Competency-Based Dynamic Curriculum for MD/ MS Unani

(PRESCRIBED BY NCISM)

Semester III-VI

Tashreehul Badan

(Human Anatomy)

(SUBJECT CODE : UNIPG-TB)

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

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NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE

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Preface

The postgraduate education program in Tahreehul Badan is designed to nurture specialists capable of delivering high-quality healthcare and advancing scientific research. By establishing uniform training guidelines nationwide, this curriculum ensures that students develop the necessary expertise to address the evolving needs of the medical community and society. Additionally, it equips them with teaching skills to integrate Tahreehul Badan with related subjects, fostering a holistic educational approach while remaining aware of their limitations.

Prepared by subject-content experts from the National Commission for Indian System of Medicine, the document underscores the foundational importance of Tashreehul Badan in medical sciences. A competency-based dynamic curriculum bridges classical Unani insights with modern advancements, enabling postgraduate students to grasp core aspects like microscopic anatomy, embryology, genetics, gross anatomy, and neuroanatomy. This comprehensive approach cultivates critical thinking, practical expertise, and research skills, preparing students for specialized clinical practices and academic roles.

The curriculum also emphasizes ethical conduct, empathetic interactions, and effective communication with students, colleagues, and donors' families. By promoting work ethics and eliminating personal prejudices, the program shapes well-rounded professionals. It aims to inspire students to contribute meaningfully to the field of Tashreehul Badan blending time-tested Unani principles with contemporary scientific discoveries, ensuring the growth of both individual practitioners and the discipline itself.

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NCISM

(NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE)

Competency-Based Dynamic Curriculum for MD/ MS Unani

Tashreehul Badan (UNIPG-TB)

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 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)			
M 1 علم الجنین عمومی)(Ilmul Janeen Umoomi) General Embryology.	2	60	50
M 2 علم الجنین نظامی)(Ilmul Janeen Nizami) Systemic Embryology.	2	60	50
Paper No : 2 (تشریح البدن وتشریح اطلاقی)(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)			
M 9 خطہ رأس کی ظاہری واطلاقی تشریح)(Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.	2	60	50
M 10 خطہ عنق کی ظاہری واطلاقی تشریح)(khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.	2	60	50
Paper No : 3 (تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)			
M 17 نظام عصبی کا تعارف)(Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System	2	60	50
M 18 نظام اعصاب کی بالیدگی)(Nizam-e- A'asab ki Baleedgi) Development of the Nervous System.	2	60	50

Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات)(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)			
M 25 خطہ راس وعنق کی سطحی تحدید(Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region.	2	60	50
M 26 تشریح شعاعی(Tashreeh-e- Shua'ei) Radiological Anatomy.	2	60	50
Semester No : 4			
Paper No : 1 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)			
M 3 خوردبینی تشریح(Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology.	2	60	50
M 4 نواۃ(Nawat) Nucleus دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle. جسم کی خردبینی ساخت(Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body.	2	60	50
Paper No : 2 (تشریح البدن وتشریح اطلاقی)(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)			
M 11 طرف اعلیٰ کی ظاہری واطلاقی تشریح(Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.	2	60	50
M 12 طرفِ اسفل کی ظاہری واطلاقی تشریح(Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.	2	60	50
Paper No : 3 (تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)			
M 19 طریق حسی مخصوصہ(Tariq-e- Hissi Makhsoosa) Special Sensory Pathways	2	60	50
M 20 طرائق عصبی(Taraiq-e- A'sabi) Neural Pathways	2	60	50
Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات)(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)			
M 27 تصویروں کی تعبیر(Tasveeron Ki Ta'abeer) Interpretation of Radiographs.	2	60	50

M 28 خطہ صدر و بطن کی سطحی تحدید (Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region.	2	60	50
Semester No : 5			
Paper No : 1 تشریح جنینی، خوردبینی و علم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)			
M 5 اجسام لونیہ و کیمیائے نسیجی (Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry	2	60	50
M 6 اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل (Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی و مناعتی تکنیک (Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques.	2	60	50
Paper No : 2 تشریح البدن و تشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)			
M 13 صدر کی ظاہری، جراحی و سریری تشریح (Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax.	2	60	50
M 14 بطن کی ظاہری، جراحی و سریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.	2	60	50
Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy)			
M 21 نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system	2	60	50
M 22 تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy	2	60	50
Paper No : 4 تشریح سطحی، شعاعی، قانونی و جدید تشریحی تحقیقات (Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)			
M 29 طرف اعلیٰ و طرف اسفل کی سطحی تحدید (Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs.	2	60	50

M 30 تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy.	2	60	50
Semester No : 6			
Paper No : 1 تشریح جنینی، خوردبینی وعلم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)			
M 7 نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی (Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics.	2	60	50
M 8 علم النسل تناسلی (Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی وعلم المناعت (Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology.	2	60	50
Paper No : 2 تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)			
M 15 کمانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e-Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia.	2	60	50
M 16 عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management.	2	60	50
Paper No : 3 تشریح اعصابی (Tashreeh-e-A'sabi) Neuroanatomy)			
M 23 عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.	2	60	50
M 24 مجموعہ سریری (Majmo'ah-e- Sareeri) Thalamic complex , نظام بطنی وخلاء (Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) تحت العنکبوت Ventricular system and Sub Arachnoid spaces.	2	60	50

Paper No : 4 (تشریح سطحی، شعاعی، قانونی و جدید تشریحی تحقیقات)(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)			
M 31 تشریح میں جدید تحقیقات)(Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy	2	60	50
M 32 قانون تشریح و تشریح اخلاقیات)(Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics	2	60	50
	64	1920	1600

Credit frame work

UNIPG-TB 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**

Credit Analysis Overview					
Sem/Paper	**Paper No 1**	**Paper No 2**	**Paper No 3**	**Paper No 4**	**Credits**
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-TB	Tashreehul Badan (Human Anatomy)

Table 1 : Course learning outcomes and mapped Program learning outcomes

CONo	A1 Course learning Outcomes (CO) UNIPG-TB At the end of the course UNIPG-TB, the students should be able to	B1 Course learning Outcomes mapped with program learning outcomes.
CO1	Demonstrate and apply knowledge of human anatomy and procedural management	PO1,PO2,PO8
CO2	Correlate Unani principles to human anatomy	PO3,PO5,PO6
CO3	Demonstrate gross and microscopic anatomy through research and innovations with the help of advanced techniques.	PO3,PO5,PO8
CO4	Illustrate developmental Anatomy (Genetics, Embryology, Surface Anatomy, Surgical anatomy, Neuroanatomy and functional pathways)	PO2,PO5,PO6
CO5	Interprete radiological anatomy and describe clinical application of anatomical knowledge, recent advances and its correlation with forensic anatomy.	PO1,PO5,PO6,PO8
C0 6	Describe the fundamentals of Unani medicine and its Application in the field of research in anatomy.	PO3,PO4,PO6,PO7,PO8
C0 7	Communicate anatomy law, basic Unani anatomical concepts and ethics to the learners and researchers	PO1,PO3,PO4,PO6

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

Paper No : 1 تشریح جنینی، خوردبینی وعلم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics						
Semester No : 3						
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-1 علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology. This module provides an in-depth understanding of the fundamental processes of human development from gametogenesis to organogenesis. This module focuses on the cellular and molecular mechanisms governing embryogenesis, the formation of body structures, and the clinical significance of congenital anomalies. This module will explore the dynamic changes occurring during early human development and their applications in medical science, particularly in reproductive biology, developmental genetics, and teratology. The module integrates theoretical knowledge with histological, imaging, and experimental techniques to provide a comprehensive understanding of embryology. As far as research relevance is concerned, this module bridges the gap between theoretical embryology and clinical practice by emphasizing congenital	2	10	20	30	60

	malformations, prenatal diagnostics, and advances in reproductive medicine. It also introduces students to research opportunities in developmental biology and regenerative medicine. **• M 1U 1 علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology -1** 1.1.1 علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology. 1.1.2 تکون خلایا جنسیہ (Takawwun-e-khlaya jinsiyah) Gametogenesis). 1.1.3 تخصیب (Takhseeb) Fertilization. 1.1.4 غرس الجنین (Gharsul-Janeen) Implantation. **• M 1U 2 علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology -II** 1.2.1 مشیمہ (Mashimah) placenta. 1.2.2 بالیدگی جنین اولی (Baleedgi-e-Janeen awwali) Early Embryonic Development.					
	M-2 علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology. This module focuses on the detailed study of the development of organ systems in the human body. It covers the sequential development of each system from the embryonic to the fetal stage, highlighting the molecular mechanisms, genetic regulation, and clinical relevance of congenital anomalies. This module integrates embryological knowledge with applied clinical concepts, emphasizing congenital malformations, developmental disorders, and their impact on human health. It provides postgraduate students with a strong foundation in developmental anatomy, essential for careers in anatomy, embryology, pediatrics, obstetrics, and genetic research. This module also bridges embryology with clinical medicine by addressing birth defects,	2	10	20	30	60

	prenatal diagnosis, and regenerative medicine. It also provides insights into the role of stem cells, genetic therapies, and advancements in fetal medicine. **• M 2U 1 علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology-I** 2.1.1. علم الجنین نظامی (Ilmul Janeen Nizami) Systemic embryology. 2.1.2. تطور نظام اعضاء (Tatawwur -e-Nizm-e-A'aza) Development of Organ systems. 2.1.3. Systemic embryology, Development of Organ systems **• M 2U 2 علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology-II** 2.2.1 خلقی نقائص مع تکون شذوذ (Khalqi Naqais ma;a takawwun-e-Shuzooz) Congenital abnormalities with Teratogenesis. 2.2.2 خلقی نقائص کی تشریحی اساس (Khalqi Naqais ki Tashreehi Asas) Anatomical Basis Of Congenital Anomalies.					
		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 خوردبینی تشریح (Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی (Ilm-e-Hayat-e-Khalwi) Cell Biology.	2	10	20	30	60

	This module provides an in-depth understanding of the structural and functional organization of cells, tissues, and organs at the microscopic level. This module integrates classical histology with modern cell biology, emphasizing the cellular mechanisms that regulate tissue function, growth, and regeneration. It also explores recent advancements in microscopy techniques, stem cell research, and molecular cell biology, highlighting their clinical and research applications. Students will gain expertise in histological interpretation, tissue organization, and cellular interactions, which are fundamental to understanding disease pathology and therapeutic innovations. This module also bridges histology and cell biology with clinical applications, including disease pathology, regenerative medicine, and molecular diagnostics. It prepares students for careers in medical education, research, and healthcare. **• M 3U 1 علم حیاتِ خلوی (Ilm-e-Hayat-e-Khalwi) Cell Biology** 3.1.1. علم حیاتِ خلوی (Ilm-e-Hayat-e-Khalwi) Cell Biology. 3.1.2. رطوبت خلیہ (Ratubat-e-Khalya) Cytoplasm. 3.1.3 مصفوفہ خلیہ (Masfufah-e-Khuwiyah) Cytoplasmic Matrix. 3.1.4. غشاء خلیہ (Ghisha-e-khalyah) cell membrane. 3.1.5. عضویات خلیہ (Uzwiyat-e- Khalyah) Cell organelles. **• M 3U 2 خوردبینی تشریح (Tashreeh-e- Khurd-beeni) Microscopic Anatomy** 3.2.1. ہیکل خلیہ (Haikal-e-Khalya) cytoskeleton. 3.2.2. خلوی مشمولات (Khalvi Mashmulat) Cell inclusions. 3.2.3. اھداب (Hudbah) Cilia) عصیہ (Isiyah) flagella.					

	3.2.4. خلیات اساسیہ کا حصول، استحکام و استعمال (Khulaya't -e-Asasiyah ka Husul, istehkam aur Iste'mal) Collection, Maintenance and Application of Stem Cells. 3.2.5. بنک التبرید (Bankuttabreed).Cryobanking.					
	M-4 نواۃ (Nawat) Nucleus دورۂ خلیہ (Daurah-e-Khaliyah) cell cycle. جسم کی خوردبینی ساخت (Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body. This module provides an in-depth exploration of the nucleus, cell cycle, and microscopic structures of the human body, emphasizing their significance in growth, development, and disease processes. The course integrates cellular and molecular biology with microscopic anatomy, offering insights into the structural organization of tissues and organs at the microscopic level. Students will develop expertise in histological techniques, microscopy, and cell cycle regulation, gaining a strong foundation in cellular mechanisms underlying normal physiology and pathological conditions such as cancer and tissue degeneration. This module is crucial for understanding cellular and microscopic anatomy about health and disease. It provides the foundation for advanced research in histopathology, cancer biology, regenerative medicine, and molecular diagnostics. **• M 4U 1 نواۃ (Nawat) Nucleus** 4.1.1. نواۃ (Nawat) Nucleus) . 4.1.2. لفافۂ نواۃ (Lifafah-e-Nawat) Nuclear Envelope. 4.1.3. مصفوفہ نواۃ (Masfufah-e- Nawat) Nuclear matrix. 4.1.4. نویہ (Nuwaiyah) Nucleolus. 4.1.5. حمض نواتی (Himz-e-Nawawi) DNA.	2	10	20	30	60

	4.1.6. اجسام لونیہ کے دیگر اجزاء (Ajsam-e- Launiyah ke deegar Ajza) Other Components of Chromatin. 4.1.7. تعمیر لحمین (Ta'ameer-e- Lahmeen) protein synthesis. **• M 4U 2 دورۂ خلیہ (Daurah-e-Khaliyah) cell cycle** 4.2.1. نواۃ کے وہ تغیرات جو موت الخلیہ کی نشاندہی کرتے ہیں (Nawat ke who taghiyurat, jo maut-e-Khalyah ki Nishandahi karti hain) Nuclear changes indicating cell death. 4.2.2 انقسام مساوی (Inqisam-e-musawi) Mitosis. 4.2.3. انقسام تقلیلی (Inqisam -e- Taqleeli) Meiosis. 4.2.4. تجدید خلیہ (Tajdeed-e-khalyah) Cell Renewal 4.2.5. تفرق خلیہ و تکاثر خلیہ (Tafarruq-e-Khalyah wa Takasur-e Khalyah) Cellular Differentiation and Cellular Proliferation. 4.2.6. جسم کی خوردبینی ساخت (Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body. تنظیم خلوی (Tanzeem-e-Khalwi) Cellular organization. 4.2.7. روشنی اور الیکٹران خوردبینی خواص (Raushni aur electron Khurdbeeni Khawas) light and Electron Microscopic features. 4.2.8. ساخت و افعال کے باھمی تعلقات (Sakht-wa-Af'al ke Bahami Ta'alluqat) Structure - function Correlations.					
		4	20	40	60	120

