and Unani Medicine:

- Development of patient-specific treatment protocols based on *Mizaj* (temperament).
- Use of genetic and lifestyle data for drug selection and dose optimization.
- Prevention strategies tailored to individual predispositions.
- Enhancing patient care through integrated personalized healthcare models.

Practical Training 32.3 AI Tools for Medical Imaging Analysis

Total Duration: 2 Hours

1. **Introduction to AI in Healthcare (Duration: 30 Minutes)**

- Brief lecture covering:
  - Overview of Artificial Intelligence, Machine Learning, and Deep Learning.
  - Role of AI in healthcare diagnostics.
  - Relevance to AYUSH and Unani Medicine.

2. **Medical Imaging and AI Applications (Duration: 30 Minutes)**
   - X-ray
   - CT Scan
   - MRI

- Ultrasound

- Demonstration of AI-based image analysis applications like:
  - Detection of fractures, tumors, lesions.
  - Image enhancement and pattern recognition.
  - AI in histopathology and radiology.

3. **Demonstration of AI Tools for Image Analysis (Duration: 30 Minutes)**

- Live or recorded demonstration of freely available AI tools such as:
  - Google Teachable Machine
  - ImageJ with AI Plugins
  - Deep Learning AI-based platforms
  - Sample case studies on AI applications in image analysis.

4. **Discussion on AI in AYUSH Context (Duration: 30 Minutes)**
   - Identification of medicinal plants through image analysis.
   - Skin disease diagnosis in Unani Dermatology.
   - Pattern recognition in Mizaj determination.
   - Disease prognosis using imaging-based biomarkers.

Practical Training 32.4 Machine Learning Algorithms for Disease Prediction

Total Duration: 2 Hours

1. **Introduction to Machine Learning Concepts (Duration: 30 Minutes)**

- Explanation of:
  - What is Machine Learning?
  - Difference between Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL).
  - Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning.

2. **Overview of ML Algorithms for Disease Prediction (Duration: 30 Minutes)**

- Discussion and explanation of key ML algorithms:
    - Decision Trees
    - Logistic Regression
    - Support Vector Machines (SVM)
    - Random Forest
    - K-Nearest Neighbors (KNN)
    - Naive Bayes
    - Neural Networks
- Real-world examples of disease prediction using ML models.

3. **Demonstration of ML Tools and Platforms (Duration: 30 Minutes)**

- Introduction to simple ML platforms like:
    - Google Teachable Machine
    - Orange Data Mining Tool
    - Weka Software
    - Python-based ML (Scikit-learn) overview
- Live demonstration of creating a simple disease prediction model using sample data.

4. **Discussion on ML Applications in AYUSH Research (Duration: 30 Minutes)**

- Brainstorming session on how ML can help in AYUSH and Unani Medicine:
    - Prediction of Mizaj (temperament) based disorders.
    - Identification of disease risk factors.
    - Personalized treatment models based on patient data.
    - Drug response prediction in Unani formulations.
    - Early diagnosis based on patient symptoms and historical data.

Practical Training 32.5 AI-assisted AYUSH Therapies

Total Duration: 4 Hours

1. **Introduction to AI in AYUSH Healthcare by facilitator (Duration: 1 Hour)**

- Overview of AI tools used in healthcare.
- Scope of AI in AYUSH:
    - Diagnosis support
    - Personalized medicine
    - Treatment monitoring
    - Integration with wearable technology
- Examples of global initiatives and Indian efforts in AI for traditional medicine.

2. **Case Presentation and Group Discussion (Duration: 2 Hours)**

- Presentation of 2-3 selected case studies (real or hypothetical), such as:
    - AI-assisted Mizaj (temperament) assessment tool.
    - AI-based decision support system for Unani formulations.
    - AI-based monitoring of lifestyle diseases managed with AYUSH therapies.
- Students divided into groups to discuss:
    - Clinical background of the case.
    - How AI was applied?
    - Outcomes achieved.
    - Challenges faced.
    - Ethical considerations.

3. **Group Presentation and Class Discussion (Duration: 1 Hour)**

- Each group presents their case analysis.
- Facilitated discussion on future prospects of AI in AYUSH systems.

- Reflection on how AI can complement personalized AYUSH therapies.
- Exploring research gaps and opportunities in AI-assisted Unani healthcare.

Practical Training 32.6 3D medical Models

Total Duration: 4 Hours

1. Introduction and Theoretical Background (1 Hour)

- Concept of 3D designing and printing.
- Importance of 3D models in medical sciences.
- Applications in teaching-learning, research, and clinical practice.
- Examples of 3D models relevant to Unani medicine (organs, medicinal plant parts, anatomical structures).

2. Demonstration of 3D Designing (1 Hour)

- Introduction to free and user-friendly 3D designing software (e.g., Tinkercad, Blender).
- Step-by-step designing of a basic medical model (like a heart, organ, medicinal plant leaf, or drug delivery device).

3. Demonstration of 3D Printing (1 Hour)

- Overview of 3D printers and their types.
- Preparing the 3D model for printing (file conversion to STL format, slicing).
- Live demonstration of printing a simple model.

4. Group Activity and Discussion (1 Hour)

- Students in small groups will design their own simple 3D models related to AYUSH/Unani concepts.
- Interactive discussion on innovative ideas for using 3D printing in AYUSH research and practice.

Materials Required:

- Laptop/Desktop with 3D designing software installed
- Internet access (optional for online tools)

- 3D Printer with compatible filament (PLA or ABS)
- Sample 3D printed medical models
- Projector for demonstration
- Design templates for beginners

Suggested Applications in AYUSH & Unani Medicine:

- Anatomical models for teaching complex structures.
- 3D models of medicinal plant parts for identification and study.
- Customized drug delivery systems inspired by Unani formulations.
- Prosthetic devices and orthotic supports using traditional concepts.
- Patient-specific models for therapeutic counseling based on Unani principles.

Experiential Learning Activity

Experiential-Learning Learning 32.1: Virtual Lab on Genome Sequencing Techniques

Total Duration: 4 Hours

1. **Introduction to Genome Sequencing (Duration: 1 hour)**

   Explanation of basic concepts, types of sequencing methods, and their significance in biological and medicinal research.

2. **Virtual Lab Demonstration (Duration: 2 hours)**

   Students will perform a guided virtual simulation of genome sequencing experiments using online virtual lab platforms such as:

   - Amrita Virtual Labs
   - Learn Genetics Virtual Lab
   - Virtual Labs by NCBI or EMBL

   Activities may include:

   - DNA sample preparation
   - Loading sequences

- Running sequencing simulations
- Observing and analyzing generated sequence data

3. **Discussion on Applications in AYUSH/Unani Research (Duration: 1 hour)**

   Group discussion on the use of genome sequencing for:

   - Medicinal plant identification and authentication
   - Detection of genetic markers
   - Exploring genetic variability in Unani medicinal plants
   - Contribution to personalized medicine approaches based on genetic profiling

Experiential-Learning Learning 32.2: Group Discussion on Ethical and Regulatory Aspects of Personalized Medicine

Total Duration: 2 Hours

1. **Introduction to Ethical and Regulatory Issues (Duration: 30 minutes)**

   Brief presentation by the facilitator covering:

   - Ethical principles (autonomy, beneficence, non-maleficence, justice)
   - Privacy and confidentiality in genetic research
   - Informed consent in personalized medicine
   - Data protection laws (like GDPR, HIPAA, Indian Data Protection Bill)
   - Regulatory authorities (ICMR guidelines, AYUSH regulations, WHO recommendations)

2. **Group Discussion and Case Analysis (Duration: 1 hour)**

   Students will be divided into small groups to discuss and analyze:

   - Case scenarios involving ethical dilemmas in personalized medicine
   - Issues related to genetic testing, discrimination, data sharing, and commercialization
   - Challenges in regulatory implementation within AYUSH/Unani healthcare settings

3. **Summary and Reflection (Duration: 30 minutes)**

   Each group will present their key points and ethical recommendations.

   Facilitator will summarize the discussion highlighting best ethical practices and regulatory needs.

Suggested Case Scenarios for Discussion:

- Genetic testing for predisposition to diseases — ethical implications.
- Use of patient's genetic data by pharma companies for drug development.
- Direct-to-consumer genetic testing — benefits vs risks.
- Application of personalized medicine in Unani/AYUSH systems — feasibility and challenges.
- Data privacy concerns in digital health records and genome sequencing.

Experiential-Learning Learning 32.3: Role-play on Patient-Centered AYUSH Genomic Counseling

Total Duration: 2 Hours

Introduction & Concept Building (Duration: 30 Minutes)

- Brief lecture by facilitator on:
  - What is genomic counseling?
  - Its relevance in Personalized Medicine.
  - Application in AYUSH and Unani system.
  - Ethical and emotional aspects of counseling patients about genetic risks or personalized treatment plans.

Role-play Activity (Duration: 1 Hour)

- Students will be divided into small groups.
- Each group will receive a specific scenario for role-play involving:
  - A genomic counselor (student)
  - A patient (student)
  - Observers (rest of the group)

Sample Role-play Scenarios:

1. Counseling a patient on genetic predisposition to metabolic disorders and Unani preventive strategies.
2. Discussing genomic test results for personalized herbal treatment.
3. Handling a patient's emotional response to genetic risk findings.
4. Advising on lifestyle modifications based on Mizaj (temperament) and genomic data.
5. Addressing patient concerns on privacy and data security in genomic testing.