Semester No : 5

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

					including Modular Assessment	
	M-5 اجسام لونیہ وکیمیائے نسیجی (Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry The Human Chromosomes and histochemistry module provides an in-depth understanding of chromosomal structure, function, and abnormalities, along with histochemical techniques used to study cellular and tissue components. This module integrates cytogenetic, molecular biology, and histochemistry, emphasizing their applications in clinical diagnostics, pathology, and research. This Module will explore chromosomal organization, karyotyping, and genetic disorders, as well as histochemical staining techniques used to identify cellular components like proteins, carbohydrates, and nucleic acids. The Module is designed to enhance skills in microscopy, molecular genetics, and diagnostic histopathology. This module bridges genetics, histology, and pathology with clinical medicine, emphasizing the role of chromosomal analysis and histochemistry in disease diagnosis and medical research. It prepares students for careers in medical genetics, cytogenetic, pathology, and biomedical research. **• M 5U 1 اجسام لونیہ (Ajsam-e-Launiyah)** 5.1.1. علم النسل خلوی (Ilmul Nasal khalwi) Cytogenetics , اجسامِ لونیہ اور ان کی تعداد (Ajsam-e-Launiyah aur un ki Ta'dad) Chromosomes and their Number).	2	10	20	30	60

	5.1.2. تقسیم اجسام لونیہ (Ta'qseem Ajsam-e- Launiyah) Chromosomes classification. 5.1.3. اجسام لونیہ: ترکیب و ترتیب (Ajsam-e- Launiyah tarkeeb-wa-tarteeb) Methods of Chromosome Preparation Banding Patterns. 5.1.4. اجسام لونیہ کے نقائص (Ajsam-e-Launiyah ke naqais) Chromosomal Abnormalities. 5.1.5. اجسام لونیہ مستقلہ کے نقائص (Ajsam-e-Launiyah mustaqillah ke naqais) Autosomal Abnormalities. **• M 5U 2 کیمیائے نسیجی (Kimya-e-Naseeji)** 5.2.1. اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. 5.2.2. علم النسل جزوی (Ilmul Nasal Juzvi) Molecular Genetics. 5.2.3. مختلف نسیجی کیمیاوی تکنیک (Mukhtalif Naseeji Keemyawi Takneek) Various histochemimcal Techniques.					
	M-6 اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل (Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی و مناعتی تکنیک (Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques. This module provides an integrated approach to the study of sex chromosomal abnormalities, molecular genetics, cytogenetics, and histochemical techniques, highlighting their relevance in clinical diagnostics, medical research, and pathology. This Module will explore the structure and function of sex chromosomes, their abnormalities and associated syndromes, molecular and cytogenetic	2	10	20	30	60

	techniques for chromosomal analysis, and advanced histochemical and immune histochemical staining methods used in diagnostics and biomedical research. This module bridges genetics, histology, and pathology, providing essential knowledge for careers in medical genetics, pathology, forensic sciences, and molecular diagnostics. It is particularly relevant for researchers and clinicians specializing in cytogenetics, histopathology, and personalized medicine. **• M 6U 1 ورثہ نمطِ یک جینی علم النسل (Ilmul Nasal Juzvi) Molecular Genetics** 6.1.1. ورثہ نمطِ یک جینی(Wirsah Namt-e-yakjeeni) Single gene pattern inheritance. 6.1.2. ورثہ نمط جینی مستقلہ(Wirsah Namt-e-Jeeni mustaqillah) Autosomal chromosome pattern of inheritance. 6.1.3. ورثہ نمطِ جینی جنسی(Wirsah Namt-e-Jeeni Jinsi) Sex chromosomal pattern of inheritance. 6.1.4. ورثہ نمطِ متوسط(Wirsah Namt-e-mutawassit) Intermediate pattern of Inheritance. **• M 6U 2 کیمیاوی تکنیک مناعتی (Naseeji Keemyawi Mana'ati Takneek) Immunohistochemical techniques** 6.2.1. متعدد نسبی جوڑے(Muta'addad nasbee jorhe) Multiple alleles. 6.2.2. طفرہ (Tafrah) Mutations. 6.2.3. غیر مندیلی ورثہ(Wirsah-e-Ghair Mendeli) Non-Mendelian inheritance. 6.2.4. ورثہ متقدرہ (Wirsah-e-Mutaqaddirah) Mitochondrial inheritance. 6.2.5. طبعی مجموعہ جینی (Tab'a -e-majmoo'ah-e- Jeeni) Genome Imprinting. 6.2.6. ثنیات الابوین (Sunaiyatul Abawain) parental Disomy.					

		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-7 نمطِ ارثی کے متعدد ترتیبی عوامل(Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی(Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics. This module provides an in-depth understanding of multi factorial inheritance, genetic basis of cancer, and pharmaco genetics, emphasizing their significance in disease prediction, prevention, and personalized medicine. Students will explore how genetic and environmental factors interact in multi factorial diseases, the molecular mechanisms of cancer development, and the impact of genetic variability on drug response. This module integrates genomics, molecular pathology, and clinical pharmacology to provide essential knowledge for research and clinical applications. This module is crucial for understanding the genetic basis of complex diseases, cancer progression, and drug response variability. It prepares students for careers in	2	10	20	30	60

	medical genetics, oncology research, personalized medicine, and clinical pharmacology. **• M 7U 1 نمطِ ارثی(Inheritance)** 7.1.1. نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. 7.1.2. نمطِ ارثی کے متعدد عوامل کا معیار (Namt-e-Irsi ke muta'addad awamil ka Me'ayar) Criteria for Multifactorial inheritance. 7.1.3. علم التشوھات(Ilmul Tashwwuhat)Teratology. 7.1.4. جینی ساخت (Jeeni saakht) Structure of Gene. **• M 7U 2 فحص جزوی(Fa'hs al Juzyi)** 7.2.1. فحص جزوی (Fa'hs al Juzyi) Molecular Screening). 7.2.2. علم النسل سرطانی(Ilmul Nasal sartani) Cancer Genetics. 7.2.3. سرطانِ دموی(Sarta'n-e-Damwi) Haematological malignancies. 7.2.4. علم النسل صیدلی (Ilmul Nasal sai'dali) Pharmacogenetics.					
	M-8 علم النسل تناسلی(Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی و علم المناعت(Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology. This module explores the genetic basis of reproduction, advancements in gene therapy, and the role of immunology in health and disease. It integrates concepts from reproductive genetics, molecular medicine, and immunogenetics to provide a comprehensive understanding of fertility, genetic disorders, therapeutic gene editing, and immune system interactions. Students will gain expertise in prenatal genetic diagnosis, assisted reproductive technologies (ART), principles of gene therapy, and	2	10	20	30	60

	immunological mechanisms in disease pathogenesis and defense. This module provides essential knowledge for careers in medical genetics, reproductive medicine, immunotherapy, and molecular biology. It is particularly relevant for researchers and clinicians specializing in genetic counseling, gene therapy, and immune-based therapies. **• M 8U 1 علم النسل تناسلی (Ilmul Nasal Tanasul) Reproductive Genetics** 8.1.1. علم النسل تناسلی (Ilmul Nasal Tanasul) Reproduction Genetics. 8.1.2. مردانہ وزنانہ عقم (بانجھ پن) (Mardana wa Zanana uqm) Male and Female Infertility). 8.1.3. تناسلِ مساعد (Tanasul-e-musa'id) Assisted reproduction. 8.1.4. علم النسل قبل الغرس (Ilmul Nasl QablalGharas) Preimplantation genetics. 8.1.5. تشخیص قبل الولادت (Tashkhees-e-Qabl al Wiladah) Prenatal diagnosis). 8.1.6. استشراحِ جینی (Istishrah-e-Jeeni) Genetic Counselling. **• M 8U 2 علاج جینی واطلاقی معلومات (Ilaj-e-Jeeni wa Itlaqi Ma'alumat) Gene therapy and its applied knowledge** 8.2.1. اخلاقیات علم النسل (Akhlaqiyat-e-Ilmul Nasl) Ethics of Genetics. 8.2.2. اصولِ علاج جینی واطلاقی معلومات (Usool-e-Ilaj-e-Jeeni wa Itlaqi Ma'alumat) Principles of Gene therapy and its applied knowledge. 8.2.3. نظامِ مناعت اور دفاعی میکانیہ میں شامل ہونے والے خلیات (Nizam-e-Mana'at aur difa'ei makaniyah men shamil hoane wale khaliyat) Immune system and Cell Types Involved in Defence Mechanism. 8.2.4. توافقِ انسجۂ کبیرہ کی سریریاتی اہمیت (Tawa'fuq-e-Ansija-e- Kabeerah ki Sariryati Ahmiyat) Clinical Significance of major Histocompatibility complex.					

		4	20	40	60	120
		16	80	160	240	480
Paper No : 2 تشریح البدن و تشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy						
Semester No : 3						
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-9 خطہ رأس کی ظاہری و اطلاقی تشریح (Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region. This module provides an in-depth study of the gross anatomy, functional significance, and clinical applications of the head region. It covers the skull, cranial nerves, musculature, vasculature, and specialized sensory organs, emphasizing their structural relationships and clinical relevance. Students will gain a comprehensive understanding of head anatomy through cadaveric dissections, radiological imaging, and clinical case discussions, helping them correlate anatomical knowledge with surgical, neurological, and dental applications. This module is essential for medical practitioners, surgeons, dentists, and neuroscientists who require a thorough understanding of head anatomy for diagnostic, surgical, and clinical applications.	2	10	20	30	60

	• **M 9U 1 خطہءِراس (Khitt'a-e- Ra's) Head Region-I** 9.1.1. عظامِ راس(Iza'm –e- Ra's) Osteology of Head Region. 9.1.2. مفاصلِ راَس (Mafasil –e- Ra's) Arthrology Of Head Region. • **M 9U 2 خطہ رَاس(Khitt'a-e- Ra's) Head Region-II** 9.2.1. عضلاتِ راَس Azla't -e- Ra's (Myology of Head region). 9.2.2. دماغ(Dimagh) Brain. 9.2.3. خطہ رَاس کی ظاہری واطلاقی تشریح(Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.					
	M-10 خطہ عنق کی ظاہری واطلاقی تشریح(khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region. This module provides a detailed study of the gross and applied anatomy of the neck, focusing on its complex structures, anatomical relationships, and clinical significance. It covers the cervical vertebrae, muscles, neurovascular structures, fascial planes, lymphatics, and vital organs such as the thyroid and larynx. Through cadaveric dissections, radiological imaging, and clinical correlations, students will develop a comprehensive understanding of the functional anatomy of the neck and its relevance in medical, surgical, and diagnostic fields. This module is highly relevant for ENT specialists, neurosurgeons, general surgeons, radiologists, and oncologists, as it provides critical anatomical insights into diagnosing and managing neck-related conditions • **M 10U 1 خطہ عنق(khitt'a Unq)- Neck region-I** 10.1.1. عظامِ عنق(Izam-e- Unq) osteology of neck Region.	2	10	20	30	60

	10.1.2. مفاصلِ عنق(Mafasil -e- Unq) Arthrology Of neck Region. 10.1.3. عضلاتِ عنق(Azla't -e- Unq) Myology of neck Region. **• M 10U 2 خطہ عنق(khitt'a Unq)- Neck region-II** 10.2.1. احشاءِ عنقAhsh'a -e-Unq) Splanchology of neck Region. 10.2.2. خطہ عنق کی ظاہری واطلاقی تشریح(khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.					
		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 طرف اعلیٰ کی ظاہری واطلاقی تشریح(Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs. This module provides an in-depth study of the gross anatomy, functional significance, and clinical applications of the upper limb. It covers the bones, joints, muscles, blood vessels, nerves, and lymphatics, along with their anatomical relationships and applied aspects in orthopaedics, neurology, vascular surgery, and rehabilitation medicine. Students will develop a comprehensive understanding of upper limb anatomy through cadaveric	2	10	20	30	60

	dissections, radiological imaging, and clinical case discussions, allowing them to correlate anatomical knowledge with fractures, nerve injuries, vascular disorders, and surgical procedures. This module is essential for orthopaedic surgeons, physiotherapists, neurologists, radiologists, and sports medicine specialists, as it provides critical anatomical knowledge for diagnosing and managing upper limb disorders and injuries. **• M 11U 1 طرف اعلیٰ (Taraf-e-A'ala) upper limb-I** 11.1.1. عظام طرفِ اعلیٰ (Iza'am-e-Taraf-e-A'ala) Osteology of upper limb. 11.1.2. مفاصل طرفِ اعلیٰ (Mafasil -e- Taraf-e-A'ala) Arthrology of upper limb. **• M 11U 2 طرف اعلیٰ (Taraf-e-A'ala) upper limb-II** 11.2.1. عضلاتِ طرفِ اعلیٰ (Azla't-e- Taraf-e-A'ala) Myology of upper limb. 11.2.2. طرف اعلیٰ کی ظاہری و اطلاقی تشریح (Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.					
	M-12 طرفِ اسفل کی ظاہری و اطلاقی تشریح (Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs. This module provides an in-depth understanding of the gross anatomy, functional significance, and clinical applications of the lower limb. It covers the bones, joints, muscles, blood vessels, nerves, and lymphatics, their anatomical relationships and clinical correlations in orthopaedics, neurology, sports medicine, and vascular surgery. Students will develop a comprehensive knowledge of lower limb anatomy through cadaveric dissections, radiological imaging, and clinical case discussions. This will allow them to correlate anatomical structures with fractures, nerve injuries, vascular disorders, and	2	10	20	30	60

	surgical interventions. This module is essential for orthopaedic surgeons, physiotherapists, neurologists, sports medicine specialists, vascular surgeons, and rehabilitation experts, as it provides critical anatomical knowledge for diagnosing and managing lower limb disorders and injuries. • **M 12U 1 طرف اسفل(Taraf-e-Asfal) Lower limb-I** 12.1.1. عظامِ طرفِ اسفل(Iza'm -e- Taraf-e- Asfal) Osteology of Lower limbs. 12.1.2. مفاصلِ طرفِ اسفل(Mafasil -e- Taraf-e-Asfal) Arthrology of Lower limbs. • **M 12U 2 طرف اسفل(Taraf-e-Asfal) Lower limb-II** 12.2.1. عضلاتِ طرفِ اسفل(Azla't-e- Taraf-e-Asfal) Myology of Lower limbs. 12.2.2 طرفِ اسفل کی ظاہری واطلاقی تشریح(Taraf-e-Asfal ki Zahiri wa Atlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.					
		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 صدر کی ظاہری، جراحی و سریری تشریح(Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax.	2	10	20	30	60

	This module provides a comprehensive study of the anatomical structures of the thoracic region, emphasizing their surgical and clinical significance. It covers the gross anatomy of the thoracic wall, thoracic cavity, mediastinum, lungs, heart, and major vascular structures. Special focus is given to the anatomical basis of thoracic surgeries, clinical conditions, and diagnostic procedures. This module is essential for understanding thoracic anatomy in both basic and applied clinical settings, preparing students for further studies in surgery, radiology, and cardiopulmonary medicine. **• M 13U 1 صدر(Sadr) Thorax-I** 13.1.1. عظامِ صدر(Iza'm -e-Sadr) Osteology of Thorax. 13.1.2. مفاصلِ صدر(Mafasil-e-Sadr) Arthrology of Thorax. **• M 13U 2 صدر(Sadr) Thorax-II** 13.2.1. عضلاتِ صدر (Azlat-e-Sadr) Myology of Thorax. 13.2.2. احشاءِ صدر(Ahsh'a-e- Sadr) Splanchology of Thorax. 13.2.3. صدر کی ظاہری، جراحی و سریری تشریح (Sadr ki Zahiri,Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical anatomy of thorax.					
	M-14 بطن کی ظاہری، جراحی و سریری تشریح(Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen. This module provides an in-depth exploration of the gross anatomy of the abdomen with an emphasis on its surgical and clinical applications. It covers the structural organization, vascular supply, innervation, and functional significance of the abdominal viscera. The module integrates anatomical knowledge with common abdominal surgical procedures and clinical	2	10	20	30	60

	conditions, preparing students for practical applications in surgery, radiology, and gastroenterology. This module is essential for understanding the anatomy of the abdomen in both basic and clinical contexts, providing a strong foundation for future specializations in surgery, gastroenterology, radiology, and urology. **• M 14U 1 بطن(Batan) Abdomen-I** 14.1.1. قطن کے سناسن کی تشریح(Qutn ke sanasin ki Tashreeh) Osteology of Lumbar spine. 14.1.2. مفاصل قطن(Mafasil-e-Qutn)Arthrology of Lumbar region. 14.1.3. عضلاتِ دیوارِ بطن(Azlat-e- Diwar-e-Batan) Myology of Abdominal wall. **• M 14U 2 بطن(Batan) Abdomen-II** 14.2.1. قناۃ اَربی کی تشریح(Qan'at-e-Urbi ki Tashreeh) Anatomy of Inguinal Canal. 14.2.2. احشاءِ بطن (Ahsh'a-e-batan) Splanchology of Abdomen. 14.2.3. بطن کی ظاہری، جراحی و سریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.					
		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**	**2G Total**

					Modular Assessment	
	M-15 عانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia. This module provides an extensive study of the anatomy of the pelvis, perineum, and external genitalia, with a focus on their structural, functional, surgical, and clinical significance. It covers the osteology, musculature, neurovascular supply, and visceral components of the pelvic region. Additionally, it integrates anatomical knowledge with surgical interventions and common clinical conditions related to the reproductive, urinary, and gastrointestinal systems. This module is essential for understanding the pelvic and perineal anatomy in clinical practice, offering a foundation for specializations in gynecology, urology, general surgery, and radiology **• M 15U 1 نظام تناسلیہ (Nizam-e-Tanasuliya) Reproductive System-I** 15.1.1. عظامِ عانہ وعجان (Izam_e Aanah wa ujan) Osteology of Pelvis and perineum. 15.1.2. مفاصل عانہ وعجان (Mafasil-e- Aanah wa ujan) Arthrology of Pelvis and perineum. 15.1.3. عضلات عانہ وعجان (Azlat-e- Aanah wa ujan) Myology of Pelvis and perineum. **• M 15U 2 نظام تناسلیہ (Nizam-e-Tanasuliya) Reproductive System-II** 15.2.1. احشاء عانہ وعجان (Ahsh'a-e- Tashreeh-e- Aanah wa ujan) Splanchology of Pelvis and perineum.	2	10	20	30	60

	15.2.2 خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia. 15.2.3. عانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum.					
	M-16 عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management. This module provides a foundational understanding of the general anatomy of the human body, emphasizing its clinical applications in Unani medicine and procedural management. Additionally, it covers essential techniques in cadaver embalming, preservation, and museum specimen preparation. The course integrates traditional anatomical knowledge with applied skills necessary for medical education, research, and clinical practice. This module is essential for students pursuing anatomy, forensic medicine, and Unani medical practice, equipping them with practical skills in human body preservation and applied anatomical techniques. **• M 16U 1 عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management, مختلف تحنیطی اعمال کا بیان (Mukhtalif Tahneeti Ama'al ka bayan) Descriptions Of Different Embalming Procedures.** 16.1.1. عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body.	2	10	20	30	60

	16.1.2. یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management. 16.1.3. مختلف تحنیطی اعمال کا بیان (Mukhtalif Tahneeti Ama'al ka bayan) Descriptions Of Different Embalming Procedures. **• M 16U 2 تحنیط المیت (Tahneetul maiyit) Embalming of Cadaver, تحفظِ نعش و عینہ (Tahaffuz-e-N'ash wa Einah-e-Tashreeh) Preservation of Cadaver and specimen, تحذیرِ متحف (Tahzeer-e-Mat-haf) Museum preparation.** 16.2.1. تحنیط المیت (Tahneetul maiyit) Embalming of Cadaver. 16.2.2. تحفظِ نعش وعینہ (Tahaffuz-e-N'ash wa Einah-e-Tashreeh) Preservation of Cadaver and specimen. 16.2.3. تحذیرِ متحف (Tahzeer-e-Mat-haf) Museum preparation.					
		4	20	40	60	120
		16	80	160	240	480

Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy

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 نظام عصبی کا تعارف (Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System	2	10	20	30	60

	At the end of this module, students will be able to describe and classify the Nervous system and its role in coordinating body functions.The student will aquire the ability to identify the neurons,Neuroglia along with their classification. This module will help the student to understand the role of neurotransmitters in transmission of nerve signals and in identifying the various neural disorders and can also help in understanding the structural and functional importance of Synapses in Neural communication.This module will let students to had the deep understanding of the Autonomic nervous system(ANS) and Enteric Nervous System(ENS) with their cellular components and structural and functional units. **• M 17U 1 مرکزی نظام عصبی و محیطی کا تعارف (Markazi, Nizam e A'sabi wa Muheeti ka ta.aruf) Introduction of Central and Peripheral Nervous System. عصب واقسام عصب(Asab wa Aqsam-e Asab) Neurons and classification of Neurons. مشابک (Mashabik) Synapses. نقلات عصبی (Naqlaat –e-As'abi) Neurotransmitters. خلایا دبقیہ (khalaya-e-Dabqiya) Neuroglia.** 17.1.1. مرکزی نظام عصبی و محیطی کا تعارف(Markazi,Nizam e A'sabi wa Muheeti ka ta.aruf) Introduction of Central and Peripheral Nervous System. 17.1.2. عصب واقسام عصب(Asab wa Aqsam-e Asab) Neurons and classification of Neurons. مشابک(Mashabik) Synapses. 17.1.3. نقلات عصبی(Naqlaat –e-As'abi) Neurotransmitters. 17.1.4. خلایا دبقیہ(khalaya-e-Dabqiya) Neuroglia. **• M 17U 2 نظام عصبی غیر ارادی(Nizam e A'sabi Ghair Iradi) Autonomic nervous system. غیر شرکی نظامِ شرکی نظامِ عصبی(Shirkee Nizam e A'sabi) sympathetic nervous system.**					

	عصبی (Ghair Shirkee Nizam e A'sabi) para sympathetic nervous system. نظام عصبی معوی (Nizam e A'sabi Mew) enteric nervous system. نظام عصبی جسدی (Nizam e A'sabi Jasdi) Somatic nervous system. 17.2.1. نظام عصبی غیر ارادی (Nizam e A'sabi Ghair Iradi) Autonomic nervous system. 17.2.2. نظام عصبی معوی (Nizam e A'sabi Mewi) Enteric nervous system. 17.2.3. نظام عصبی جسدی (Nizam e A'sabi Jasdi) Somatic nervous system.					
	M-18 نظام اعصاب کی بالیدگی (Nizam-e- A'asab ki Baleedgi) Development of the Nervous System. At the end of this module,students will be able to describe and explain the development of the Cenentral nervous system and the Peripheral nervous system from the embryonic structure with the knowledge of the formation of primary and secondary brain vesicles.It will further help students to understand the formation and differentiation of Autonomic nervous system and how they form the connectivity between the Central nervous system and the targeted organs.In addition to this students will also identify the developmental stages of Enteric nervous system. This module will give an overview regarding the development of Nervous system from embryonic structure into specialized components which will help students to understand and identify the various Neural disorders. • **M 18U 1 نظام عصبی مرکزی کی بالیدگی (Nizam e A'sabi Markazi ki Baleedgi) Development of central nervous system. نظام عصبی محیطی کی بالیدگی (Nizam e A'sabi Muheeti ki Baleedgi) Development of peripheral nervous system.**	2	10	20	30	60

	18.1.1. نظام عصبی مرکزی کی بالیدگی (Nizam e A'sabi Markazi ki Baleedgi) Development of central nervous system. 18.1.2. نظام عصبی محیطی کی بالیدگی (Nizam e A'sabi Muheeti ki Baleedgi) Development of peripheral nervous system. **• M 18U 2 نظام عصبی غیر ارادی کی بالیدگی (Nizam e A'sabi Ghair Iradi ki Baleedgi) Development of Autonomic nervous system. نظام عصبی معوی کی بالیدگی (Nizam e A'sabi Mewi ki Baleedgi) Development of Enteric nervous system.** 18.2.1. نظام عصبی غیر ارادی کی بالیدگی (Nizam e A'sabi Ghair Iradi ki Baleedgi) Development of Autonomic nervous system. 18.2.2. نظام عصبی معوی کی بالیدگی (Nizam e A'sabi Mewi ki Baleedgi) Development of Enteric nervous system.					
		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 طریق حسی مخصوصہ (Tariq-e- Hissi Makhsoosa) Special Sensory Pathways At the end of this module,students will be able to understand and explain the Olfactory and Optic pathways and their components along with the knowledge	2	10	20	30	60

	of the Mechanism of perception of smell and taste.This module will also provide students to identify the cochleovestibular and Gustatory pathways with the indepth knowledge of the structure related to the acts of Hearing ,Balance and equilibrium and the sensation of taste.It will help students to demonstrate the eye movements,auditory processing along with the detection of variety of taste perceive by individuals and their role in perception and neurological disorders. **• M 19U 1 شمی طریق (Tariq-e- Shammi) Olfactory pathway. بصری طریق (Tariq-e- Basari) optic pathway.** 19.1.1. شمی طریق (Tariq-e- Shammi) Olfactory pathway. 19.1.2. بصری طریق (Tariq-e- Basari) optic pathway. **• M 19U 2 طریق قوقعی (Tariq-e- Qauqa'ei) Cochleovestibular Pathway. طریق ذوقی (Tariq-e- Zawaqa) Gustatory pathway.** 19.2.1. طریق قوقعی (Tariq-e- Qauqa'ei) Cochleovestibular Pathway.19.2,2. طریق ذوقی (Tariq-e- Zawaqa) Gustatory pathway.					
	M-20 طرائق عصبی (Taraiq-e- A'sabi) Neural Pathways The module explains the Motor and Sensory Pathways and Central Autonomic Pathways. At the end of this module ,students will be able to describe ,explain and demonstrate the Sensory pathways (Ascending tracts) and the Motor pathways(Descending tracts) along with their differentiation.This module will guide students to identify the central autonomic pathways with identifying the key brain region involved in autonomic control.They will understand the neural	2	10	20	30	60

	connections between the central nervous system and peripheral nervous system. It will further help students to understand the anatomical structure of Hypothalamic-pituitary-adrenal (HPA) axis,Hypothalamic-sympathetic pathway,Brainstem-parasympathetic .pathway and Spinal-sympathetic reflex and their role in regulating the Hormonal regulation and feed back mechanism,homeostasis,stress responses,metabolism,immune function. **• M 20U 1 طریق حرکی(Tariq-e- Harki) Motor Pathways. طریق حسی(Tariq-e- Hissi) Sensory Pathways.** 20.1.1. طریق حرکی(Tariq-e- Harki) Motor Pathways. 20.1.2. طریق حسی(Tariq-e- Hissi) Sensory Pathways. **• M 20U 2 طریق مرکزی غیر ارادی کا تعارف(Tariq-e- Markazi Ghair iradi ka Ta'aruf) Introduction of Central Autonomic Pathways. محور کظری نخاعی تحتانی(Mehwar-e-Kuzri tahtani) Hypothalamic-pituitary-adrenal (HPA) axis. طریق شرکی تحتانی(Tareeq-e-shirki Tahtani) Hypothalamic-sympathetic pathway. طریق ساقی جار شرکی(Tareeq-e-saqi jar shirki) Brainstem-parasympathetic .pathway. انعکاسِ شرکی نخاعی(Ine'ikas-e-shirki nukhae'i) Spinal-sympathetic reflex.** 20.2.1. طریق مرکزی غیر ارادی کا تعارف(Tariq-e- Markazi Ghair iradi ka Ta'aruf) Introduction of Central Autonomic Pathways. 20.2.2. محور کظری نخاعی تحتانی(Mehwar-e-Kuzri tahtani) Hypothalamic-pituitary-adrenal (HPA) axis. 20.2.3. طریق شرکی تحتانی(Tareeq-e- shirki Tahtani) Hypothalamic-sympathetic pathway.					

	20.2.4. طریقِ ساقی جار شرکی (Tareeq-e-saqi jar shirki) Brainstem-parasympathetic pathway. 20.2.5. انعکاسِ شرکی نخاعی (Ine'ikas-e-shirki nukhae'i) Spinal-sympathetic reflex.					
		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 نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system The module explains the hypothalamo-hypophyseal, limbic system, basal nuclei and reticular system. At the end of this module,students will have in-depth understanding of the hypothalamo-hypophyseal system, limbic system, basal nuclei and reticular system.Students will be able to analyze the structural organization of each systems and their respective roles in neuroendocrine regulation,correlation with behaviour and memory,motor and autonomic regulation.	2	10	20	30	60

	This module will help students in identifying and interpreting the clinical conditions related to their dysfunctions. **• M 21U 1 نظام تحت السریری و تحت النخاعی (Nizam-e-Tahataassareeri wa Tahtan-Nukha,ei) Hypothalamo-Hypophyseal System. نظام جوفی (Nizam e Jaufi) Limbic system.** 21.1.1. نظام تحت السریری و تحت النخاعی (Nizam-e-Tahataassareeri wa Tahtan-Nukha,ei) Hypothalamo-Hypophyseal System. نظام جوفی (Nizam e Jaufi) Limbic system. **• M 21U 2 نواۃ قاعدی (Nawat-e-Qa'edi) Basal Nuclei. نواۃ شبکی (Nizam-e-Shabki) Reticular System.** 21.2.1. نواۃ قاعدی (Nawat-e-Qa'edi) Basal Nuclei. 21.2.2. نواۃ شبکی (Nizam-e-Shabki) Reticular System.					
	M-22 تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy The module explains the Cross-Sectional anatomy of Brain, Spinal and applied aspects of Nervous System. At the end of this module,students will be able to describe the cross-sectional anatomy of Brain and Spinal cord at various level and correlates the anatomical structures and apply the anatomical knowledge in understanding clinical conditions. **• M 22U 1 دماغ و نخاع کا مستعرض تراشہ (Dimagh wa Nukha ka Tashreehi Musta'raz Tarsha) Cross Sectional anatomy of Brain and Spinal cord.** 22.1.1. دماغ و نخاع کا مستعرض تراشہ Dimagh wa Nukha ka Tashreehi Musta'raz Tarsha (Cross Sectional anatomy of Brain and Spinal cord. **• M 22U 2 نظام عصبی کے اطلاقی پہلو (Nizam e-A'sbi ke Itlaqi Pehlu) Applied aspects of Nervous System.**	2	10	20	30	60