Feedback & Reflection (Duration: 30 Minutes)

- Each group presents their role-play.
- Peer and facilitator feedback on communication style, accuracy, empathy, ethical sensitivity.
- Reflection on challenges and lessons learned.

Experiential-Learning Learning 32.4: AI-powered Chatbots for Unani Consultations

Total Duration: 4 Hours

1. **Introduction to AI Chatbots in Healthcare (Duration: 1 Hour)**

- Concept and evolution of chatbots in healthcare.
- Types of chatbots: Rule-based vs AI-based.
- Applications in AYUSH and Unani practice:
    - Patient pre-consultation screening
    - FAQ handling
    - Treatment reminders
    - Patient education and lifestyle guidance
- Challenges and limitations.

2. **Demonstration of Chatbot Development Platforms (Duration: 1 Hour)**

- Introduction to beginner-friendly platforms (such as Dialogflow, Chatfuel, Botpress, Tidio, or Microsoft Bot Framework).

- Demonstrating chatbot interface design, intent creation, and response building.
- Discussing NLP (Natural Language Processing) basics in healthcare context.

3. **Hands-on Activity: Designing a Basic Unani Consultation Chatbot (Duration: 1 Hour)**

- Students (individually or in groups) will:
    - Define a chatbot scenario (e.g., Unani consultation for digestion issues or Mizaj assessment).
    - Create dialogue flow and response patterns.
    - Build a prototype chatbot using free online tools.
    - Test and troubleshoot their chatbot.

4. **Presentation & Discussion of Chatbot Models (Duration: 1 Hour)**

- Each group will demonstrate their chatbot model.
- Discussion on:
    - Strengths and weaknesses of each model.
    - Possible real-world application in AYUSH healthcare settings.
    - Ethical considerations: data privacy, patient consent, and AI limitations.

Experiential-Learning Learning 32.5: Future of AI in Unani Medicine (Panel Discussion)

Total Duration: 2 Hours

Panel Composition:

- AI Expert/Technologist
- Unani Physician/Researcher
- Bioinformatics or Data Science Specialist
- Regulatory or Ethics Expert
- Moderator (Faculty/Coordinator)

Proposed Discussion Themes:

1. What is AI and how does it relate to healthcare?
2. Current AI applications in mainstream medicine — lessons for AYUSH.
3. Scope of AI in Unani Medicine:
    - Mizaj (Temperament) analysis
    - Drug discovery and molecular modeling
    - AI in diagnosis and personalized treatment
    - AI-powered consultation tools
4. AI in Unani research — data management, clinical trials, and pharmacovigilance.
5. Challenges and Limitations:
    - Data availability and standardization
    - Ethical concerns in AI use
    - Patient privacy and regulatory guidelines
6. Future Possibilities:
    - Smart health monitoring devices for Unani principles
    - AI in preventive Unani healthcare
    - AI-driven decision support systems for Hakims
    - Integration with Digital Health Records
7. Role of Students & Researchers in shaping the future of AI in Unani.

Methodology:

- Opening Remarks & Introduction by Moderator
- Presentation by each panelist on their perspective (10 minutes each)
- Open House Discussion with Students (Q&A session)
- Brainstorming of innovative ideas

Experiential-Learning Learning 32.6: 3D-Printed Prosthetics

Total Duration: 4 Hours

1. Introduction to 3D-Printed Prosthetics by facilitator (1 Hour)

- Overview of 3D printing in prosthetics.
- Materials used (PLA, ABS, flexible polymers).
- Benefits of 3D printing in prosthetics: customization, low-cost production, faster development.

2. Presentation of Real-world Case Studies (1 Hour)

- Selected national and international case studies of 3D-printed prosthetic arms, legs, fingers, and orthotic devices.
- Success stories of low-cost prosthetic solutions for children, accident victims, and differently-abled persons.

3. Group Analysis and Discussion (1 Hour)

- Students will be divided into small groups.
- Each group will discuss assigned case studies focusing on:
    - Problem identified
    - Design solution using 3D printing
    - Materials used
    - Outcome and impact
    - Relevance to AYUSH/Unani rehabilitation strategies

4. Presentation by Student Groups & Expert Feedback (1 Hour)

- Group presentations on case study analysis.
- Discussion on how such approaches can be localized, modified, or enhanced within the AYUSH/Unani framework for patient care.
- Reflection on ethical, regulatory, and social aspects of using 3D-printed prosthetics.

Experiential-Learning Learning 32.7: Integrating AR/VR in Unani Medical Training

Total Duration: 4 Hours

1. Introduction to AR/VR in Medical Education (1 Hour)

- Brief explanation of AR and VR concepts.
- Demonstration of examples from modern medical education using AR/VR tools.
- Applications of AR/VR in anatomy learning, surgical training, patient simulations, and diagnostics.

2. Brainstorming on Possibilities in Unani Medical Training (1 Hour)

- Open discussion on how AR/VR can support:
    - Learning of Unani anatomy (Tashreeh) and physiology (Fisiology).
    - Visualization of Mizaj (temperament) concepts.
    - Simulation of Ilaj-bit-Tadbeer (regimental therapies).
    - Herbal drug identification and pharmacognosy virtual tours.
    - Skill-based training in Unani clinical procedures.

3. Group Discussion & Presentation (1 Hour)

- Students will form small groups.
- Each group will discuss assigned themes such as:
    - AR for Anatomy Learning
    - VR for Clinical Case Simulation
    - AR/VR for Herbal Garden Virtual Tours
    - Virtual OPD/Clinical Diagnosis Training
    - Patient Education through Immersive Technology
- Group presentations of ideas, challenges, and proposed solutions.

4. Expert Feedback & Concluding Discussion (1 Hour)

- Faculty feedback on group presentations.
- Open discussion on feasibility, resource requirement, and ethical aspects.
- Summary of key takeaways and futuristic possibilities.

Experiential-Learning Learning 32.8: Future trends in 3D and Immersive Technologies for Healthcare

Total Duration: 4 Hours

1. Introduction to 3D & Immersive Technologies in Healthcare (1 Hour)

- Explanation of key concepts: 3D Printing, AR, VR, MR, Holography.
- Global examples of 3D medical models, VR surgical simulations, AR anatomy learning, and personalized prosthetics.
- Role of immersive technologies in telemedicine, remote surgery, and patient rehabilitation.

2. Exploring Applications in AYUSH & Unani Medicine (1 Hour)

- Brainstorming on potential uses in AYUSH:
    - 3D printed models of Unani drug formulations.
    - VR-based patient counselling on regimental therapies (Ilaj-bit-Tadbeer).
    - AR-assisted herbal drug identification.
    - Virtual Unani clinics for teleconsultation.

3. Group Activity on Future Innovations (1 Hour)

- Students will form small groups to discuss and ideate future trends like:
    - Personalized medicine using 3D organ printing.
    - Virtual Unani pharmacy or museum.
    - AI-enabled AR/VR for diagnosis.
    - Immersive therapy rooms for mental health.
- Groups to present their futuristic vision.

4. Panel Discussion & Expert Insights (1 Hour)

- Faculty-led discussion on:
    - Opportunities for research in immersive technologies.
    - Challenges in terms of cost, training, and infrastructure.
    - Ethical considerations in virtual healthcare.
    - Future of patient-centered immersive healthcare experiences.

Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Debate (10 Marks): Conduct a debate on the topic-Ethical Considerations and Bias in AI-based Decision Making. Assessment shall be based on the performance of the candidate. 360 Evaluation (15 marks): Based on the activity performed on the topic- Unani Genomic Counselling, the candidate shall be evaluated based on 360-degree performance. DOPS (25 Marks): Demonstrate DNA Extraction and PCR Techniques. or M-MOD (25 Marks): Design and Print 3D medical Models. Or Any practical in converted form can be taken for assessment (25 marks). and Any of the experiential as portfolio/ reflections / presentations can be taken as an assessment (25 marks).	4

Table 4 : Practical Training Activity

(*Refer table 3 of similar activity number)

Practical No*	Practical name	Hours
1.1	Demonstrate models of membrane transport (diffusion, osmosis, active transport)	2
1.2	Histological features of normal and adaptive cell changes	2
1.3	Altered cell morphology in stress conditions	3
1.4	EMG (Electromyography) and interpretation of muscle activity	2
1.5	Muscle dysfunction	1
1.6	Muscle endurance test	2
1.7	Myopathies and neuromuscular junction disorders	2
1.8	Stress and metabolic biomarkers (CRP, HbA1c, Oxidative markers)	3
1.9	Physiological parameters of homeostasis (BP, Temp, HRV)	3
2.1	Assessment of Quwāte-Hāzima	4
2.2	Microbiome Analysis Techniques, Gut Barrier Markers, and Identification of Unani Ghiza & Regimens for Gut Health	4
2.3	Liver Function Tests	4
2.4	Impact of psychological stress on digestion and motility.	4
2.5	Unani Functional Foods & Detox Recipes	4
3.1	Assessment of autonomic function	6
3.2	Advanced BP measurement techniques (ambulatory, central aortic pressure)	4
3.3	Palpation of different Nabz types	4
3.4	Laboratory and imaging data related to vascular health	6
4.1	Auscultation of respiratory sounds	4