	22.2.1. نظام عصبی کے اطلاقی پہلو (Nizam e-A'sbi ke Itlaqi Pehlu) Applied aspects of Nervous System.					
		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 عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses. At the end of this module,students will be able to describe and classify the different types of nerve fibres both structural and functional .They can explain the anatomical organization of the Nerve plexuses.The student will also be able to differenciate between the Central and peripheral nerves along with identification of Upper Motor Neurons(UMN) and Lower Motor Neurons(LMN). This module will further help students in understanding, diagnosing and managing neurological disorders affecting the motor and sensory systems. **• M 23U 1 عصب مرکزی (Asab-e- Markazi) Central Nerve. عصب محیطی (Asab-e-Muheeti) Peripheral Nerve. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.** 23.1.1. عصب مرکزی (Asab-e- Markazi) Central Nerve.	2	10	20	30	60

	23.1.2. عصب محیطی(Asab-e- Muheeti) Peripheral Nerve. 23.1.3. عصبی ضفیرات(Asabi Zafiraat) Nerve Plexuses. **• M 23U 2 عصبیہ حرکی اعلیٰ(Asabiyah Harki, A'la) Upper motor Neuron. عصبیہ حرکی اسفل (Asbiyah Harki asfal) Lower motor Neuron.** 23.2.1. عصبیہ حرکی اعلیٰ(Asabiyah Harki, A'la) Upper motor Neuron. 23.2.2. عصبیہ حرکی اسفل(Asbiyah Harki asfal) Lower motor Neuron.					
	M-24 مجموعہ سریری(Majmo'ah-e- Sareeri) Thalamic complex, نظام بطنی وخلاء تحت العنکبوت (Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) Ventricular system and Sub Arachnoid spaces. At the end of this module,students will be able to describe the structural anatomy of Thalamic complex along with the identification of its nuclei and their clinical correlation.The student will have the knowledge of the Developmental and structural description of the Ventricular system. They will be able to describe the Subarachnoid space,Cerebrospinal Fluid(CSF) as weel as their clinical significance. This module will guide students to correlate their anatomical knowledge with the clinical conditions. **• M 24U 1 سریر مؤخر(Sareer-e-Moakh'ar) Dorsal thalamus. سریر مقدم(Sareer-e-Muqaddam) Ventral thalamus.** 24.1.1. سریر مؤخر(Sareer-e-Moakh'ar) Dorsal thalamus. 24.1.2. سریر مقدم(Sareer-e-Muqaddam) Ventral thalamus. **• M 24U 2 نظام بطنی(Nizam-e-Batani)Ventricular system. خلاء تحت العنکبوت(Khil'a Tahat-e-Ankabutiyah) Sub Arachnoid spaces.**	2	10	20	30	60

	24.2.1. نظام بطنی (Nizam-e-Batani)Ventricular system. 24.2.2. خلاء تحت عنکبوتیہ(Khil'a Tahat-e-Ankabutiyah) Sub Arachnoid spaces.					
		4	20	40	60	120
		16	80	160	240	480

Paper No : 4 تشریح سطحی،شعاعی،قانونی وجدید تشریحی تحقیقات(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy 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 خطہ راس وعنق کی سطحی تحدید(Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region. This module takes an in-depth look into the surface anatomy of the head and neck, focusing on key landmarks, underlying structures, and their clinical relevance. It integrates theoretical concepts with practical applications, enabling students to understand anatomical relationships and their significance in medical practice. Hands-on learning experiences, including palpation techniques and case-based discussions, enhance the ability to identify surface structures accurately. Experiential learning through clinical	2	10	20	30	60

	scenarios and imaging correlations further reinforces anatomical knowledge. By combining theoretical foundations, practical skills, and real-world applications, this module prepares students for clinical examinations, diagnostic procedures, and surgical interventions. **• M 25U 1 خطہ راس کی سطحی تحدید (Khitta-e-Ra's ki satahi Tahdeed) Surface marking of Head region.** 25.1.1. خطہ راس کی سطحی تحدید (Khitta-e-Ra's ki satahi Tahdeed) Surface marking of Head region. **• M 25U 2 خطہ عنق کی سطحی تحدید (Khitta-e- Unq ki satahi Tahdeed) Surface marking of Neck region.** 25.2.1. خطہ عنق کی سطحی تحدید (Khitta-e- Unq ki satahi Tahdeed) Surface marking of Neck region.					
	M-26 تشریح شعاعی (Tashreeh-e- Shua'ei) Radiological Anatomy. This module provides an in-depth exploration of the normal study of various medical imaging modalities, including X-ray, Ultrasonography (USG), computed tomography (CT), contrast-enhanced computed tomography (CECT), mammography, magnetic resonance imaging (MRI), and radionuclide imaging. It covers the fundamental principles, techniques, and applications of each modality, emphasizing their role in assessing normal anatomical structures. Students will engage in theoretical learning, hands-on image interpretation, and case-based discussions to enhance their diagnostic skills. Experiential learning through simulated clinical scenarios, interactive workshops, and exposure to real patient imaging studies will reinforce their	2	10	20	30	60

	ability to differentiate normal findings from pathological variations. By integrating theoretical knowledge with practical and experiential approaches, this module prepares students for accurate image analysis, clinical decision-making, and effective application of medical imaging in healthcare settings. **• M 26U 1 سادہ عکس ریزی(Sadah aks srezi) Simple x-rays procedures. تصویر بالموجات الشعاعیہ(Tasveer Bil Maujatis Sautiya) Ultrasonography. تصویر مقطعی حاسوبی(Tasweer maqta'ei Hasubi) Computed Tomography Scan. تصویر مقطعی حاسوبی مع التباین(Tasweer maqta'ei Hasubi ma'attabaun) Contrast Enhanced Computed Tomography Scan.** 26.1.1. سادہ عکس ریزی(Sadah aks srezi) Simple x-rays procedures. 26.1.2. تصویر بالموجات الشعاعیہ(Tasveer Bil Maujatis Sautiya) Ultrasonography. 26.1.3. تصویر مقطعی حاسوبی(Tasweer maqta'ei Hasubi) Computed Tomography Scan. 26.1.4. تصویر مقطعی حاسوبی مع التباین(Tasweer maqta'ei Hasubi ma'attabaun) Contrast Enhanced Computed Tomography Scan. **• M 26U 2 تصویر بالرنین المقناطیسی (Tasweer Bil Raneen Al Maqnateesi) Magnetic Resonance Imaging. تصویر شعاعی ثدی (Tasweer-e-Shu'ai Sadyi) Mammography. تصویر شعاعی نواتی (Tasveer Shu'a'ei Navati) Radionuclide scanning.** 26.2.1. تصویر بالرنین المقناطیسی(Tasweer Bil Raneen Al Maqnateesi) Magnetic Resonance Imaging. 26.2.2. تصویر شعاعی ثدیی(Tasweer-e-Shu'ai Sadyi) Mammography. 26.2.3. تصویر شعاعی نواتی(Tasveer Shu'a'ei Navati) Radionuclide scanning.					
		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-27 تصویروں کی تعبیر (Tasveeron Ki Ta'abeer) Interpretation of Radiographs. This module provides an in-depth exploration of the interpretation of various medical imaging modalities, including X-ray, Ultrasonography (USG), computed tomography (CT), contrast-enhanced computed tomography (CECT), mammography, magnetic resonance imaging (MRI), and radionuclide imaging. It focuses on developing a systematic approach to image analysis, enabling students to accurately identify normal anatomical structures, recognize pathological findings, and understand their clinical implications. Through a blend of theoretical learning, hands-on image interpretation, and case-based discussions, students will gain proficiency in differentiating normal variants from disease processes. Experiential learning opportunities, such as simulated diagnostic exercises, interactive radiology workshops, and exposure to real clinical cases, will further enhance their interpretative skills. By integrating foundational principles with practical	2	10	20	30	60

	applications, this module prepares students for effective decision-making in diagnostic imaging and clinical practice. **• M 27U 1 سادہ عکس ریزی تصویروں کی تعبیر (Sadah aks srezi Tasveeron Ki Ta'abeer) plain x-rays. تصویر بالموجات الصوتیہ کی تعبیر (Tasveer Bil Maujatis Sautiyah Ki Ta'abeer) Ultrasonography. تصویر مقطعی حاسوبی کی تعبیر (Tasweer maqta'ei Hasubi Ki Ta'abeer) Interpretation of Computed Tomography Scan.** 27.1.1. سادہ عکس ریزی تصویروں کی تعبیر (Sadah aks srezi Tasveeron Ki Ta'abeer) plain x-rays. 27.1.2. تصویر بالموجات الصوتیہ کی تعبیر (Tasveer Bil Maujatis Sautiyah Ki Ta'abeer) Ultrasonography. 27.1.3. تصویر مقطعی حاسوبی کی تعبیر (Tasweer maqta'ei Hasubi Ki Ta'abeer) Interpretation of Computed Tomography Scan. **• M 27U 2 تصویر مقطعی حاسوبی مع التباین کی تعبیر (Tasweer maqta'ei Hasubi ma'attabaun Ki Ta'abeer) Interpretation of Contrast Enhanced Computed Tomography Scan. تصویر بالرنین المقناطیسی کی تعبیر (Tasweer Bil Raneen Al Maqnateesi Ki Ta'abeer) Interpretation of Magnetic Resonance Imaging. تصویر شعاعی نواتی کی تعبیر (Tasveer Shua'aei al- Nawavi Ki Ta'abeer) Interpretation of Radionuclide scanning.** 27.2.1. تصویر مقطعی حاسوبی مع التباین کی تعبیر (Tasweer maqta'ei Hasubi ma'attabaun Ki Ta'abeer) Interpretation of Contrast Enhanced Computed Tomography Scan. 27.2.2. تصویر بالرنین المقناطیسی کی تعبیر (Tasweer Bil Raneen Al Maqnateesi Ki Ta'abeer) Interpretation of Magnetic Resonance Imaging. 27.2.3. تصویر شعاعی نواتی کی تعبیر (Tasveer Shua'aei al- Nawavi Ki Ta'abeer) Interpretation of Radionuclide scanning.					

	M-28 خطہ صدر و بطن کی سطحی تحدید (Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region. This module offers an in-depth analysis of the surface anatomy of the thorax and abdomen, focusing on key anatomical landmarks, underlying structures, and their clinical significance. It examines the relationship between external features and deeper anatomical components, aiding in the assessment of vital organs such as the heart, lungs, liver, and intestines. The module integrates theoretical concepts with practical applications, enabling students to develop essential palpation techniques and surface markings for clinical evaluation. Experiential learning through hands-on exercises, case-based discussions, and imaging correlations enhances the ability to identify and interpret anatomical structures accurately. By combining theoretical foundations, practical skills, and real-world clinical applications, this module prepares students for effective anatomical assessment in medical practice, surgery, and diagnostic imaging. **• M 28U 1 خطہ صدر کی سطحی تحدید (Khitta-e-Sadr ki satahi Tahdeed) Surface marking of Thorax.** 28.1.1. خطہ صدر کی سطحی تحدید (Khitta-e-Sadr ki satahi Tahdeed) Surface marking of Thorax. **• M 28U 2 خطہ بطن کی سطحی تحدید (Khitta-e- Batan ki satahi Tahdeed) Surface marking of Abdomen region** 28.2.1. خطہ بطن کی سطحی تحدید (Khitta-e- Batan ki satahi Tahdeed) Surface marking of Abdomen region.	2	10	20	30	60

		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-29 طرف اعلیٰ وطرف اسفل کی سطحی تحدید (Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs. This module provides an in-depth study of the surface anatomy of the upper and lower limbs, focusing on key anatomical landmarks, muscular and skeletal structures, neurovascular pathways, and their clinical relevance. It examines the external features in relation to underlying bones, joints, muscles, and nerves, enhancing students' understanding of limb function and movement. The module integrates theoretical learning with practical applications, including palpation techniques, surface markings, and functional assessments essential for clinical evaluation. Experiential learning through hands-on exercises, case-based discussions, and imaging correlations further strengthens students' ability to accurately identify anatomical structures. By combining foundational knowledge with real-world applications, this module	2	10	20	30	60

	prepares students for clinical examinations, physical assessments, surgical procedures, and rehabilitation practices **• M 29U 1 طرف اعلیٰ کی سطحی تحدید (Taraf-e-Aa'la ki satahi Tahdeed) Surface marking of upper limbs.** 29.1.1. طرف اعلیٰ کی سطحی تحدید (Taraf-e-Aa'la ki satahi Tahdeed) Surface marking of upper limbs. **• M 29U 2 طرف اسفل کی سطحی تحدید (Taraf-e-Asfal ki satahi Tahdeed) Surface marking of lower limbs** 29.2.1. طرف اسفل کی سطحی تحدید (Taraf-e-Asfal ki satahi Tahdeed) Surface marking of lower limbs.					
	M-30 تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy. This module explores forensic anatomy, focusing on the identification of human bones from their remains and the determination of sex, age, and height for medico-legal applications. It covers key anatomical markers used in forensic investigations, skeletal analysis techniques, and the scientific principles underlying biological profiling. Students will gain expertise in differentiating human from non-human remains, assessing skeletal maturity, and applying anthropometric methods to estimate stature and demographic characteristics. The module integrates theoretical foundations with practical applications through hands-on skeletal examination, forensic case studies, and simulated investigative scenarios. Experiential learning opportunities, such as forensic reconstruction exercises and radiographic analysis, will further enhance students' ability to apply anatomical knowledge in legal and	2	10	20	30	60

	forensic contexts. By combining anatomy with forensic science, this module equips students with essential skills for medico-legal investigations, criminal case assessments, and human identification processes. **• M 30U 1 تشریح قانونی (Tashreeh -e-Qanooni) Forensic Anatomy. بدنی عظام کی شناخت انکی نعش کے ذریعے کرنا (Badni Eza'm ki Shinakht unki Na'sh ke Zariye karna) Identification of human bones from their remains.** 30.1.1. تشریح قانونی (Tashreeh -e-Qanooni) Forensic Anatomy. 30.1.2. بدنی عظام کی شناخت انکی نعش کے ذریعے کرنا (Badni Eza'm ki Shinakht unki Na'sh ke Zariye karna) Identification of human bones from their remains. **• M 30U 3 تشریح کو طبی وقانونی نظریہ میں استعمال کرتے ہوئے جنس، عمر، قد کا تعین کرنا۔ (Tahreeh ko Tibbi wa Qanooni Nazariye me Iste'mal karte hue Jins, Umar wa Qa'd ka Ta'yyun karna) Determination of sex, age, and height. for medico legal application of Anatomy.** 30.2.1. تشریح کو طبی وقانونی نظریہ میں استعمال کرتے ہوئے جنس، عمر، قد کا تعین کرنا۔ (Tahreeh ko Tibbi wa Qanooni Nazariye me Iste'mal karte hue Jins, Umar wa Qa'd ka Ta'yyun karna) Determination of sex, age, and height. for medico legal application of Anatomy.					
		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 تشریح میں جدید تحقیقات (Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy This module covers the intricate aspects of intravenous urography (IVU), angiography, fluoroscopy, and their various types and clinical indications. It covers essential contrast-based imaging techniques, including barium studies for gastrointestinal tract evaluation, cholecystography for gallbladder assessment, and hysterosalpingography for reproductive health diagnostics. Students will gain a thorough understanding of the principles, procedural techniques, and interpretation of these imaging modalities in diagnosing and monitoring various medical conditions. The module integrates theoretical knowledge with practical applications, emphasizing patient preparation, imaging protocols, and contrast media usage. Experiential learning through case-based discussions, hands-on imaging analysis, and exposure to real clinical scenarios will enhance students' ability to evaluate radiographic findings accurately. By combining foundational concepts with real-world applications, this module equips students with essential skills for radiological assessments and clinical decision-making in diagnostic imaging. • **M 31U 1 تشریح میں جدید تحقیقات جس میں ساخت و اَفعال کے باہمی تعلقات کو سمجھنے میں مدد ملتی ہے اور سریریاتی مسئلوں کو حل کرنے میں استعمال ہوتے ہیں (Tashreeh Men Jadeed Tahqeeqaat Jisse Saakht-o-af'al ke bahmi ta'luqaat ko Samajhney Mem Ma'dad Milti Hai Aur Sareeryati mas'lo ko**	2	10	20	30	60

	hal karney mai iste'mal hotey hai) Recent advances in Anatomy which facilitate comprehension of structure function correlations and applications in clinical problem solving. تصویراوعیہ(Tasveer-e-Auiyyah) Angiography. 31.1.1. تشریح میں جدید تحقیقات جس میں ساخت و اَفعال کے باہمی تعلقات کو سمجھنے میں مدد ملتی ہے اور سریریاتی مسئلوں کو حل کرنے میں استعمال ہوتے ہیں (Tashreeh Men Jadeed Tahqeeqaat Jisse Saakht-o-af'al ke bahmi ta'luqaat ko Samajhney Mem Ma'dad Milti Hai Aur Sareeryati mas'lo ko hal karney mai iste'mal hotey hai) Recent advances in Anatomy which facilitate comprehension of structure function correlations and applications in clinical problem solving. 31.1.2. تصویراوعیہ(Tasveer-e-Auiyyah) Angiography. **• M 31U 2 تصویرتلون فلوری اوراس کے مختلف اقسام واشارات(Tasveer-e-Talawwun Flori wa Iske Mukhtalif Aqsa'm wa Isharaat) fluoroscopy its different types and indications. اشعاع مع بیریم(ish'aa'a ma'a barium) Barium studies. تصویرمرارہ شعاعی(Tasweer mrarah shua'ei) Cholecystography. تصویرشعاعی رحمی قاذفی(Tasweer-e- shua'ei qazifi) Hystero-salpingography.** 31.2.1. تصویرتلون فلوری واس کے مختلف اقسام واشارات(Tasveer-e-Talawwun Flori wa Iske Mukhtalif Aqsa'm wa Isharaat) fluoroscopy its different types and indications. 31.2.2. اشعاع مع بیریم(ish'aa'a ma'a barium) Barium studies. 31.2.3. تصویرمرارہ شعاعی (Tasweer mrarah shua'ei) Cholecystography. 31.2.4. تصویرشعاعی رحمی قاذفی(Tasweer-e- shua'ei rahmi-qazifi) Hystero-salpingography.					
	M-32 قانون تشریح وتشریح اخلاقیات(Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics	2	10	20	30	60

	This module provides a thorough exploration of organ donation, focusing on the ethical, legal, and anatomical principles involved in the donation process. It examines the key aspects of organ procurement, including the ethical considerations surrounding consent, donor selection, and the allocation of organs. The module also addresses the legal frameworks governing organ donation, ensuring compliance with laws and regulations. Students will gain a thorough understanding of the anatomical implications of organ donation, from recent procurement to transplantation. The module integrates theoretical knowledge with practical applications, emphasizing the importance of ethical decision-making and anatomical considerations in the context of organ donation. Through case-based discussions and experiential learning, students will develop the necessary skills to navigate the complexities of organ donation and its impact on medical practice, law, and society. **• M 32U 1 تبرع بالاعضاء (Tabarr'u bil A'aza) organ donation.** 32.1.1. تبرع بالاعضاء (Tabarr'u bil A'aza) organ donation. 32.1.2. حالیہ حاصل شدہ اعضاء کی متعلق تبرع بالاعضاء کے اصول (Haliya Hasil Shuda Aa'za ke Muta'lliq Tabarr'u bil A'aza ke Usool) Principles of organ donation from recently procured. **• M 32U 2 تشریح اخلاقیات (Tashreehi Akhlaqiyaat) Ethics of Anatomy. قانون تشریح (Qanoon-e-Tashreeh) Anatomy Law.** 32.2.1. تشریح اخلاقیات (Tashreehi Akhlaqiyaat) Ethics of Anatomy. 32.2.2. قانون تشریح (Qanoon-e-Tashreeh) Anatomy Law.					
		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(تشریح جنینی،خوردبینی وعلم النسل)Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)

Semester No : 3

Module 1 : علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology.

Module Learning Objectives

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

1. Describe General Embryology, Placenta and Early Human Embryonic Development.

2. Conduct Presentation and Group Discussion Regarding General Embryology, Placenta And Early Human Embryonic Development.

3. Identify the Early Human Embryonic Development of Stages.

Unit 1 علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology -1

1.1.1 علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology.

1.1.2 تکون خلایا جنسیہ (Takawwun-e-khlaya jinsiyah) Gametogenesis).

1.1.3 تخصیب(Takhseeb) Fertilization.

1.1.4 غرس الجنین(Gharsul-Janeen) Implantation.

References: 24,41,42,44,77,78,79,80,81,82,83,84,85,97,102,103,104,105

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 learni	3D Lecture/ Practical Training/	3E Domain / Sub Domain	3F Level (Does/Shows	3G Teaching Learning Methods

		ng Hours	Experiential Learning		how/Knows how/Know)	
CO1,CO4, CO7	Demonstrate the general Embryology and gametogenesis,	5	Practical1.1	PSY-ADT	Shows-how	PER,FC,D,D-M,BS
CO1,CO4, CO7	Analyse the Fertilization and Implantation.	7	Experiential-Learning1.1	AFT-RES	Does	D,PER,BS,D-M,SDL
CO1,CO4	Describe fertilization and implantation	2	Lecture	CC	Knows-how	L_VC,L&PPT
CO1,CO4	Describe general embryology and gametogenesis.	3	Lecture	CC	Knows-how	L_VC,L&PPT
CO1,CO4, CO7	Document the key mechanisms of embryology and gametogenesis	6	Experiential-Learning1.2	AFT-RES	Does	L_VC,PSM,PL
CO1,CO4, CO7	Illustrate the fertilization and Implantation.	5	Practical1.2	PSY-MEC	Shows-how	D,PER,RP,CBL

Unit 2 علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology -II

1.2.1 مشیمہ (Mashimah) placenta.

1.2.2 بالیدگی جنین اولی (Baleedgi-e-Janeen awwali) Early Embryonic Development.

References: 77,78,79,80,81,82,83,84,85,87,88

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the early embryonic development.	2	Lecture	CC	Knows-how	L&PPT ,L_VC

CO1,CO4, CO7	Demonstrate the anatomyof placenta	5	Practical1.3	PSY-GUD	Shows-how	D-M,SDL,PER,DIS,BS
CO1,CO4	Describe the developmental anatomy of placenta.	3	Lecture	CC	Knows-how	L_VC,L&PPT
CO1,CO4, CO7	Evaluate and analyse different sites of the Placenta	7	Experiential-Learning1.3	CE	Shows-how	PER,DIS,CD,PSM,RP
CO1,CO4, CO7	Analyse the different stages of Early Embryonic Development	6	Experiential-Learning1.4	PSY-MEC	Shows-how	DIS,SIM,PrBL,PER,CBL
CO1,CO4, CO7	Demonstrate the the early embryonic development.	5	Practical1.4	PSY-ADT	Shows-how	D-M,PBL,PER,D,DIS

Practical Training Activity

Practical Training 1.1 General Embryology

Total Learning Hours: 5:00 Hours

Activity 1: Demonstration (1 Hour)

The teacher will explain gametogenesis and early embryonic stages using 3D models, charts, and diagrams, providing step-by-step explanations. Students will observe, take notes, and ask questions.

Activity 2: Group Chart-Making (1 Hour)

The teacher will guide students in creating flowcharts on gametogenesis phases. Groups will design detailed charts and present them to the class.

Activity 3: Flipped Classroom (1.5 Hour)

The teacher will assign preparatory tasks on gametogenesis and embryology. Students will complete materials at home and engage in discussions during the session.

Activity 4: Brainstorming (1.5 Hour)

The teacher will organize groups to discuss genetic disorders linked to gametogenesis errors. Students will brainstorm causes, consequences, and share findings.

Practical Training 1.2 Fertilization and Implantation.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will use models and animations to explain the processes of fertilization and implantation.

Students will observe the demonstration, take notes, and ask questions to clarify concepts related to fertilization and implantation.

Activity 2: Self-Directed Learning (1 Hour)

The teacher will provide curated resources (articles, videos, diagrams) on hormonal changes during fertilization and implantation.

Students will independently explore the materials, research key hormonal changes, and present their findings to peers in small groups or as short summaries.

Activity 3: Case-Based Learning (1 Hour)

The teacher will guide students in small groups to analyze clinical cases related to implantation disorders or hormonal imbalances.

Students will discuss the clinical scenarios, identify problems, apply anatomical and physiological knowledge, and propose appropriate interventions or explanations.

Activity 4: Role Play (1 Hour)

The teacher will create simulated patient counseling scenarios related to implantation issues.

Students will prepare scripts, assume roles (e.g., doctor, patient), and perform role-plays using visual aids to effectively communicate medical concepts in a clinical context.

Activity 5: Chart/Model Making (1 Hour)

The teacher will assist student groups in designing visual representations of the fertilization process.

Students will collaboratively create charts or 3D models illustrating the stages of fertilization, and present and explain their models to the class, reinforcing their understanding.
Practical Training 1.3 The placenta
Total Learning Hours: 5:00 Hours **Activity 1: Teacher-Led Demonstration (1 Hour)** The teacher will use models and images to explain placental anatomy, highlighting structures like chorionic villi and their functions in gas exchange, nutrient transfer, and waste elimination. Students will observe and ask questions. **Activity 2: Self-Directed Learning (1 Hour)** Students will research topics like hormonal functions or immunological roles of the placenta, preparing a write-up or presentation. **Activity 3: Brainstorming Session (1 Hour)** Student's groups will brainstorm aspects of placental functions and discuss clinical conditions like placenta previa and preeclampsia, presenting their findings. **Activity 4: Quiz/Interactive Polls (1 Hour)** Students will participate in quizzes or polls to test their understanding of placental anatomy and related scenarios. **Activity 5: Specimen Handling (1 Hour)** Students will handle preserved placental specimens to examine physical features and discuss their roles in pregnancy.
Practical Training 1.4 Early Embryonic Development.
Total Learning Hours: 5:00 Hours **Activity 1: Teacher-Led Demonstration (1 Hour)** The teacher will use visual aids to explain embryonic development stages and germ layer functions. **Activity 2: Hands-On Model Building (1 Hour)** Students will construct models of embryonic stages using creative materials, focusing on structure and germ layers. **Activity 3: Microscopy Lab (1 Hour)**

Students will examine histological slides to identify key embryonic structures.

Activity 4: Group Discussion (1 Hour)

Students will discuss developmental processes and their implications for anomalies.

Activity 5: Problem-Based Learning (1 Hour)

Students will analyze clinical cases of developmental errors and propose solutions.

Experiential Learning Activity

Experiential-Learning Learning 1.1: Fertilization and Implantation.

Total Learning Hours: 7:00 Hours

Activity 1: Model-Based Activity (1 Hour) Students will use 3D models or digital platforms to trace the journey of sperm, egg, zygote, and blastocyst, mapping key interactions and roles in fertilization and implantation.

Activity 2: Histological Slide Analysis (1 Hour) Students will examine slides to identify cellular elements of implantation, linking structures to functions like nutrient exchange.

Activity 3: Fertility Treatment Simulation (1 Hour) Students will role-play clinicians, designing ART protocols to address fertilization or implantation challenges, simulating IVF or endometrial priming.

Activity 4: Brainstorming Developmental Failures (1.5 Hour) Groups will brainstorm disruptions in fertilization or implantation, exploring causes like chromosomal abnormalities or hormonal imbalances.

Activity 5: Experimental Data Interpretation (1.5 Hour) Students will analyze datasets on hormone levels or genetic markers, drawing conclusions for reproductive health.

Activity 6: Hormonal Pathways Study (1 Hour) Students will map hormonal changes like LH, FSH, progesterone, and hCG, linking fluctuations to physiological impacts.

Experiential-Learning Learning 1.2: Basics of General Embryology

Total Learning Hours: 6:00 Hours

Activity 1: Case-Based Learning (1 Hour)

Students will analyze clinical cases on gametogenesis defects or embryological abnormalities, identifying affected stages, causes, and solutions.

Activity 2: Conceptual Mind Mapping (1 Hour)

Students will create mind maps linking gametogenesis and embryology processes to structures and functions.

Activity 3: Peer teaching (1 Hour)

Students will teach specific gametogenesis or embryology stages to their peers using diagrams and presentations.

Activity 4: Problem-Solving Challenge (1 Hour)

Students will work in groups to solve scenarios involving errors in gametogenesis or embryonic development, proposing solutions.

Activity 5: Creative Visualization (1 Hour)

Students will design creative outputs like posters or infographics to represent gametogenesis and embryology processes.

Activity 6: Reflective Q&A (1 Hour)

Students will participate in a Q&A session to reflect on learning, clarify doubts, and solidify understanding.

Experiential-Learning Learning 1.3: The Placenta

Total Learning Hours: 7:00 Hours

Activity 1: Laboratory Analysis (1 Hour)

Students will examine placenta slides under a microscope, identifying key features and understanding its role in maternal-fetal exchange.

Activity 2: To make flash card (1 Hour)

Students will simulate physiological processes of the placenta, acting out functions like nutrient transfer and hormone secretion.

Activity 3: Critical Comparison (1.5 Hour)

Students will compare the human placenta with those of other species, discussing structural and functional differences.

Activity 4: Problem-Solving Challenge (1 Hour)

Students will analyze scenarios of placental dysfunction, identifying causes and proposing solutions.

Activity 5: Mind Mapping (1.5 Hour)

Students will create integrative mind maps linking the placenta's structure to its functions, promoting holistic understanding.

Activity 6: Creative Visuals (1 Hour)

Students will design posters or videos showcasing the placenta’s structure and roles with scientific accuracy.

Experiential-Learning Learning 1.4: Early Embryonic Development.