4.2	Analysis of blood gases	6
4.3	Clinical effects of hyperventilation, hypoxia, and orthopnea	4
4.4	High altitude physiology	6
5.1	Urine examination under different physiological conditions and in different Amzaja	4
5.2	Reflex testing and neurological examination related to micturition pathways	4
5.3	Assessment of bladder control using urodynamic parameters/simulators	4
5.4	Urine specific gravity and osmolality tests	2
5.5	Different thermometry methods	4
5.6	Body’s thermal responses	2
6.1	Hormone level profiles during reproductive cycle.	4
6.2	Menopausal symptoms	4
6.3	Fetal development	4
6.4	Semen analysis, hormone profiles, and ovulatory status	4
6.5	Risk assessments for environmental and lifestyle-related reproductive disorders	4
7.1	Feedback mechanisms of endocrine axis	4
7.2	Metabolic panels (glucose, insulin, lipid profile) and hormonal biomarkers	4
7.3	Metabolic changes under physiological vs. stress conditions	4
7.4	Hypothyroidism, adrenal insufficiency, and their metabolic effects	4
7.5	Endocrine profiles in Obesity, PCOS, and diabetes and Mizaj classification	2
7.6	Hormonal panels in metabolic disorders and correlate with anthropometric data	2
8.1	Gut-brain interaction	4
8.2	Stress assessment techniques	6
8.3	Sleep patterns and insomnia	3

8.4	Sensory testing (visual acuity, audiometry, olfactory/taste discrimination)	4
8.5	EEG sleep stages and cognitive assessment	3
9.1	Investigation of protein presence in a food stuff	1
9.2	Importance of lipids	6
9.3	Inability of Humans to digest cellulose	5
9.4	Reversible and irreversible denaturation of proteins	8
10.1	Urine/serum metabolites in various states	4
10.2	Assessing Metabolic states through biochemical indicators	6
10.3	Mitochondrial dysfunction in metabolic disorders	5
10.4	Quantify and interpret enzyme Kinetics	5
11.1	Enzyme activity estimation using UV-Vis spectrophotometry	2
11.2	IR spectral analysis for biomolecular identification	2
11.3	Fluorescence and NMR spectrometry	3
11.4	Thin-layer chromatography and compound Identification	3
11.5	HPLC system and sample analysis interpretation	2
11.6	Paper chromatography with pigment separation	2
11.7	Enzyme-linked assays to measure biomarkers (e.g., ELISA)	3
11.8	Detection of cardiac/liver markers in test samples	3
12.1	Glucose and urea estimation assays	3
12.2	Liver enzyme profile measurement	3
12.3	pH and ion concentration measurement in biological fluids	3
12.4	Interpreting liver, kidney and lipid test reports	8
12.5	Document Mizaj and compare with biomarker findings	3

13.1	Societal impact of genetics in medicine	3
13.2	DNA model to analyze structure-function relationships	3
13.3	RNA-mediated regulatory mechanisms	3
13.4	Human Inheritance: Karyotype and Pedigree Studies	3
13.5	Genetic Variation – Mutation and Polymorphism	1
13.6	Pedigree analysis	4
13.7	Genetic Risk Calculation	3
14.1	cytogenetic analysis using visual tools to identify chromosomal abnormalities	3
14.2	Diagnostic algorithms for identifying and managing human metabolic disorders	3
14.3	molecular diagnostic techniques for monogenic disorders using virtual simulations	3
14.4	Developmental Timeline Models for Human Genetic Syndromes	3
14.5	Complex Genetic Disorder Risk Assessment Using Simulations	4
14.6	Pharmacogenetic Algorithm Design for Medication Selection	4
15.1	Hardy-Weinberg equation	6
15.2	Basic genetic counseling protocol for a given condition	3
15.3	Pedigree chart construction and analysis for different inheritance patterns	7
15.4	Simulated linkage analysis, sequencing, and PCR (Polymerase Chain Reaction)	4
16.1	Biological databases: Sequence databases (GenBank, EMBL), structure databases (PDB), and specialized databases (e.g., AYUSH-specific databases)	6
16.2	Medicinal plant related genomic and proteomic data relevant to Unani/AYUSH	6
16.3	Gene prediction and annotation	2
16.4	Protein structure analysis using bioinformatics tools (e.g. RASMOL, PyMOL)	3
16.5	Molecular docking using Autodock	3
17.1	Mizaj-based food categorizations with WHO dietary guidelines	4

17.2	Therapeutic diet charts for case studies (diabetic, hypertensive, obese)	4
17.3	Anthropometric tools to assess nutrition status in patients	4
17.4	BMR, caloric requirements, and analyze case data	4
17.5	Nutrition counselling summaries	4
18.1	Abdominal exam findings in clinical settings	4
18.2	Liver Function Test	4
18.3	pH monitoring and acid secretion tests	6
18.4	Interpretation of stool fat tests, lactose tolerance, and related diagnostics	6
19.1	BP, pulse assessment, and JVP evaluation	4
19.2	ECG recording, interpretation, and correlate with patient conditions	6
19.3	Imaging reports (angiograms, cardiac MRI) in real case scenarios	4
19.4	Clinical cases of cardiac ischemia and congenital defects	6
20.1	Systematic respiratory examination	4
20.2	PFTs and ABG interpretation using clinical scenarios	6
20.3	PFT and ABG data of ARDS, COVID-19 lung sequelae, TB	4
20.4	CPAP devices, and mechanical ventilators	6
21.1	Diagnostic interpretation of hormonal assay reports related to reproductive health	2
21.2	Pelvic ultrasonography and semen analysis reports	2
21.3	Renal Function Test (RFT) and urine analysis	2
21.4	Electrolyte and acid-base parameters	4
21.5	Proteinuria and hematuria	4
21.6	Dialysis modalities (hemodialysis vs. peritoneal)	2
21.7	Fluid and hormonal regulation strategies during renal compromise	4

22.1	CBC, smear and coagulation panels	6
22.2	Diagnostic tests for autoimmune and allergic disorders (ANA, RF, IgE)	4
22.3	Inflammation profiles and clinical management	4
22.4	Aging-related conditions (frailty, sarcopenia, cognitive decline)	6
23.1	Endocrine system evaluations	4
23.2	Case history and clinical chart analysis of endocrine syndromes	4
23.3	Hormonal assay reports and diagnostic test results	6
23.4	Hormone profiles and case interpretations	6
24.1	Cranial nerve and reflex testing in peer groups	4
24.2	EEG, EMG, and GCS	4
24.3	Pain threshold and nerve injury testing	4
24.4	Neurological examination in neuropathy and hemiplegia	4
24.5	Sleep logs, behavior scales, and neuroimaging	4
25.1	Literature analysis of Kamilus Sana, Miat Masihi, Al Qanoon fit Tib	10
25.2	Literature Analysis: Firdousul Hikmat, Kitabul Kulliyat (Ibn Rushd)	10
26.1	Physical Fitness Certificate	2
26.2	Spirometry to assess respiratory function during and after exercise	6
26.3	Use of indirect calorimetry and other tools to measure energy expenditure during exercise	6
26.4	Hands-on measurement of ECG, heart rate and heart rate variability in response to exercise	6
27.1	Climate Data analysis Using Excel and R	6
27.2	Biodiversity survey in a local ecosystem	7
27.3	Photosynthetic rates under different light and CO2 conditions	7
28.1	Evolutionary trees	5

28.2	Circulatory systems of Fish and Earthworm	2
28.3	Field Visit and Case Study Analysis on Environmental Stressors and Their Physiological Impact on Flora and Fauna	6
28.4	Case study analysis on evolutionary medicine	7
29.1	Physiological tools and recent advances in validation of Unani Medicine	6
29.2	Diagnostic tools in validation of Mizaj	4
29.3	Models for Integration	6
29.4	Hands-on Research & Validation Techniques in Unani Medicine	4
30.1	Setting up basic educational tools (LMS, video conferencing)	1
30.2	Accounts on popular educational platforms	2
30.3	Digital learning environments	1
30.4	Designing a lesson plan incorporating technology	5
30.5	Hands-on experience with various educational apps	5
30.6	Case studies on failed tech implementations in education	2
30.7	Case studies and Group discussion on mitigating tech-related issues	4
31.1	Physiological Responses in Isolated Organ Models	4
31.2	Cell Culture-Based Physiological Assays	3
31.3	Organ Bath Studies for Drug Response in Small Mammals	4
31.4	Frog Heart and Muscle Physiology Experiments	4
31.5	In Silico Modeling for Physiological Studies	3
31.6	Organ-on-a-Chip Technology Demonstration	2
32.1	DNA Extraction and PCR Techniques	6
32.2	Personalized Treatment Approaches	2
32.3	AI Tools for Medical Imaging Analysis	2

32.4	Machine Learning Algorithms for Disease Prediction	2
32.5	AI-assisted AYUSH Therapies	4
32.6	3D	4

Table 5 : Experiential learning Activity

(*Refer table 3 of similar activity number)

Experiential learning No*	Experiential name	Hours
1.1	Stress adaptation in different diseases	6
1.2	Taqwiyat-e-Aza and Unani interventions in muscle weakness	2
1.3	Muscle fatigue and weakness	2
1.4	Neuromuscular transmission	4
1.5	Use of Neuromuscular Junction drugs	4
1.6	Disrupted homeostasis	4
1.7	Unani-based homeostasis maintenance plans	4
2.1	Assessment tools/Questionnaire for Quwāte-Hāzima	6
2.2	Unani Diet Plans for Modulating Gut Microbiota	4
2.3	Hepatoprotective Unani Drugs	6
2.4	GI & Liver Disorders: Diagnostic Workup & Integrated Management Approaches	4
2.5	Community-based Survey/Interaction on Dietary Practices, Liver Health Awareness	6
3.1	Dysautonomia (e.g., POTS, orthostatic hypotension)	6
3.2	Community-based screening of BP	8
3.3	Techniques of recording pulse wave signals	6
3.4	Hemodynamic compromise	6
4.1	Mechanics of respiration	6
4.2	Impaired gas exchange	4
4.3	Patient education programe of respiratory diseases.	6