Total Learning Hours: 6 Hours

Activity 1: Interactive Model Analysis (1 Hour)

Students will analyze and interpret detailed 3D models of embryonic stages, focusing on identifying key developmental features. They will explore spatial relationships and functional aspects of the structures.

Activity 2: Problem-Based Learning (1 Hour)

Students will be presented with a clinical scenario involving disrupted embryonic development (e.g., congenital abnormalities). They will work in groups to analyze the scenario, identify the developmental stage affected, and suggest possible causes or interventions.

Activity 3: Sequential Visualization (1 Hour)

Students will create sequential diagrams or flowcharts illustrating the stages of early embryonic development. Each diagram will emphasize critical milestones, transitions, and their physiological or morphological significance, encouraging clarity and precision in representation.

Activity 4: Simulation Activities ((1 Hour)

Using virtual or augmented reality tools, students dynamically simulate the progression of embryonic stages.

Activity 5: Case Study Evaluation (1 Hour)

Students will analyze a case study involving embryonic developmental abnormalities, reviewing available data to deduce which stage of development was disrupted.

Activity 6: Timed Challenge: Stage Assembly (1 Hour)

Using provided resources (e.g., images, model parts, written descriptions); students will construct a timeline or visual representation of embryonic development within a set duration.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** 1. **Histological Slide Interpretation**Students will identify and explain developmental stages or structures. **(Marks: 10)** 2. Case Based Assessment or practical performance or Dissection/ virtual dissection or or exploration through virtual reality - **(Marks: 15)** 3. **Portfolio Submission** Students will compile of learning activities: annotated images, case summaries, technique reviews, and reflections. **(Marks: 10)** 4. Making model or Poster making- **(Marks: 15)** 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 assessment. (25 Marks)	4
Module 2 : علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology.	
Module Learning Objectives (At the end of the module, the students should be able to) 1. Describe Systemic Embryology Development Of Organ Systems And Anatomical Basis Of Congenital Anomalies.	

2. Conduct Presentation And Group Discussion Regarding Systemic Embryology Development Of Organ Systems And Anatomical Basis Of Congenital Anomalies.

3. Identify Systemic Embryological Development Of Organ Systems.

Unit 1 علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology-I

2.1.1. علم الجنین نظامی (Ilmul Janeen Nizami) Systemic embryology.

2.1.2. تطور نظام اعضاء (Tatawwur -e-Nizm-e-A'aza) Development of Organ systems.

2.1.3. Systemic embryology, Development of Organ systems

References: 77,78,79,80,81,82,83,84,85

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Systemic embryology	2	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD
CO1,CO4, CO7	Evaluate the Developmental Anatomy of Organ systems.	7	Experiential-Learning2.1	CE	Does	SIM,JC,PSM,PER, CD
CO1,CO4, CO7	Demonstrate coordinated assembly of a model illustrating stages of general systemic embryology.	5	Practical2.1	PSY-MEC	Shows-how	FC,D,PER,D-M,FV
CO1,CO4, CO7	Demonstrate systemic embryological development through clinically integrated tasks to enhance understanding of developmental processes and cngenital anomalies.	6	Experiential-Learning2.2	AFT-VAL	Does	CBL,CD,DIS,PER
CO1,CO4	Describe the Development of Organ systems.	3	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC

CO1,CO4	Describe the Anatomical Basis Of Congenital Anomalies.	2	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO4, CO7	Demonstrate the development of organ systems.	5	Practical2.2	PSY-MEC	Shows-how	PER,BS,SDL,D,D-M

Unit 2 علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology-II

2.2.1 خلقی نقائص مع تکون شذوذ (Khalqi Naqais ma;a takawwun-e-Shuzooz) Congenital abnormalities with Teratogenesis.

2.2.2 خلقی نقائص کی تشریحی اساس (Khalqi Naqais ki Tashreehi Asas) Anatomical Basis Of Congenital Anomalies.

References: 77,78,79,80,81,82,83,84,85

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Congenital abnormalities with Teratogenesis.	3	Lecture	CC	Knows-how	L_VC,L&PPT ,L&GD
CO1,CO4, CO7	Analyze the Congenital abnormalities with Teratogenesis.	7	Experiential-Learning2.3	AFT-RES	Does	IBL,CBL,DIS,JC,CD
CO1,CO4, CO7	Illustrate and demonstrate the congenital abnormalities with teratogenesis.	5	Practical2.3	PSY-GUD	Shows-how	PER,DIS,D-M,FV,ML
CO1,CO4, CO7	Demonstrate the Anatomical Basis Of Congenital Anomalies.	6	Experiential-Learning2.4	PSY-GUD	Shows-how	PBL,DIS,PL,PER
CO1,CO4, CO7	Illustrate and demonstrate the anatomical Basis of Congenital anomalies.	5	Practical2.4	PSY-ADT	Shows-how	PER,CBL,D,RP,D-M

Practical Training Activity
Practical Training 2.1 General Systemic embryology.
Total Learning Hours: 5 Hours **Activity 1: Teacher Demonstration (1 Hour)** The teacher will use 3D models, diagrams, and charts to explain the sequential development of organ systems and embryological stages. Students will take notes, analyze normal and abnormal sequences, and clarify key concepts. **Activity 2: Flipped Classroom Session (1 Hour)** Students will review pre-assigned materials on systemic embryology and engage in classroom discussions to apply their knowledge, analyze concepts, and solve case-based scenarios collaboratively. **Activity 3: Concept Mapping (1 Hour)** Students will design concept maps connecting embryological stages, derivatives, and anomalies for various organ systems, linking development processes to conditions like spina bifida or congenital heart defects. **Activity 4: Clinical Correlation Assignment (1 Hour)** The teacher will assign organ systems for students to research and link to clinical conditions. Students will present findings on embryological bases, pathophysiology, diagnostics, and therapeutic approaches. **Activity 5: Real-Life Clinical Exposure (1 Hour)** Students will visit a pediatric or obstetric department to observe real cases of congenital anomalies. They will learn diagnostic techniques, counseling strategies, and management methods, followed by reflective discussions.
Practical Training 2.2 Development of organ systems.
Total Learning Hours: 5 Hours **Activity 1: Teacher Demonstration (1 Hour)**

The teacher will demonstrate the sequential development of major organ systems, highlighting key embryological stages using 3D models, diagrams, and charts. Students will observe, take notes, and ask questions to clarify anatomical relationships and congenital conditions.

Activity 2: Histology Slide Observation (1 Hour)

Students will analyze microscopic slides of developing organs, such as the heart, lungs, or brain, identifying structural features and correlating them with their developmental functions.

Activity 3: Case-Based Learning (CBL) (1 Hour)

Students will explore clinical cases involving organ development disorders, using patient data and imaging studies to trace embryological origins, identify affected structures, and propose interventions.

Activity 4: Group Discussion (1 Hour)

Students will engage in discussions to review organ system development timelines and brainstorm clinical implications of errors at specific stages, debating topics.

Activity 5: Self-Directed Learning (SDL) with Reflection (1 Hour)

Students will independently research the development of a chosen organ system, preparing a report or presentation that emphasizes common disorders and their impact on anatomy and physiology.

Practical Training 2.3 Congenital abnormalities with teratogenesis.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will use 3D models, diagrams, and animations to explain congenital abnormalities and teratogenesis, focusing on errors during embryogenesis and teratogen exposure. Students will observe, analyze step-by-step development, take notes, and ask questions.

Activity 2: Museum Specimen Observation (1 Hour)

Students will observe preserved fetal specimens with congenital abnormalities in an anatomy museum. They will analyze structural changes, document observations on a guided worksheet, and discuss embryological origins of defects.

Activity 3: Histological Slide Observation (1 Hour)

Students will examine microscopic slides of tissues impacted by teratogens, identifying structural abnormalities like neural tube defects or skeletal malformations, and correlating them with functional consequences.

Activity 4: Animated Video/Documentary Screening (1 Hour)

Students will watch animations or documentaries on teratogenesis and congenital anomaly development, visualizing processes such as neural tube closure disruption or heart septation errors.

Activity 5: Guest Lecture by Clinical Expert (1 Hour)

A pediatrician or geneticist will present clinical cases of congenital birth defects, discussing diagnostic approaches, prevention strategies (e.g., folic acid supplementation), and management. Students will engage in a Q&A session.

Practical Training 2.4 Congenital Anomalies

Total Learning Hours: 5 Hours

Activity 1: Demonstration (1 Hour)

The teacher will demonstrate congenital anomalies using 3D models. Students will observe, analyze deviations from normal anatomy, take notes, and ask questions for better understanding.

Activity 2: Embryological Chart/Model Preparation (1 Hour)

The teacher will guide students in creating charts or models of congenital anomalies caused by embryological errors. Students will illustrate sequential development stages and present their work to peers.

Activity 3: Histological Slide Analysis (1 Hour)

The teacher will explain histological slides related to anomalies. Students will analyze slides under microscopes, document structural changes, and share insights in group discussions.

Activity 4: Case-Based Learning (CBL) (1 Hour)

The teacher will present clinical cases of congenital anomalies. Students will analyze cases, identify affected structures, and propose interventions or preventive measures. **Activity 5: Role Play / Patient Counseling Simulation (1 Hour)** The teacher will guide scenarios for simulated counseling sessions. Students, as doctors, will counsel parents, explaining the anatomical basis of anomalies with visual aids, enhancing communication and empathy skills
Experiential Learning Activity
Experiential-Learning Learning 2.1: Developmental Anatomy of Organ systems.
Total Learning Hours: 7 Hours **Activity 1: Clinical Exposure or Observation (1.5 Hours)** Students will visit pediatric or obstetric departments to observe congenital anomaly cases, diagnostic procedures, and medical management. Reflections will link embryology concepts to clinical practice, such as neural tube defect prevention. **Activity 2: Timeline Construction (1.5 Hours)** Students will create timelines for the development of organ systems, including key embryological events (e.g., heart looping, neurulation) and their critical time points. **Activity 3: Journal Club (2 Hours)** Students will review journal articles on topics like congenital anomalies or regenerative medicine. Group discussions and debates will analyze research findings, emphasizing systemic embryology and clinical innovations, such as prenatal diagnostics. **Activity 4: Problem-Solving: Developmental Failure Analysis (1 Hour)** Students will analyze scenarios of developmental errors (e.g., septal defect or neural crest migration failure). They will identify causes and propose interventions, such as surgical corrections or preventive strategies. **Activity 5: Interactive Clinical Case Discussions (1 Hour)**

Students will engage with a clinical expert presenting real cases of congenital anomalies. Discussions will analyze embryological roots and treatment options, such as managing diaphragmatic hernias or ventricular septal defects.

Experiential-Learning Learning 2.2: General systemic embryology

Total Learning Hours: 6 Hours

Activity 1: Peer Teaching (1 Hour)

Students will prepare presentations on the embryological development of organ systems, incorporating visual aids and linking developmental stages to potential anomalies for better engagement and clinical relevance.

Activity 2: Clinical Correlation Assignment (1 Hour)

Students will research and present systemic embryology's links to clinical conditions, such as congenital heart defects, explaining their embryological basis, features, and therapeutic approaches using case studies and imaging.

Activity 3: Reflection Writing (1 Hour)

Students will write reflective essays connecting systemic embryology knowledge with its role in diagnosing and managing congenital disorders, emphasizing clinical applications and patient education.

Activity 4: Timeline Activity (1 Hour)

Students will create timelines of developmental milestones for various organ systems, highlighting stages like gastrulation and neurulation while identifying critical periods where errors could lead to anomalies.

Activity 5: Real-Life Clinical Case Review (1 Hour)

Students will analyze real clinical cases of congenital anomalies, examining patient histories, imaging, and outcomes to understand the link between embryological errors and anatomical defects.

Activity 6: Literature Review (1 Hour)

Students will review recent advancements in systemic embryology, summarizing studies on topics like gene editing and organoid modeling, and discussing their clinical implications in a report or presentation.

Experiential-Learning Learning 2.3: Congenital abnormalities with Teratogenesis.
Total Learning Hours: 7 Hours **Activity 1: Group Teratogen Research and Discussion (1 Hour)** Students will research specific teratogens and their effects on fetal development. They will discuss findings in groups, present insights using diagrams and timelines, and analyze disrupted embryological processes. **Activity 2: Clinical Case Studies (1 Hour)** Students will analyze cases involving congenital anomalies caused by teratogens. They will identify disrupted developmental stages, propose diagnostic tools, and discuss management strategies. **Activity 3: Journal Club (2 Hours)** Students will review and critically evaluate research articles on teratogenesis, discussing methodologies, results, and clinical applications. Presentations will connect findings to embryology and congenital anomaly management. **Activity 4: Hypothetical Experiment Design (1 Hour)** Students will design theoretical experiments on teratogen effects .They will propose methodologies, outcomes, and ethical considerations, with discussions on public health applications. **Activity 5: Literature Review Club (1 Hour)** Students will conduct literature reviews on topics like teratogen detection technologies, presenting findings and debating advancements in maternal-fetal medicine to address teratogen-induced anomalies. **Activity 6: Real-World Application: Policy Analysis (1 Hour)** Students will assess policies on teratogen regulation and propose improvements or new strategies, presenting actionable recommendations for enhancing policy impact.
Experiential-Learning Learning 2.4: Anatomical Basis Of Congenital Anomalies.
Total Learning Hours: 6 Hours

Activity 1: Peer Teaching (1 Hour)

Students will research and present a congenital anomaly, focusing on its embryological development, anatomical basis, and clinical implications, using visual aids like diagrams or 3D models.

Activity 2: Comparative Anatomy Activity (1 Hour)

Students will compare normal and abnormal anatomical models, analyzing structural deviations and their functional impacts, such as scoliosis or reduced flexibility.

Activity 3: Problem-Solving Session (1 Hour)

In teams, students will address scenarios of developmental errors, trace their embryological origins, and propose interventions, such as managing atrial septal defects through postnatal surgical techniques.

Activity 4: Clinical Anatomy Workshop (1 Hour)

Students will examine preserved specimens of congenital anomalies, document structural features, and trace them to specific embryological stages. Discussions may include teratogens and preventive measures.

Activity 5: Role-Playing as Counselors (1 Hour)

Students will simulate counseling parents about congenital anomalies, explaining the anatomical basis in simple terms, providing emotional support, and outlining treatment options.

Activity 6: Research Project on Preventive Measures (1 Hour)

Students will research preventive measures for congenital anomalies, such as folic acid supplementation or teratogen screening, and prepare presentations or reports emphasizing maternal health and environmental safety.