4.4	Adaptations of the human body to high altitude	10
5.1	Istefrāgh (diuresis, Hammām, etc.) and renal physiology	4
5.2	Unani interpretation of disorders of Micturition	4
5.3	Management of renal tubular acidosis, dehydration, and edema	4
5.4	Use of diuretics in various disorders	4
5.5	Thermal stress responses in patients	4
5.6	Thermoregulation in different Climates	6
6.1	Correlation of Quwwat-e-Muwallida and Tanasuliya with Reproductive physiology	6
6.2	Unani perspectives on pregnancy and menopause	6
6.3	Puberty and aging: an integrative viewpoint	6
6.4	Personalized reproductive health strategies	6
6.5	Counseling sessions on infertility, hygiene, and reproductive wellness	2
7.1	Hypo- or Hyper- secretion of hormones	3
7.2	Endocrine testing algorithms	3
7.3	Patient-centric hormonal maps	4
7.4	Estimation of Vitamin D and Correlation with Different Temperaments	2
7.5	Lifestyle-induced endocrine disruptions	2
7.6	Circadian lifestyle interventions	2
7.7	Case-based Unani treatment plans for PCOS and obesity	4
7.8	Endocrine lifestyle correction using Unani approaches	2
7.9	Lifestyle intervention protocols	4
8.1	Massage, Riyazat and relaxation protocols	4
8.2	Psychosomatic disorders	6

8.3	Sensory therapy	3
8.4	Sensory dysfunctions	3
8.5	Relaxation-based memory improvement techniques	4
8.6	Cognitive disorders with Unani application	6
9.1	Connecting Biomolecules and Unani Medicine	5
9.2	Protein levels estimation in various foodstuffs	5
9.3	Enzyme Specificity	8
9.4	Protein Precipitation and Coagulation Mechanisms in Biological Fluids	8
10.1	Relationship between enzymes and Unani concepts of Af'al (functions) and Mizaj (temperament)	10
10.2	Major metabolic pathways	10
10.3	Unani metabolic principles vs modern physiology	6
11.1	Mass spectrometry in metabolomics	4
11.2	Application of NMR in drug development	3
11.3	Analysis of case reports using both Unani and biochemical perspectives	7
11.4	Chromatographic test report evaluation	6
11.5	Interpretation of case scenarios using biomarker profiles	6
12.1	Biochemical abnormalities to Clinical findings	10
12.2	Diagnostic reasoning using biochemical data	6
12.3	Unani validation workshop: Akhlat and biochemical states	10
13.1	Integration of molecular genetics with Unani medical concepts	3
13.2	RNA’s role in clinical disorders	3
13.3	Ethical implications of genetic discoveries	3
13.4	Integrative Mapping of Unani and Modern Genetic Perspectives	6

13.5	Chromosomal disorders	3
13.6	Patient communication framework	4
13.7	Human Genetic Disorders Case Analysis	4
14.1	Chromosomal and metabolic disorder cases through clinical reasoning	5
14.2	Pharmacogenetic Algorithm Design for Medication Selection	4
14.3	Integrating Molecular Diagnosis with Unani Principles	8
14.4	Personalized Medicine Approaches through Pharmacogenetics & Unani Integration	5
14.5	Parallels between Epigenetics and Unani Concepts	4
15.1	Gene frequency trends in populations with high consanguinity vs low consanguinity	8
15.2	Consanguinity, genetic counseling, and risk stratification, with integration of Unani principles of familial constitution	9
15.3	Simulated lab walk-through to visualize molecular diagnosis	5
15.4	Unani embryological principles (Takwin-i-Janin) and modern reproductive genetics scenarios	4
16.1	Bioinformatics for Personalized Medicine in Unani Medicine	6
16.2	Workshop on Bioinformatics Tools for AYUSH	6
16.3	Project Work – Genomics and Proteomics of Medicinal Plants	8
16.4	Bioinformatics in advancing research in Unani system	6
17.1	Dietary planning for different Amzija (temperaments)	4
17.2	Dietary counselling	6
17.3	Dietary correction strategies and personalized nutrition	4
17.4	Dietary surveys in clinical or community settings	6
17.5	Diet modification based on metabolic and Mizaj assessment	6
18.1	Comprehensive GI assessments on patients and relate findings to diagnoses	4
18.2	Differential diagnoses based on clinical examination	4

18.3	LFT reports and their correlation with clinical scenarios	4
18.4	Functional GI disorders and their correlation with Unani clinical categories	4
18.5	Malabsorption syndromes and link with symptoms, labs, and imaging	6
18.6	Unani principles of digestion and absorption in patient management	4
19.1	Diagnostic and therapeutic approaches in hypertensive and hypotensive patients	6
19.2	Unani interpretation of hypertension (e.g. Imtila)	4
19.3	Modern diagnostics and Unani evaluation of cardiac functions	4
19.4	Echocardiography, Holter monitoring and stress tests	2
19.5	Management protocols of heart failure and MI	6
19.6	Unani perspective(e.g. Su' Mizāj al-Qalb) on cardiac failure	4
20.1	Respiratory conditions through Unani lens: Insidād, Tafarruq al-Rūḥ, Sue Mizāj Riyah	4
20.2	Unani interpretation of pulmonary function and Nafas-related diseases	6
20.3	Unani-based approach to chronic lung conditions and drug selection rationale	4
20.4	CPR using current resuscitation protocols	6
20.5	Real or simulated resuscitation or ventilator case	6
21.1	Menstrual irregularities (amenorrhea, dysmenorrhea, PCOS)	4
21.2	Unani perspectives on infertility (uqr)	4
21.3	Fluid and electrolyte correction strategies in clinical practice	6
21.4	Unani treatment rationale in Ihtibās al-Bawl	6
21.5	Unani therapeutic approaches in renal conditions	6
22.1	Anemia, leukemia, and bleeding disorders in Unani perspective	4
22.2	Autoimmune and allergic reactions and Unani immunomodulation	6
22.3	Anti-inflammatory methods in Unani Tibb	4

22.4	Geriatric evaluations and Unani geroprotection concepts	6
22.5	Longevity, resilience, and Unani lifestyle integration	6
23.1	Unani evaluation and Mizaj assessment in endocrine patients	6
23.2	Syndromic evaluation of endocrine diseases	4
23.3	Mizaj derangement in endocrine syndromes	4
23.4	Hormone testing procedures	6
23.5	Dual perspectives (biomedical + Unani) on endocrine disorders	6
24.1	EEG/NCS/EMG and GCS evaluation in patients	6
24.2	Neuroimaging Techniques: CT, MRI, PET Scan in Neurology	4
24.3	Pain characteristics in patients with varied Mizaj	4
24.4	Assessment of chronic pain and neuralgia cases	4
24.5	Neurological clinical presentations in classical Unani texts	4
24.6	EEG during sleep cycles	4
25.1	Visit to library for manuscripts and preparation of report	10
25.2	Group Discussion on evolution of Manafeul Aza	6
25.3	Preparing an Article on Classical Literature	10
26.1	Determination of Physical fitness	6
26.2	Field visit to a sports science or rehabilitation center to observe practical applications of exercise physiology.	4
26.3	Developing individualized and Tailored exercise programs based on Mizaj for health, fitness, and performance improvement	10
26.4	Case Scenario – Sports Performance enhancement using Unani System	6
27.1	Project: Investigating local impacts of climate change on a human population living at high altitude	10

27.2	Community Engagement to raise awareness about local climate issues and physiological impacts on health and agriculture	9
27.3	Educational materials for local schools or organizations	7
28.1	Behavioral Adaptation to Environmental Changes	7
28.2	Guest lectures from experts in evolutionary biology and physiology	6
28.3	Case studies & GD: Current trends and methodologies in evolutionary physiology research	6
28.4	Group project: Recognizing Current Trends and Methodologies in Evolutionary Physiology Research	7
29.1	Knowledge Validation Vs Knowledge Addition	4
29.2	Future research in Unani Medicine	6
29.3	Benefits of Integration of health Systems	3
29.4	Integration Model designing	4
29.5	Limitations and Challenges in Integration	3
29.6	Priority Areas of Research in Unani Medicine	2
29.7	Validation Process of Traditional Medicine Concepts	2
29.8	Research Ethics – Unani and Modern View	2
30.1	Tech-integrated lesson plan development and implementation it in a classroom setting	8
30.2	Attend Workshops/Seminars on Education Technology	6
30.3	Feedback assessment on the use of Education Technology	6
30.4	Shadow classroom teaching using technology	6
31.1	Live Demonstration of Animal Behavior and Reflexes	4
31.2	Simulation-based Learning on Organ Functions	4
31.3	Virtual Lab on Frog Cardiac and Neuromuscular Physiology	4
31.4	Case-Based Learning on Experimental Models in AYUSH Research	4

31.5	Case-Based Discussion on Successful Alternatives in Research	2
31.6	Group Seminar on Future Directions in Non-Animal Testing	4
31.7	Virtual Lab Simulations on Pharmacological and Toxicological Studies	4
32.1	Virtual Lab on Genome Sequencing Techniques	4
32.2	Group Discussion on Ethical and Regulatory Aspects of Personalized Medicine	2
32.3	Role-play on Patient-Centered AYUSH Genomic Counseling	2
32.4	AI-powered Chatbots for Unani Consultations	4
32.5	Future of AI in Unani Medicine (Panel Discussion)	2
32.6	3D	4
32.7	Integrating AR/VR in Unani Medical Training	4
32.8	Future trends in 3D and Immersive Technologies for Healthcare	4

Table 6 : Assessment Summary: Assessment is subdivided in A to H points

6 A : Number of Papers and Marks Distribution

Subject Code	Paper	Theory	Practical	Total
UNIPG-MZ	4	100 x 4 Papers = 400	400	800

6 B : Scheme of Assessment (Formative and Summative Assessment)

Credit frame work

UNIPG-MZ consists of 32 modules totaling 64 credits, which correspond to 1920 Notional Learning Hours. Each credit comprises 30 Hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Formative Assessment : Module wise Assessment:will be done at the end of each module. Evaluation includes learners active participation to get Credits and Marks. Each Module may contain one or more credits.

Summative Assessment: Summative Assessment (University examination) will be carried out at the end of Semester VI.

6 C : Calculation Method for Modular Grade Points (MGP)

Module Number & Name (a)	Credits (b)	Actual No. of Notional Learning Hours (c)	Attended Number of notional Learning hours (d)	Maximum Marks of assessment of modules (e)	Obtained Marks per module (f)	MGP =d*f/c*e*100
Semester No : 3						
Paper No : 1 (عمومی واطلاقی منافع الاعضاء General and Applied Physiology)						
M 1 سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis	2	60		50		
M 2 معدی امعائی، کبدی وصفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology	2	60		50		
Paper No : 2 (حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics)						
M 9 حیاتیاتی سالمات Biomolecules	2	60		50		
M 10 مسارات استقلابیہ اور انکی تنظیم Metabolic Pathways and Regulation	2	60		50		
Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)						
M 17 طبی تغذیہ Clinical Nutrition	2	60		50		
M 18 مَعدَہ۔کبدی وصفراوی نِظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System	2	60		50		
Paper No : 4 (تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances)						
M 25 طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology	2	60		50		
M 26 یونانی تصور ریاضت اور اس کا اسپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology	2	60		50		
	16	480		400		
Semester No : 4						
Paper No : 1 (عمومی واطلاقی منافع الاعضاء General and Applied Physiology)						

M 3 قلبی نظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system	2	60		50		
M 4 نظام تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system	2	60		50		
Paper No : 2 (حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics)						
M 11 جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques	2	60		50		
M 12 طبی حیاتی کیمیا Medical Biochemistry	2	60		50		
Paper No : 3 (معالجاتی منافع الاعضاء Clinical Physiology)						
M 19 نظام قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System	2	60		50		
M 20 نظام تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System	2	60		50		
Paper No : 4 (تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances)						
M 27 موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change	2	60		50		
M 28 ارتقائی فزیالوجی Evolutionary Physiology	2	60		50		
	16	480		400		
Semester No : 5						
Paper No : 1 (عمومی و اطلاقی منافع الاعضاء General and Applied Physiology)						
M 5 کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation	2	60		50		
M 6 تناسلی و نشوونمائی فزیالوجی Reproductive & Developmental Physiology	2	60		50		
Paper No : 2 (حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics)						
M 13 اساس جینیات Foundations of Genetics	2	60		50		
M 14 Human Genetic Disorders and Diagnostic Approaches	2	60		50		
Paper No : 3 (معالجاتی منافع الاعضاء Clinical Physiology)						
M 21 نظام کلیہ و تولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems	2	60		50		

M 22 Clinical Haematology, دموية سريرية، مناعت، شيخوخة، اور التہاب Immunology, Aging, and Inflammation	2	60		50		
Paper No : 4 (Integrative Physiology and Recent Advances تکاملی منافع الاعضاء و جدید اضافات)						
M 29 Physiological Tools for طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Validation of Unani Medicine	2	60		50		
M 30 Medical Education Technology طبی تعلیمی ٹیکنالوجی	2	60		50		
	16	480		400		
Semester No : 6						
Paper No : 1 (General and Applied Physiology عمومی و اطلاقی منافع الاعضاء)						
M 7 Endocrine & Metabolic Integration غدودی اور میٹابولک انضمام	2	60		50		
M 8 Neurophysiology, Stress, and نیوروفزیالوجی، تناؤ، اور خاص حسّات Special Senses	2	60		50		
Paper No : 2 (Biochemistry, Genetics and Bioinformatics حیاتی کیمیا، جینیات و طبی معلومیات)						
M 15 Medical Genetics, Genomic Applications, and Population Genetics	2	60		50		
M 16 Bioinformatics طبی معلومیات	2	60		50		
Paper No : 3 (Clinical Physiology معالیجاتی منافع الاعضاء)						
M 23 Clinical Physiology of the نظام غدد کی کلینکل فزیالوجی Endocrine System	2	60		50		
M 24 Clinical Neurophysiology کلینیکل نیوروفزیالوجی	2	60		50		
Paper No : 4 (Integrative Physiology and Recent Advances تکاملی منافع الاعضاء و جدید اضافات)						
M 31 Vertebrate and Amphibian Physiology برمائی و فقاری فزیالوجی	2	60		50		
M 32 Recent Advances جدید اضافات	2	60		50		
	16	480		400		
MGP = ((Number of Notional learning hours attended in a module) X (Marks obtained in the modular assessment) / (Total number of Notional learning hours in the module) X (Maximum marks of the module)) X 100						

6 D : Semester Evaluation Methods for Semester Grade Point Average (SGPA)

SGPA will be calculated at the end of the semester as an average of all Module MGPs. Average of MGPS of the Semester For becoming eligible for Summative assessment of the semester, student should get minimum of 60% of SGPA

SGPA = Average of MGP of all modules of all papers = add all MGPs in the semester/ no. of modules in the semester Evaluation Methods for Modular Assessment

Semester No : 3		
Paper No : 1 عمومی واطلاقی منافع الاعضاء General and Applied Physiology		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
1	M1. سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis	C 1
2	M2. معدی امعائی، کبدی وصفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology	C 2
Paper No : 2 حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
3	M9. حیاتیاتی سالمات Biomolecules	C 3
4	M10. مسارات استقلابیۃ اور انکی تنظیم Metabolic Pathways and Regulation	C 4
Paper No : 3 معالیجاتی منافع الاعضاء Clinical Physiology		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
5	M17. طبی تغذیہ Clinical Nutrition	C 5
6	M18. مَعدَہ۔کبدی وصفراوی نِظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System	C 6
Paper No : 4 تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances		

A S.No	B Module number and Name	C MGP
7	M25. طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology	C 7
8	M26. یونانی تصور ریاضت اور اس کا اسپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology	C 8
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7+C8) / Number of modules(8)
Semester No : 4		
Paper No : 1 عمومی و اطلاقی منافع الاعضاء General and Applied Physiology		
A S.No	B Module number and Name	C MGP
1	M3. قلبی نظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system	C 1
2	M4. نظام تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system	C 2
Paper No : 2 حیاتی کیمیا، جینیات و طبی معلومیات Biochemistry, Genetics and Bioinformatics		
A S.No	B Module number and Name	C MGP
3	M11. جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques	C 3
4	M12. طبی حیاتی کیمیا Medical Biochemistry	C 4
Paper No : 3 معالیجاتی منافع الاعضاء Clinical Physiology		
A S.No	B Module number and Name	C MGP
5	M19. نظام قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System	C 5
6	M20. نظام تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System	C 6
Paper No : 4 تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances		

A S.No	B Module number and Name	C MGP
7	M27.موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change	C 7
8	M28.ارتقائی فزیالوجی Evolutionary Physiology	C 8
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7+C8) / Number of modules(8)
Semester No : 5		
Paper No : 1 عمومی واطلاقی منافع الاعضاء General and Applied Physiology		
A S.No	B Module number and Name	C MGP
1	M5.کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation	C 1
2	M6.تناسلی ونشوونمائی فزیالوجی Reproductive & Developmental Physiology	C 2
Paper No : 2 حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics		
A S.No	B Module number and Name	C MGP
3	M13.اساس جینیات Foundations of Genetics	C 3
4	M14.Human Genetic Disorders and Diagnostic Approaches	C 4
Paper No : 3 معالیجاتی منافع الاعضاء Clinical Physiology		
A S.No	B Module number and Name	C MGP
5	M21.نظام کلیہ وتولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems	C 5
6	M22.دمویہ سریریہ، مناعت، شیخوخہ، اور التہاب Clinical Haematology, Immunology, Aging, and Inflammation	C 6
Paper No : 4 تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances		

A S.No	B Module number and Name	C MGP
7	M29. طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Physiological Tools for Validation of Unani Medicine	C 7
8	M30. طبی تعلیمی ٹیکنالوجی Medical Education Technology	C 8
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7+C8) / Number of modules(8)
Semester No : 6		
Paper No : 1 عمومی واطلاقی منافع الاعضاء General and Applied Physiology		
A S.No	B Module number and Name	C MGP
1	M7. غدودی اور میٹابولک انضمام Endocrine & Metabolic Integration	C 1
2	M8. نیوروفزیالوجی، تناؤ، اور خاص حسّات Neurophysiology, Stress, and Special Senses	C 2
Paper No : 2 حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics		
A S.No	B Module number and Name	C MGP
3	M15.Medical Genetics, Genomic Applications, and Population Genetics	C 3
4	M16. طبی معلومیات Bioinformatics	C 4
Paper No : 3 معالیجاتی منافع الاعضاء Clinical Physiology		
A S.No	B Module number and Name	C MGP
5	M23. نظام غدد کی کلینکل فزیالوجی Clinical Physiology of the Endocrine System	C 5
6	M24. کلینیکل نیوروفزیالوجی Clinical Neurophysiology	C 6
Paper No : 4 تکاملی منافع الاعضاء وجدید اضافات Integrative Physiology and Recent Advances		