Modular Assessment

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

Total Marks for this module: 50 **1.Labeling Diagrams:** Students will label parts, developmental stages, and key molecular signals on provided images or schematic diagrams of developing organs **(10 Marks)** **2. Research Proposal Writing:** Students will draft proposals focusing on advancements in fetal medicine, stem cell research, or gene therapy **(15 Marks).** **3.Critical Review of Recent Studies:** Students will analyze groundbreaking research on fetal development and congenital malformations, evaluating the methodology, findings, and implications **(15 Marks).** **4. Seminar Presentations:** The teacher will assign topics such as prenatal diagnosis or regenerative medicine, requiring students to present their insights and participate in peer discussions **(10 Marks).** 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 assessment. (25 Marks)	
Semester No : 4	
Module 3 : خوردبینی تشریح(Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology.	
Module Learning Objectives (At the end of the module, the students should be able to) 1. Describe Microscopic Anatomy- Cytoplasm, Cytoplasmic Matrix, Cell membrane and Cellular organelles. Cytoskeleton, Cell inclusions, Cilia and flagella and about information of Collection Maintenance and Application of Stem Cells, Cryobanking and its Application. 2. Conduct presentation and group Discussion on Microscopic Anatomy. 3. Identify the cellular organelles.	

Unit 1 علم حیاتِ خلوی (Ilm-e-Hayat-e-Khalwi) Cell Biology

3.1.1. علم حیاتِ خلوی (Ilm-e-Hayat-e-Khalwi) Cell Biology.

3.1.2. رطوبت خلیہ (Ratubat-e-Khalya) Cytoplasm.

3.1.3 مصفوفہ خلیہ (Masfufah-e-Khuwiyah) Cytoplasmic Matrix.

3.1.4. غشاء خلیہ (Ghisha-e-khalyah) cell membrane.

3.1.5. عضویات خلیہ (Uzwiyat-e- Khalyah) Cell organelles.

References: 65,66,67,68,69,70,71,72,73,74,75,76

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the Cell Biology with Cytoplasm, Cytoplasmic Matrix, cell membrane.	2	Lecture	CC	Know	L&PPT ,L&GD,L_VC
CO1,CO3, CO7	Evaluate the cell biology, cytoplasm, cytoplasmic matrix and cell membrane.	7	Experiential-Learning3.1	AFT-VAL	Does	D,IBL,JC,SIM,PER
CO1,CO3, CO7	Demonstrate the cell biology, cytoplasm, cytoplasmic matrix and cell membrane.	5	Practical3.1	PSY-SET	Shows-how	PER,BS,D-M,FC,DIS
CO1,CO3, CO7	Construct and present to demonstrate structural and functional aspects of cellular organelles.	6	Experiential-Learning3.2	AFT-RES	Does	DIS,JC,SDL,D,PER
CO1,CO3	Describe the Cellular organelles.	3	Lecture	CC	Knows-how	L_VC,L&PPT ,L&GD
CO1,CO7	Demonstrate the cellular organelles.	5	Practical3.2	PSY-GUD	Shows-how	PER,D,D-M,SDL,DIS

Unit 2 تشریح خوردبینی(Tashreeh-e- Khurd-beeni) Microscopic Anatomy

3.2.1. ہیکل خلیہ (Haikal-e-Khalya) cytoskeleton.

3.2.2. خلوی مشمولات (Khalvi Mashmulat) Cell inclusions.

3.2.3. اھداب،(Hudbah) Cilia عصیہ(Isiyah) flagella.

3.2.4. خلیات اساسیہ کا حصول،استحکام واستعمال (Khulaya't -e-Asasiyah ka Husul, istehkam aur Iste'mal) Collection, Maintenance and Application of Stem Cells.

3.2.5. بنک التبرید(Bankuttabreed).Cryobanking.

References: 65,66,67,68,69,70,71,72,73,74,75,76

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the cytoskeleton, Cell inclusions, Cilia and flagella.	2	Lecture	CC	Know	L_VC,L&GD,L&PPT
CO1,CO3, CO7	Examine the cytoskeleton,cell inclusions,cilia and flagella	6	Experiential-Learning3.3	CAN	Shows-how	CBL,SDL,PL,JC,D
CO1,CO3, CO7	Demonstrate the cytoskeleton, cell inclusions, cilia and flagella.	5	Practical3.3	PSY-SET	Shows-how	D,SDL,SIM,PER,DIS
CO1,CO3, CO7	Discuss the collection, maintenance and application of stem cells and cryobanking.	7	Experiential-Learning3.4	CAN	Shows-how	PER,SDL,PL,CBL,SIM
CO1,CO3	Discuss the information of Collection, Maintenance and Application of Stem Cells and Introduction of Cryobanking and its Application.	3	Lecture	CC	Knows-how	L&GD,L&PPT,L_VC

CO1,CO3, CO7	Illustrate and demonstrate the maintenance and application of stem cells and cryobanking.	5	Practical3.4	PSY-GUD	Shows-how	FV,DIS,PER,D,SIM

Practical Training Activity

Practical Training 3.1 Cell Biology.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will demonstrate cell structures, cytoplasm, and membranes using light and electron microscopy. Students will observe slides, note features like the phospholipid bilayer, and discuss how these structures support cellular processes.

Activity 2: Clinical Correlation / Case Discussion (1 Hour)

The teacher will present clinical cases of membrane transport defects and cytoplasmic abnormalities. Students will analyze cellular dysfunctions, trace impacts, and discuss diagnostic and management strategies.

Activity 3: Self-Directed Learning / Flipped Classroom (1 Hour)

Students will study membrane transport mechanisms independently, preparing presentations on processes like osmosis and active transport, and share insights in class discussions.

Activity 4: Brainstorming Session (1 Hour)

In groups, students will brainstorm the roles of the cytoplasmic matrix in processes like protein synthesis and energy production. Presentations will explore implications of cytoplasmic abnormalities and potential adaptations.

Activity 5: Interactive Diagram Labeling (1 Hour)

Students will label high-resolution diagrams of cellular structures, identifying and explaining features like transport proteins and actin filaments, discussing their coordination in maintaining cellular function.

Practical Training 3.2 Cellular organelles.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (Microscopy) (1 Hour)

The teacher will use light and electron microscopes to demonstrate cellular organelles like mitochondria, ER, and Golgi apparatus. Students will observe, take notes, and discuss organelle structures and their functions.

Activity 2: Student Microscopic Observation (1 Hour)

Students will examine stained slides under microscopes, identify organelles, sketch their features, and write notes on their structures and functions, enhancing observational skills.

Activity 3: 3D Model / Virtual Lab Demonstration (1 Hour)

Using 3D models or virtual simulations, the teacher will explain organelle structures and functions. Students will interact with models, document mechanisms, and discuss functional coordination between organelles.

Activity 4: Group Activity – Organelle Roleplay (1 Hour)

Students will roleplay as organelles, creatively presenting their functions, such as ATP production by mitochondria or protein packaging by the Golgi apparatus, emphasizing interdependence in cellular activity.

Activity 5: Concept Mapping / Flowcharts (1 Hour)

Students will create concept maps or flowcharts illustrating organelle relationships and functions, presenting and explaining coordination processes like energy production, transport, and repair.

Practical Training 3.3 Cellular structures.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will use 3D models, animations, and microscopic slides to demonstrate cytoskeleton components, cell inclusions, cilia, and flagella, highlighting their cellular roles and specialized functions. Students will take notes, ask questions, and connect the concepts to real-life processes like mitosis.

Activity 2: Microscopy Session (1 Hour)

Students will observe stained slides of cytoskeletal components and cell inclusions under microscopes, identifying and labeling structures like microtubules and lipid droplets while comparing their distribution across cell types.

Activity 3: 3D Model Making (1 Hour)

Under teacher supervision, students will create 3D models of cytoskeletal components, cilia, and flagella, showcasing details like microtubule arrangements and basal body features. They will explain the role and importance of each structure in cellular function.

Activity 4: Clinical Correlation / Case Diagnosis (1 Hour)

Students will analyze clinical cases involving cytoskeletal defects, such as Kartagener syndrome, identifying affected structures, explaining pathological impacts, and discussing management strategies.

Activity 5: Model Dissection Activity (1 Hour)

Students will dissect virtual or physical cell models to locate and identify components like microtubules and cilia. They will label structures, explain their functions, and discuss integration within cellular processes.

Practical Training 3.4 Stem Cells and Cryobanking.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will use 3D models, animations, and live demonstrations to explain stem cell culture processes, including cell isolation, maintenance, and cryopreservation. Students will observe, take notes, and discuss critical checkpoints and potential deviations.

Activity 2: Student Hands-on Practice (1 Hour)

Under teacher supervision, students will perform mock setups for stem cell isolation, culturing, and cryopreservation, using virtual tools or practice equipment. They will document progress and identify areas for improvement.

Activity 3: Virtual Lab / Simulation (1 Hour)

Students will explore virtual lab platforms, observing procedures like cryobanking and cell differentiation. They will complete guided exercises, such as simulating freezing techniques and predicting outcomes of errors.

Activity 4: Visit to Stem Cell Lab / Cryobank (1 Hour)

Students will visit a cryobank facility to observe real-time practices, such as freezing and storage of stem cells. They will interact with lab personnel to understand the equipment and current advancements.

Activity 5: Group Discussion & Q&A Session (1 Hour)

The teacher will lead a session on the ethical and clinical aspects of stem cell research. Students will discuss topics like accessibility, regulatory challenges, and future developments, fostering critical thinking.

Experiential Learning Activity

Experiential-Learning Learning 3.1: Cellular biology.

Total Learning Hours: 7 Hours

Activity 1: Journal Club (1 Hour)

Students will critically review research articles on cytoplasmic matrix properties, membrane transport mechanisms, or breakthroughs in cell biology, presenting findings and discussing implications during group sessions.

Activity 2: Dynamic Roleplay of Cellular Processes (1 Hour)

Students will act out cellular processes like ion transport and protein synthesis, assigning roles such as membrane proteins or cytoskeletal elements to simulate interactions and cellular coordination.

Activity 3: Design a Lab Protocol (1 Hour)

Students will create detailed hypothetical protocols for studying processes like osmosis or active transport, defining objectives, methods, and experimental parameters for peer review.

Activity 4: Multimedia Explanation Creation (1 Hour)

Students will develop multimedia content (e.g., videos or animations) explaining cytoplasm and membrane contributions to processes like endocytosis or signal transduction, simplifying complex mechanisms.

Activity 5: Real-World Application Research (1 Hour)

Students will research applications of cellular biology, such as drug delivery or vaccine development, linking membrane transport mechanisms to therapeutic approaches and presenting their findings.

Activity 6: Organelle Dissection Simulation (1 Hour)

Using digital tools or diagrams, students will virtually dissect cells to analyze cytoplasmic matrix and membrane roles in metabolism and permeability, documenting findings in structured reports.

Activity 7: Case-Based Problem Solving (1 Hour)

Students will solve case-based problems involving cellular abnormalities, like altered membrane fluidity or cytoplasmic viscosity, predicting outcomes and proposing solutions to restore cellular balance.

Experiential-Learning Learning 3.2: Cellular organelles.

Total Learning Hours: 6 Hours

Activity 1: Concept Mapping (1 Hour)

Students will create concept maps showing interconnections and functions of cellular organelles, linking processes like protein synthesis (ER) and energy production (mitochondria) to emphasize organelle coordination.

Activity 2: Comparative Analysis (1 Hour)

Students will compare organelle structures and functions across cell types (e.g., plant vs. animal cells), analyzing adaptations like chloroplasts in plants for photosynthesis or mitochondria in muscle cells for energy.

Activity 3: Literature Review (1 Hour)

Students will review recent discoveries on organelle functions, such as autophagy or lysosomal activity, summarizing findings and discussing their relevance to medicine and biotechnology.

Activity 4: Problem-Solving Scenarios (1 Hour)

Students will address hypothetical organelle dysfunction scenarios, such as Golgi apparatus failures or lysosomal defects, proposing solutions to mitigate issues like waste buildup or protein transport errors.

Activity 5: Journal Club (1 Hour)

Students will critically evaluate research articles on organelle functions and disorders, analyzing methodologies and clinical implications, and sharing insights through group discussions.

Activity 6: Peer Teaching (1 Hour)

In groups, students will research and teach organelle structures and functions (e.g., mitochondria or lysosomes) using interactive tools like diagrams and animations to enhance peer learning.

Experiential-Learning Learning 3.3: Cytoskeleton and Cell inclusions.

Total Learning Hours: 6 Hours

Activity 1: Concept Mapping (1 Hour)

Students will create concept maps to illustrate interconnections among the cytoskeleton, cell inclusions, cilia, and flagella, highlighting roles like energy storage (lipid inclusions) and fluid movement.

Activity 2: Peer Teaching (1 Hour)

Students will independently research topics like microtubule dynamics or primary cilia functions, presenting their findings through models or presentations to teach their peers collaboratively.

Activity 3: Problem-Solving Scenarios (1 Hour)

Students will analyze hypothetical structural defects, such as absent intermediate filaments or impaired flagellar function, propose solutions, and justify their approaches using cellular principles.

Activity 4: Brainstorming and Discussion (1 Hour)

Students will brainstorm innovative applications of cytoskeletal elements in medical and technological fields, such as drug delivery or nanotechnology, fostering interdisciplinary thinking.

Activity 5: Literature Review (1 Hour)

Students will review advancements in cytoskeletal dynamics or related fields, summarizing findings and discussing their implications for cellular functions and disease understanding.

Activity 6: Journal Club Activity (1 Hour)

Students will critically evaluate research articles on cytoskeletal components and their functions, discussing methodologies and clinical implications in group sessions to connect literature to practical biology.

Experiential-Learning Learning 3.4: Stem Cells and Cryobanking.

Total Learning Hours: 7 Hours

Activity 1: Clinical Correlation / Case Discussion (1 Hour)

Students will analyze case studies of membrane transport defects or cytoplasmic abnormalities, such as cystic fibrosis, linking cellular issues to functional implications and proposing solutions.

Activity 2: Problem-Solving Scenario (1 Hour)

Students will address scenarios involving cellular defects, predicting outcomes of membrane dysfunction or cytoplasmic irregularities, and exploring their impact on cellular homeostasis.

Activity 3: Group Discussions (1 Hour)

Students will lead discussions reflecting on how abnormalities in cellular structures contribute to health problems, connecting molecular disruptions to systemic effects.

Activity 4: Peer Teaching (1 Hour)

Students will present topics like membrane protein functions, using diagrams or models to enhance understanding and foster collaborative learning.

Activity 5: Application to Research and Medicine (1 Hour)

Students will explore how advancements in membrane and cytoplasmic dynamics have influenced medical treatments and discuss potential applications like drug delivery or precision medicine.

Activity 6: Debate on Public vs. Private Cryobanks (1 Hour)

Students will debate public versus private cryobanking systems, presenting arguments on accessibility, ethical concerns, and affordability, enhancing communication and critical thinking. **Activity 7: Research Presentation on Emerging Technologies (1 Hour)** Students will deliver presentations on cutting-edge technologies in stem cell applications, showcasing their impact on cryobanking and therapeutic advancements.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** **1.Microscopy Practical Assessments:** Students will analyze tissue slides, document cellular structures, and identify pathology markers **(10 Marks).** **2.Case-Based Discussions (CBDs):** The teacher will present clinical cases related to tissue degeneration or regenerative medicine, prompting students to connect histology with disease pathology **(15 Marks).** **3**. Viva Voce or Presentation/Demonstration or critical paper reading or Clinical examination - **(Marks: 10)** **4**.**Histological Sketching & Annotation:** The teacher will ask students to create labeled diagrams of tissues, linking structural details to their functions and pathologies **(Marks: 15)** 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 assessment. (25 Marks)	4
Module 4 : نواۃ(Nawat) Nucleus دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle. جسم کی خردبینی ساخت(Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body.	