A S.No	B Module number and Name	C MGP
7	M31.برمائی وفقاری فزیالوجیVertebrate and Amphibian Physiology	C 7
8	M32.جدید اضافاتRecent Advances	C 8
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7+C8) / Number of modules(8)

S. No	Evaluation Methods
1.	Method explained in the Assessment of the module or similar to the objectives of the module.

6 E : Question Paper Pattern

MD/MS Unani Examination

UNIPG-MZ

Sem VI

Time: 3 Hours ,**Maximum Marks:** 100

INSTRUCTIONS: All questions compulsory

		Number of Questions	Marks per question	Total Marks
Q 1	Application-based Questions (ABQ)	1	20	20
Q 2	Short answer questions (SAQ)	8	5	40
Q 3	Analytical based structured Long answer question (LAQ)	4	10	40
				100

6 F : Distribution for summative assessment (University examination)

S.No	List of Module/Unit	ABQ	SAQ	LAQ
Paper No : 1 (عمومی واطلاقی منافع الاعضاء General and Applied Physiology)				
(M-1) سیل فزیالوجی، عضلاتی فزیالوجی، اور استتباب Cell Physiology, Muscle Physiology and Homeostasis (Marks: Range 5-20)				
1	**(U-1)** خلیہ کی فزیالوجی اور تکیُّف Cell Physiology and Adaptation	No	Yes	No
2	**(U-2)** عضلاتی فزیالوجی Muscle Physiology	No	Yes	Yes
3	**(U-3)** وصل العصبی عضلی Neuromuscular Junction	Yes	Yes	Yes
4	**(U-4)** استتباب اور طبیعت Homeostasis and Tabiyat	No	Yes	No
(M-2) معدی امعائی، کبدی وصفراوی فزیالوجی Gastrointestinal and Hepatobiliary Physiology (Marks: Range 5-20)				
1	**(U-1)** مَعدَہ وَاَمعاء کی فزیالوجی Gastrointestinal Physiology	Yes	Yes	Yes
2	**(U-2)** گٹ مائیکروبائیوم، اِمتیازی مدافعت اور گٹ کی صحت کے یونانی اُصول Gut Microbiome, GI Immunity & Unani Approaches to Gut Health	Yes	Yes	Yes
3	**(U-3)** جِگر وصَفراوی نِظام کی فزیالوجی Hepatobiliary Physiology	Yes	Yes	Yes
4	**(U-4)** گٹ۔ جگر صحت کے اطلاقی پہلو Applied aspects of Gut-Liver Health	Yes	Yes	Yes
(M-3) قلبی نِظام کی عمومی اور اطلاقی فزیالوجی General and Applied physiology of Cardiovascular system (Marks: Range 5-20)				
1	**(U-1)** نِظام قلب وعروق کی تنظیم Cardiovascular Regulation	No	Yes	Yes
2	**(U-2)** ضغط الدم اور عروقی صحت Blood Pressure and Vascular Health	Yes	Yes	Yes
3	**(U-3)** نبض کا تقیم اور تفسیر Pulse (Nabz) Assessment and Interpretation	Yes	Yes	No
4	**(U-4)** عروقی خرابی اور ہیموڈینامک عوارض Vascular Dysfunction and Hemodynamic Disorders Vascular Dysfunction and Hemodynamic Disorders	No	Yes	Yes
(M-4) نِظام تنفس کی عمومی اور اطلاقی فزیالوجی General and Applied Physiology of Respiratory system (Marks: Range 5-20)				
1	**(U-1)** تنفّس کی میکانیات Mechanics of breathing	No	Yes	No
2	**(U-2)** تہویۃ الرئۃ Pulmonary ventilation	No	Yes	Yes
3	**(U-3)** تنفّس کی اطلاقی فزیالوجی Applied physiology of Respiration	Yes	Yes	Yes

4	**(U-4)** بلندی اور گہرے سمندر میں غوطہ زنی کی فزیالوجی Physiology of high altitude and deep-sea diving	Yes	Yes	Yes
(M-5) کلیہ کی فزیالوجی اور جسمانی درجہ حرارت کا کنٹرول Renal Physiology and Thermoregulation (Marks: Range 5-20)				
1	**(U-1)** افعال کلیہ اور اسکے یونانی تصورات Renal Function and its Unani concept	No	Yes	Yes
2	**(U-2)** تبول کا میکانیزم اور اضطرابات Micturition Mechanism and abnormalities	Yes	Yes	Yes
3	**(U-3)** حمضی قاعدی توازن Acid Base Balance	Yes	Yes	Yes
4	**(U-4)** جسمانی حرارت کی تنظیم Regulation of Body Temperature	No	Yes	Yes
(M-6) تناسلی و نشوونمائی فزیالوجی Reproductive & Developmental Physiology (Marks: Range 5-20)				
1	**(U-1)** افعال تناسلیہ کی نیورواینڈوکرائن تنظیم Neuroendocrine Regulation of Reproductive Function	No	Yes	Yes
2	**(U-2)** حمل، رضاعت اور سن یاس Pregnancy, Lactation and Menopause	Yes	Yes	Yes
3	**(U-3)** نشوونما کی فزیالوجی Developmental Physiology	No	Yes	Yes
4	**(U-4)** عقر، صحت انجابیہ اور طرزِ زندگی کے اثرات Infertility, Reproductive Health & Lifestyle Impact	Yes	Yes	Yes
(M-7) غدودی اور میٹابولک انضمام Endocrine & Metabolic Integration (Marks: Range 5-20)				
1	**(U-1)** ہارمونی سگنلنگ اور ہدف عضو کا ردِ عمل Hormonal Signalling & Target Organ Response	No	Yes	Yes
2	**(U-2)** استحالوی نظم اور رسیلاتی تداخل Metabolic Regulation & Hormonal Crosstalk	No	Yes	Yes
3	**(U-3)** یوماوی وایڈوکرائن نظم اور ہارمونوی عوارض Circadian Endocrine Rhythms & Hormonal Disorders	Yes	Yes	Yes
4	**(U-4)** طرزِ زندگی، استحالوی عوارض اور مزاج Lifestyle, Metabolic Disorders & Mizaj in Endocrine Physiology	Yes	Yes	Yes
(M-8) نیوروفزیالوجی، تناؤ، اور خاص حسّات Neurophysiology, Stress, and Special Senses (Marks: Range 5-20)				
1	**(U-1)** عصبی و نیوروہیومورل نظام کا اندماج Functional Integration of Nervous & Neurohumoral Systems	No	Yes	Yes

2	(U-2) اظطراب، تکیف، اور امراض Stress, Adaptation, and Disorders	Yes	Yes	Yes
3	(U-3) خصوصی حواس کی فزیالوجی اور حسی امراض Physiology of Special Senses and Sensory Disorders	No	Yes	Yes
4	(U-4) اعلیٰ دماغی افعال اور نیند کی فزیالوجی Higher Brain Functions and Sleep Physiology	No	Yes	Yes
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**
Paper No : 2 (حیاتی کیمیا، جینیات وطبی معلومیات Biochemistry, Genetics and Bioinformatics)				
(M-9) حیاتیاتی سالمات Biomolecules (Marks: Range 5-15)				
1	(U-1) حیاتی کیمیائی ساختوں کے عمومی اصول General principles of biochemical structures	No	Yes	Yes
2	(U-2) پروٹینز Proteins	No	Yes	Yes
3	(U-3) لیپڈز Lipids	No	Yes	Yes
4	(U-4) کاربوہائیڈریٹس Carbohydrates	No	Yes	No
(M-10) مسارات استقلابیۃ اور انکی تنظیم Metabolic Pathways and Regulation (Marks: Range 5-15)				
1	(U-1) عمومی اُصول General principle	No	Yes	Yes
2	(U-2) اے ٹی پی کی پیداوار اور کنٹرول ATP Production and Control	No	Yes	Yes
3	(U-3) انزائمز Enzymes	No	Yes	Yes
4	(U-4) میٹابو لک مسارات Metabolic pathways	No	Yes	Yes
(M-11) جدید حیاتی کیمیائی تکنیکیں Advanced Biochemical Techniques (Marks: Range 5-20)				
1	(U-1) اسپیکٹروسکوپک تکنیکیں Spectroscopic techniques	No	Yes	Yes
2	(U-2) کرومیٹوگرافک تکنیکیں Chromatographic techniques	No	Yes	Yes
3	(U-3) بائیومارکرز اور یونانی ادغام Biomarkers and Unani Integration	Yes	Yes	Yes
(M-12) طبی حیاتی کیمیا Medical Biochemistry (Marks: Range 5-15)				
1	(U-1) کلینیکل بائیوکیمسٹری clinical biochemistry	No	Yes	Yes
2	(U-2) حیاتی کیمیائی تجزیہ biochemical Analysis	No	Yes	Yes
(M-13) اساس جینیات Foundations of Genetics (Marks: Range 5-20)				

1	**(U-1)** تاریخی اور مالیکیولر بنیادیں Historical and Molecular Foundations	No	Yes	Yes
2	**(U-2)** انسانی کروموسومل ساخت اور جینیاتی تغیر Human Chromosomal Structure and Genetic Variation	No	Yes	Yes
3	**(U-3)** انسانی آبادی کی جینیات اور وراثتی نمونے Human Population Genetics and Inheritance Patterns	Yes	Yes	Yes
(M-14) Human Genetic Disorders and Diagnostic Approaches (Marks: Range 5-20)				
1	**(U-1)** انسانی کروموسومل اور حیاتی کیمیائی امراض Human Chromosomal and Biochemical Disorders	No	Yes	Yes
2	**(U-2)** انسانی مونوجینک اور نشوونما کے امراض Human Monogenic and Developmental Disorders	No	Yes	Yes
3	**(U-3)** انسانی پیچیدہ امراض اور فارماکوجینیٹکس Human Complex Disorders and Pharmacogenetics	Yes	Yes	Yes
(M-15) Medical Genetics, Genomic Applications, and Population Genetics (Marks: Range 5-20)				
1	**(U-1)** آبادی کی جینیات اور وراثتی خطرات Population Genetics and Inheritance Risks	No	Yes	Yes
2	**(U-2)** جین خلل Gene disorder	Yes	Yes	Yes
3	**(U-3)** جینیاتی نقشہ سازی اور امراض کی مالیکیولر بنیاد Genetic Mapping and Molecular Basis of Disorders	No	Yes	Yes
4	**(U-4)** مشاورت اور عوامی صحت کے اطلاقات Counseling & Public Health Applications	Yes	Yes	Yes
(M-16) طبی معلومیات Bioinformatics (Marks: Range 5-15)				
1	**(U-1)** طبی معلومیات کا تعارف Introduction to Bioinformatics	No	Yes	No
2	**(U-2)** حیاتیاتی ڈیٹا بیسز اور معلومات کی بازیافت Biological Databases and Information Retrieval	No	Yes	Yes
3	**(U-3)** جینومکس اور پروٹیومکس Genomics and Proteomics	No	Yes	Yes
4	**(U-4)** مالیکیولر ماڈلنگ اور دوا کی دریافت Molecular Modelling and Drug Discovery	No	Yes	Yes
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**

Paper No : 3 (معالیجاتی منافع الاعضاء Clinical Physiology)				
(M-17) طبی تغذیہ Clinical Nutrition (Marks: Range 5-20)				
1	**(U-1)** تغذیہ کے بنیادی اُصول: جدید و یونانی نقطۂ نظر Fundamentals of Nutrition – Current and Unani Perspectives	No	Yes	Yes
2	**(U-2)** طبی تغذیہ اور غذائی منصوبہ بندی Clinical Nutrition and Dietary Planning	Yes	Yes	Yes
3	**(U-3)** غذائی جائزہ اور جسمانی ترکیب Nutritional Assessment and Body Composition	Yes	Yes	Yes
4	**(U-4)** توانائی کا اِستحالہ اور مزاج پر مبنی تدبیر Energy Metabolism and Mizaj-Based Modulation	No	Yes	Yes
(M-18) مَعدَہ-کبدی و صفراوی نظام کی کلینکل فزیالوجی Clinical Physiology of Gastrointestinal & Hepatobiliary System (Marks: Range 5-20)				
1	**(U-1)** نظامِ ہضم کی کلینیکل تشخیص Clinical Assessment of Gastrointestinal System	No	Yes	Yes
2	**(U-2)** اختبار وظائف الکبد اور کبدی صفراوی اضطرابات Liver Function Tests and Hepatobiliary Disorders	Yes	Yes	Yes
3	**(U-3)** اختبار وظائف مَعدَہ اور اِمعائی فعلی عوارض Gastric Function Tests and Functional GI Disorders	Yes	Yes	Yes
4	**(U-4)** غذائی انجذاب کی خرابیاں اور طبی ربط Malabsorption Syndromes and Clinical Correlations	Yes	Yes	Yes
(M-19) نظامِ قلب کی کلینکل فزیالوجی Clinical Physiology of Cardiovascular System (Marks: Range 5-20)				
1	**(U-1)** کلینیکل معائنہ اور بلڈ پریشر کی تشخیص Clinical Examination and Blood Pressure Assessment	Yes	Yes	Yes
2	**(U-2)** قلبی برق نگاری اور تشخیصی آلات Electrocardiography and Diagnostic Tools	Yes	Yes	Yes
3	**(U-3)** امراض قلب کی پیتھوفزیالوجی اور یونانی ربط Cardiovascular Pathophysiology and Unani Correlations	Yes	Yes	Yes
(M-20) نظامِ تنفس کی کلینکل فزیالوجی Clinical Physiology of Respiratory System (Marks: Range 5-20)				
1	**(U-1)** طبی معائنہ اور تشخیصی آلات/وسائل Clinical Examination and Diagnostic Tools	Yes	Yes	Yes
2	**(U-2)** اختبار وظائف الرئۃ اور خون میں گیسوں کا تجزیہ Pulmonary Function Test and Blood Gas Analysis	Yes	Yes	Yes

3	**(U-3)** نظامِ تنفس کی فعلیاتی امراضیات اور طبی ربط Respiratory Pathophysiology and Clinical Correlation	Yes	Yes	Yes
4	**(U-4)** وینٹیلیشن سپورٹ Ventilation Support	Yes	Yes	No
(M-21) نظامِ کلیہ و تولید کی کلینکل فزیالوجی Clinical Physiology of Reproductive and Renal Systems (Marks: Range 5-20)				
1	**(U-1)** نظامِ تولید کی طبی فعلیات Clinical Physiology of Reproductive System	Yes	Yes	Yes
2	**(U-2)** اختبارِ وظائف الکلیہ اور کہارل توازن Renal Function Evaluation and Electrolyte Homeostasis	Yes	Yes	Yes
3	**(U-3)** امراضِ کُلوی کا طبی ربط Clinical Correlation of Renal Disorders	Yes	Yes	Yes
4	**(U-4)** علاج، غسلِ کُلیہ، اور مربوط طریقہ کار Therapeutics, Dialysis, and Integrated Approach	Yes	Yes	Yes
(M-22) دموية سریریہ، مناعت، شیخوخۃ، اور التہاب Clinical Haematology, Immunology, Aging, and Inflammation (Marks: Range 5-20)				
1	**(U-1)** طبی علمُ الدم اور تشخیصی اَسالیب Clinical Haematology and Diagnostic Approaches	Yes	Yes	Yes
2	**(U-2)** طبی علمُ المناعت Clinical Immunology	Yes	Yes	Yes
3	**(U-3)** اُلتہاب، اِصلاح، اور مُضادِّ التہاب تدابیر Inflammation, Repair, and Anti-inflammatory Strategies	Yes	Yes	Yes
4	**(U-4)** عمر رسیدگی، طولِ عمر، اور شیخوخت سے تحفظ Aging, Longevity, and Geroprotection	No	Yes	Yes
(M-23) نظامِ غدد کی کلینکل فزیالوجی Clinical Physiology of the Endocrine System (Marks: Range 5-20)				
1	**(U-1)** غدودی اِضطرابات کا طبی جائزہ Clinical Evaluation of Endocrine Disorders	Yes	Yes	Yes
2	**(U-2)** غدودی اِضطرابات کے لیے متلازماتی طریقہ کا Syndromic Approach to Endocrine Disorders	Yes	Yes	Yes
3	**(U-3)** ہرمونی اندازہ جات اور تأویل Hormonal Assays and Interpretation	Yes	Yes	Yes
(M-24) کلینیکل نیوروفزیالوجی Clinical Neurophysiology (Marks: Range 5-20)				
1	**(U-1)** نظامِ اعصاب کا طبی معائنہ اور تشخیصی اختبار Clinical Examination and Diagnostic Testing of Nervous System	Yes	Yes	Yes

2	**(U-2)** اِصابۃ الأعصاب، اعصابی بحالی، اور درد کی فعلیات Nerve Injuries, Neuro-regeneration and Pain Physiology	Yes	Yes	Yes
3	**(U-3)** Neurogenesis and Neuropathies	Yes	Yes	Yes
4	**(U-4)** نوم کی فعلیات، جذبات، طرزِ عمل، اور اعصابی تصویر کشی Sleep Physiology, Emotion, Behavior and Neuroimaging	Yes	Yes	Yes
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**
Paper No : 4 (تکاملی منافع الاعضاء و جدید اضافات Integrative Physiology and Recent Advances)				
(M-25) طب یونانی میں منافع الاعضاء پر نظر عام An Overview of Unani Physiology (Marks: Range 5-15)				
1	**(U-1)** منافع الاعضاء کا کلاسیکی تصور Classical concept of Manafeul Aza	No	Yes	Yes
2	**(U-2)** کلاسیکی ادب کا تقابلی تجزی Comparative analysis of classical Literature	No	Yes	Yes
(M-26) یونانی تصور ریاضت اور اس کا اسپورٹس اور ایکسرسائز فزیالوجی سے تعلق Unani Concept of Riyazat and its relevance to Sports and Exercise Physiology (Marks: Range 5-20)				
1	**(U-1)** لیاقتِ بدنیہ کا جائزہ Assessment of Physical Fitness	Yes	Yes	Yes
2	**(U-2)** ریاضت کے فزیولوجیکل تکیُّفات Physiological adaptations to Exercise	Yes	Yes	Yes
3	**(U-3)** ریاضت کی فعلیات Exercise Physiology	No	Yes	Yes
(M-27) موسمیاتی تغیرات کی فزیالوجی Physiology of Climate Change (Marks: Range 5-20)				
1	**(U-1)** موسمیاتی تبدیلی کا تعارف Introduction to Climate Change	No	Yes	Yes
2	**(U-2)** انسانی فزیالوجی اور موسمیاتی تبدیلی Human Physiology and Climate Change	Yes	Yes	Yes
3	**(U-3)** تحقیق اور مستقبل کے اِتّجاہات Research and Future Directions	No	Yes	Yes
(M-28) ارتقائی فزیالوجی Evolutionary Physiology (Marks: Range 5-15)				
1	**(U-1)** ارتقائی اصولوں کا تعارف Introduction to Evolutionary Principles	No	Yes	Yes
2	**(U-2)** تقابلی فعلیات Comparative Physiology	No	Yes	Yes
3	**(U-3)** انسانی صحت میں ارتقائی فعلیات Evolutionary Physiology in Human Health	No	Yes	Yes
(M-29) طب یونانی کی توثیق کے لیے فزیالوجی ٹولز Physiological Tools for Validation of Unani Medicine (Marks: Range 5-20)				

1	(U-1) طبِ یونانی کے بنیادی تصوّرات کی تصدیق Validation of Core Concepts of Unani	No	Yes	Yes
2	(U-2) نظامِ صحت کا اِدغام Integration of Health Systems	Yes	Yes	Yes
3	(U-3) توثیق کا عمل Validation Process	No	Yes	Yes
(M-30) طبی تعلیمی ٹیکنالوجی Medical Education Technology (Marks: Range 5-15)				
1	(U-1) تعلیمی ٹیکنالوجی کے بنیادی اصول Basics of Education Technology	No	Yes	No
2	(U-2) تدریس و تعلّم کے طریقے اور تکنیکیں Teaching/Learning Methods & Techniques	No	Yes	Yes
3	(U-3) تعلیمی ٹیکنالوجی کے جدید ترین ٹولز Latest Tools of Education Technology	No	Yes	Yes
4	(U-4) تعلیمی ٹیکنالوجی کی حدود Limitations of Education Technology	No	Yes	Yes
(M-31) برمائی و فقاری فزیالوجی Vertebrate and Amphibian Physiology (Marks: Range 5-15)				
1	(U-1) فقاریہ حیوانات کی فعلیات کے عمومی اصول General Principles of Vertebrate Physiology	No	Yes	Yes
2	(U-2) عام تجرباتی جانوروں کی فعلیات Physiology of Common Lab Animals	No	Yes	Yes
3	(U-3) حیوانی تجربات کا متبادل Alternate to Animal Experimentation	No	Yes	Yes
(M-32) جدید اضافات Recent Advances (Marks: Range 5-15)				
1	(U-1) جینومکس اور شخصی طب Genomics and Personalized Medicine	No	Yes	Yes
2	(U-2) مصنوعی ذہانت (اے آئی) اور مشین لرننگ Artificial Intelligence (AI) and Machine Learning	No	Yes	Yes
3	(U-3) تھری ڈی پرنٹنگ اور ورچوئل رئیلٹی (وی آر) اور آگمینٹڈ رئیلٹی (اے آر) 3D Printing and Virtual Reality (VR) and Augmented Reality (AR)	No	Yes	Yes

6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)

Instructions for the paper setting.

1. University examination shall have 4 papers of 100 marks.

Each 100 marks question paper shall contain:-

• Application Based Question: 1 No (carries 20 marks)

• Short Answer Questions: 8 Nos (each question carries 05 marks)

• Long Answer Questions: 4 Nos (each question carries 10 marks)

2. Questions should be drawn based on the table 6F.

3. Marks assigned for the module in 6F should be considered as the maximum marks. No question shall be asked beyond the maximum marks.

4. Refer table 6F before setting the questions. Questions should not be framed on the particular unit if indicated “NO”.

5. There will be a single application-based question (ABQ) worth 20 marks. No other questions should be asked from the same module where the ABQ is framed.

6. Except the module on which ABQ is framed, at least one Short Answer Question should be framed from each module.

7. Long Answer Question should be analytical based structured questions assessing the higher cognitive ability.

8. Create Blueprint based on instructions 1 to 7.

6 H : Distribution of Practical Exam (University Examination)

S.No	Heads	Marks
1	**Long procedure/Major practical:** Two (02) practicals. 50 Marks for each practical. Any two (02) Major Practical (Criteria: Duration≥6 Hours) from the below list may be given for assessment. List of Major Practical: 3.1, 3.4, 4.2, 4.4, 8.2, 16.1, 16.2, 18.3, 18.4, 19.2, 20.2, 20.4, 22.1, 22.4, 23.4, 26.2, 26.3, 26.4, 27.1, 27.3, 29.3, 32.1	100
2	**Short procedure/Minor practical:** Two (02) practicals. 25 Marks for each practical Any two (02) Minor Practical/ Short Procedure (Criteria: Duration < 6 Hours) from the below list may be given for assessment. Each practical 25 Marks. List of Minor Practical: 1.1, 1.2, 1.4, 1.5, 1.6, 1.8, 1.9, 2.1, 2.2, 2.3, 2.4, 3.2, 3.3, 5.1, 5.4, 5.5, 8.4, 9.1, 10.1, 11.1, 16.3, 16.4, 16.5, 17.2, 17.3, 17.4, 18.2, 19.1, 20.1, 24.1, 24.3, 24.4, 26.1, 28.1, 30.1, 30.4, 31.1, 31.2, 31.3, 31.4, 31.5, 32.1.	50
3	**Spotters:** The following may be given as spotters: 1. 05 Microscopic Slides for identification (e.g. from Practical 1.3, 6.4) 10 Marks (2 marks each) 2. 02 EMG/ NCV/ EEG/ECG Traces for diagnosis (e.g. from Practical 1.7, 24.2) 10 Marks (5 marks each) 3. 02 USG reports (e.g. from Practical 6.3, 21.2) 10 Marks (5 marks each) 4. 04 Lab reports for diagnosis/interpretation (e.g. from Practical 6.1, 7.1, 7.2, 7.3, 7.6, 19.3, 20.3, 21.3, 21.5, 21.7, 22.2, 22.3,23.1, 23.3) 20 Marks (5 marks each)	50
4	**Assessing teaching ability:** **Assessment Criteria: Teaching Ability:** Domain — Criteria — Max Marks Content Knowledge & Clarity — - Demonstrates accurate and up-to-date subject knowledge - Explains concepts clearly and logically — 5	25

	Organization & Delivery	- Structures session effectively (introduction, body, summary) - Uses time efficiently and stays on topic	5	
	Engagement & Interaction	- Encourages learner participation/questions - Uses interactive methods or media effectively	5	
	Professionalism & Communication	- Maintains professional demeanor and appropriate language - Communicates with confidence and enthusiasm	5	
5	Assessing presentation skills: Assessment Criteria: Presentation Skills Similar criteria as given for assessment of teaching skills may be adopted.			25
6	Viva (4 examiners: 25 marks/each examiner)#			100
7	Logbook (Activity record)			25
8	Practical/Clinical Record: There should be a minimum of one practical from each module.			25
Total Marks				**400**

No separate marks for dissertation viva.

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Abbreviations

Domain		T L Method		Level	
CK	Cognitive/Knowledge	L	Lecture	K	Know
CC	Cognitive/Comprehension	L&PPT	Lecture with PowerPoint presentation	KH	Knows how
CAP	Cognitive/Application	L&GD	Lecture & Group Discussion	SH	Shows how
CAN	Cognitive/Analysis	L_VC	Lecture with Video clips	D	Does
CS	Cognitive/Synthesis	REC	Recitation		
CE	Cognitive/Evaluation	SY	Symposium		
PSY-SET	Psychomotor/Set	TUT	Tutorial		
PSY-GUD	Psychomotor/Guided response	DIS	Discussions		
PSY-MEC	Psychomotor/Mechanism	BS	Brainstorming		
PSY-ADT	Psychomotor Adaptation	IBL	Inquiry-Based Learning		
PSY-ORG	Psychomotor/Origination	PBL	Problem-Based Learning		
AFT-REC	Affective/ Receiving	CBL	Case-Based Learning		
AFT-RES	Affective/Responding	PrBL	Project-Based Learning		
AFT-VAL	Affective/Valuing	TBL	Team-Based Learning		
AFT-SET	Affective/Organization	TPW	Team Project Work		
AFT-CHR	Affective/ characterization	FC	Flipped Classroom		
		BL	Blended Learning		
		EDU	Edutainment		
		ML	Mobile Learning		
		ECE	Early Clinical Exposure		
		SIM	Simulation		
		RP	Role Plays		
		SDL	Self-directed learning		
		PSM	Problem-Solving Method		

		KL	Kinaesthetic Learning		
		W	Workshops		
		GBL	Game-Based Learning		
		LS	Library Session		
		PL	Peer Learning		
		RLE	Real-Life Experience		
		PER	Presentations		
		D-M	Demonstration on Model		
		PT	Practical		
		X-Ray	X-ray Identification		
		CD	Case Diagnosis		
		LRI	Lab Report Interpretation		
		DA	Drug Analysis		
		D	Demonstration		
		D-BED	Demonstration Bedside		
		DL	Demonstration Lab		
		DG	Demonstration Garden		
		FV	Field Visit		
		JC	Journal Club		
		Mnt	Mentoring		
		PAL	Peer Assisted Learning		
		C_L	Co Learning		