Module Learning Objectives

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

1. Describe Describe the Nucleus, Nuclear Envelope and Nucleolus DNA and Other Components of Chromatin, protein synthesis, Nuclear changes that indicate cell death. Mitosis, Meiosis, Cell Renewal, Cellular Differentiation and Cellular Proliferation. Microscopic Anatomy of the Structures of the body, light and Electron Microscopic features of the structures, Structure - function Correlations of the different structures of the body

2. Conduct Presentation And Group Discussion For Cell Cycle

3. Identify Nuclear changes that indicate cell death and DNA strands.

Unit 1 نواۃ(Nawat) Nucleus

4.1.1. نواۃ (Nawat) Nucleus) .

4.1.2. لفافہ نواۃ(Lifafah-e-Nawat) Nuclear Envelope.

4.1.3. مصفوفہ نواۃ (Masfufah-e- Nawat) Nuclear matrix.

4.1.4. نویہ (Nuwaiyah) Nucleolus.

4.1.5. حمض نواتی (Himz-e-Nawawi) DNA.

4.1.6. اجسام لونیہ کے دیگر اجزاء (Ajsam-e- Launiyah ke deegar Ajza) Other Components of Chromatin.

4.1.7. تعمیر لحمین (Ta'ameer-e- Lahmeen) protein synthesis.

References: 66,67,68,69,70,71,72,73,74,75,76

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the the nucleus, nuclear envelope, nuclear matrix and nucleolus.	2	Lecture	CC	Know	L_VC,L&GD,L&PPT
CO1,CO3, CO7	Evaluate the nucleus,nuclear envelope,nuclear matrix and nucleolus.	7	Experiential-Learning4.1	CE	Shows-how	DIS,JC,D-M,PER,CBL

CO1,CO4, CO7	Demonstrate the nucleus, nuclear envelope, nuclear matrix and nucleolus.	5	Practical4.1	PSY-SET	Shows-how	DIS,PER,SDL,BS, CBL
CO1,CO3, CO7	Create 3D model of DNA and discuss the various components.	6	Experiential-Learning4.2	PSY-SET	Shows-how	PER,DIS,D-M,CBL,D
CO1,CO3, CO4	Describe the DNA and Other Components of Chromatin, protein synthesis.	3	Lecture	CC	Knows-how	L&GD,L&PPT ,L
CO1,CO4, CO7	Illustrate and demonstrate the DNA and other components of chromatin and protein synthesis.	5	Practical4.2	PSY-GUD	Shows-how	PER,BS,DIS,SDL, D-M

Unit 2 دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle

4.2.1. نواۃ کے وہ تغیرات جو موت الخلیہ کی نشاندہی کرتے ہیں(Nawat ke who taghiyurat, jo maut-e- Khalyah ki Nishandahi karti hain) Nuclear changes indicating cell death.

4.2.2 انقسامِ مساوی (Inqisam-e-musawi) Mitosis.

4.2.3. انقسام تقلیلی(Inqisam -e- Taqleeli) Meiosis.

4.2.4. تجدید خلیہ (Tajdeed-e-khalyah) Cell Renewal

4.2.5. تفرق خلیہ و تکاثر خلیہ(Tafarruq-e-Khalyah wa Takasur-e Khalyah) Cellular Differentiation and Cellular Proliferation.

4.2.6. جسم کی خوردبینی ساخت (Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body. تنظیم خلوی (Tanzeem-e-Khalwi) Cellular organization.

4.2.7. روشنی اور الیکٹران خوردبینی خواص(Raushni aur electron Khurdbeeni Khawas) light and Electron Microscopic features.

4.2.8. ساخت اور افعال کے باہمی تعلقات(Sakht-wa-Af'al ke Bahmi Ta'alluqat) Structure - function Correlations.

References: 65,66,67,68,69,70,71,72,73,74,75,76

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the nuclear changes indicating cell death and mitosis, meiosis, cell renewal, cellular differentiation, cellular proliferation.	3	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC

CO1,CO3, CO7	Explore & demonstrae the nuclear changes indicating cell death, mitosis, meiosis, cell renewal, cellular differentiation and cellular proliferation.	7	Experiential-Learning4.3	PSY-MEC	Shows-how	D,PER,CBL,DIS,SDL
CO1,CO3, CO7	Illustrate and demonstrate the nuclear changes indicating cell death, mitosis, meiosis, cell renewal, cellular differentiation and cellular proliferation.	5	Practical4.3	PSY-SET	Shows-how	DIS,PER,SDL,PBL,D
CO1,CO3, CO7	Explore the microscopic structures, cellular organization, light and electron, microscopic features and structures of the body - function Correlations.	6	Experiential-Learning4.4	PSY-GUD	Does	PER,BS,JC,D,DIS
CO1,CO3	Describe the microscopic structures of the body, cellular organization, light and electron, microscopic features and structure - function correlations.	2	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO4, CO7	Illustrate and demonstrate the microscopic structures of the body, cellular organization, light and electron, microscopic features and structure - function correlations.	5	Practical4.4	PSY-GUD	Shows-how	D-M,PER,SDL,D,DIS

Practical Training Activity

Practical Training 4.1 The nucleus.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration using 3D Models (30 Min)

The teacher will use 3D models or animations to explain nucleus components like the nuclear envelope, matrix, and nucleolus, detailing their roles in protecting genetic material, providing structural support, and synthesizing rRNA.

Activity 2: Diagram Drawing and Labeling (1 Hour)

Students will create and label diagrams of nucleus components, such as nuclear pores, nucleolus, and matrix, ensuring accuracy and spatial relationships while discussing their functions.

Activity 3: Group Brainstorming Session (1 Hour)

Students will explore functions like ribosome synthesis by the nucleolus and structural integrity from the nuclear matrix, connecting these roles to cellular processes like protein synthesis.

Activity 4: Self-Directed Learning (SDL) (1 Hour)

Students will research disorders related to nuclear envelope defects, summarizing how these impact cellular functions and presenting findings on related diseases during class discussions.

Activity 5: Case-Based Discussion (30 Min)

Students will analyze genetic disorder cases, such as laminopathies, linking nuclear envelope defects to cellular consequences and proposing therapeutic approaches during group discussions.

Activity 6: Presentation of Recent Research (1 Hour)

Students will review research papers on the nuclear matrix's role in cancer, aging, or other topics, summarizing findings and discussing implications for cellular behavior in health and disease.

Practical Training 4.2 Chromatin and protein synthesis.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration of DNA Structure (1 Hour)

The teacher will explain DNA's double helix structure using 3D models and animations, focusing on components like the sugar-phosphate backbone, base pairing (A-T, G-C), and genetic coding. Students will observe, take notes, and discuss the significance of DNA features.

Activity 2: Chromatin Staining under Microscope (1 Hour)

Students will examine stained slides of euchromatin and heterochromatin under a microscope to observe differences in structure and function. They will sketch and note the role of chromatin states in transcription and gene expression.

Activity 3: Protein Synthesis Flowchart Preparation (1 Hour)

Students will design flowcharts illustrating transcription and translation, from mRNA formation to protein assembly. Visual aids and annotations will clarify each step in the protein synthesis process.

Activity 4: Model Making Activity (1 Hour)

Students will build physical models of DNA, chromatin, and ribosomes, demonstrating molecular structures like nucleotide pairs or nucleosomes. They will present their models, explaining interactions and functions.

Activity 5: Brainstorming Session (1 Hour)

Students will brainstorm the clinical significance of chromatin in diseases like cancer, discussing chromatin remodeling and its effect on gene expression. They will generate ideas for diagnostics and therapies.

Practical Training 4.3 Cellular activity.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will showcase histological slides and electron micrographs, highlighting nuclear changes during apoptosis, necrosis, mitosis, and meiosis. Students will observe and take notes on morphological distinctions, engaging in discussions about functional relevance.

Activity 2: Group Discussion & Brainstorming (1 Hour)

Students will explore differences between apoptosis, necrosis, proliferation, and differentiation during group discussions. Real-world examples like tissue remodeling and degenerative diseases will help link these processes to clinical applications.

Activity 3: Problem-Based Learning (PBL) (1 Hour)

Students will analyze clinical cases, such as cancer or degenerative diseases, identifying disrupted cellular mechanisms and proposing interventions like promoting apoptosis or preventing necrosis.

Activity 4: Flipped Classroom Activity (1 Hour)

Students will study pre-assigned materials on cell cycle phases and differentiation before class. Classroom discussions and activities will deepen their understanding and application of these concepts.

Activity 5: Q&A and Reflection (1 Hour)

The teacher will lead a Q&A session on topics like tissue health and differentiation, prompting students to reflect on key takeaways and their relevance to clinical and research applications.

Practical Training 4.4 Microscopic organization of the cell.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (1 Hour)

The teacher will demonstrate tissue and cellular structures using light microscopy, explaining slide preparation, magnification, and staining techniques. Students will observe and take notes on methods and tissue features.

Activity 2: Student Hands-On Microscopy Session (1 Hour)

Students will examine pre-stained slides under microscopes, sketch tissues like muscle or epithelial layers, and label features such as nuclei and membranes while analyzing structure-function relationships.

Activity 3: Group Slide Discussion (1 Hour)

Students will compare light and electron microscopic images of tissues in groups, discussing structural features like organelles and their functional roles, summarizing findings for class presentations.

Activity 4: Diagrammatic Illustration (1 Hour)

Students will draw detailed, labeled diagrams of observed tissues, capturing features like stratification or fiber alignment, and annotate diagrams with notes on functional relevance, guided by the teacher.

Activity 5: Research Article Review (1 Hour)

Students will review articles on electron microscopy advancements, summarizing findings and analyzing contributions to tissue structure-function understanding in small groups or class-wide discussions.

Experiential Learning Activity

Experiential-Learning Learning 4.1: Basics of nucleus
Total Learning Hours: 7 Hours **Activity 1: Case Study Analysis (1 Hour)** Students will analyze clinical cases involving nuclear changes, such as cancer or degenerative diseases, connecting disruptions to their cellular and systemic effects. **Activity 2: Flowchart Creation (1 Hour)** Students will design flowcharts illustrating nuclear changes during processes like the cell cycle, meiosis, and apoptosis, emphasizing sequential progression and logical flow. **Activity 3: Experimental Data Interpretation (1 Hour)** Students will interpret experimental data, such as DNA fragmentation in apoptosis or chromosomal alignment in mitosis, drawing conclusions about nuclear changes and their broader implications. **Activity 4: Virtual Microscopy Exploration (1 Hour)** Students will use virtual microscopy tools to observe nuclear changes across tissues and cell types, documenting variations in chromatin structure, spindle formation, and nuclear fragmentation. **Activity 5: Cross-Sectional Cellular Analysis (1 Hour)** Students will analyze images or models of nuclear activities in tissues, such as mitotic figures or apoptotic bodies, linking observations to tissue health and functionality. **Activity 6: Cellular Lifecycle Presentation (1 Hour)** Students will collaborate to deliver presentations detailing the lifecycle of a cell, focusing on nuclear events like differentiation, division, and apoptosis, using diagrams for clarity. **Activity 7: Scientific Poster Creation (1 Hour)** Students will create scientific posters summarizing nuclear changes, integrating diagrams and data interpretations to showcase connections between cell death, renewal, differentiation, and proliferation.

Experiential-Learning Learning 4.2: DNA and protein synthesis.
Total Learning Hours: 6 Hours **Activity 1: DNA Model Building (1 Hour)** Students will construct 3D DNA models showcasing the double helix structure, base-pairing (A-T, G-C), and antiparallel strands. They will explain the role of base pairing in replication and transcription. **Activity 2: Diagrammatic Representation (1 Hour)** Students will create diagrams of chromatin organization, highlighting nucleosomes and histones, and illustrating transcription and translation steps while annotating how chromatin structure affects gene accessibility. **Activity 3: Flowchart Creation (1 Hour)** Students will design flowcharts detailing protein synthesis from transcription to translation, including RNA splicing, codon recognition, and peptide chain formation for logical clarity. **Activity 4: Case Study on Chromatin and Gene Expression (1 Hour)** Students will analyze case studies on chromatin remodeling, linking euchromatin and heterochromatin to gene expression and protein synthesis outcomes. **Activity 5: Literature Review of Chromatin Research (1 Hour)** Students will review articles on chromatin dynamics and histone modifications, summarizing their impact on gene regulation and presenting findings to peers. **Activity 6: Case Analysis of Epigenetic Disorders (1 Hour)** Students will investigate cases of epigenetic disorders, analyzing how transcription and protein synthesis are disrupted and proposing therapeutic interventions.
Experiential-Learning Learning 4.3: Cellular activity.
Total Learning Hours: 7 Hours **Activity 1: Microscopic Slide Examination (1 Hour)** Students will analyze histological slides and micrographs to identify nuclear changes during apoptosis, necrosis, mitosis, and meiosis, documenting observations and correlating findings with cellular processes.

Activity 2: Case Study Analysis (1 Hour)

Students will investigate clinical cases of nuclear abnormalities, evaluating how disruptions in processes like proliferation and differentiation affect tissue functionality.

Activity 3: Group Debate on Cellular Processes (1 Hour)

Students will debate the roles of nuclear changes, such as apoptosis in preventing overgrowth, mitosis in tissue repair, and meiotic errors in genetic stability, fostering critical discussions.

Activity 4: 3D Model Construction (1 Hour)

Students will create physical or digital 3D models of nuclear structures, demonstrating their changes during processes like mitosis and apoptosis, emphasizing functionality.

Activity 5: Experimental Data Interpretation (1 Hour)

Students will analyze datasets or microscopy images showing nuclear changes, interpreting them to explain cellular behaviors like chromatin condensation or spindle formation.

Activity 6: Literature Review and Presentation (1 Hour)

Students will summarize research articles on nuclear changes in differentiation, proliferation, or apoptosis, presenting insights and molecular mechanisms to their peers.

Activity 7: Group Presentation on Cell Renewal Strategies (1 Hour)

Students will research cell renewal mechanisms in humans or planarians, detailing how nuclear changes support tissue maintenance and regeneration.

Experiential-Learning Learning 4.4: Microscopic organization of the cell.

Total Learning Hours: 6 Hours

Activity 1: Comparative Diagram Drawing (1 Hour)

Students will draw comparative diagrams of structures observed under light and electron microscopes, such as muscle fibers or epithelial tissues, annotating key features and their functions.

Activity 2: Group Brainstorming on Structural Specializations (1 Hour)

Students will brainstorm structural adaptations in specific cell types, discussing how these adaptations enhance cellular functions.

Activity 3: Self-Directed Research on Microscopy Techniques (1 Hour)

Students will research advanced microscopy techniques, such as confocal or scanning electron microscopy, and prepare reports on their applications in studying cellular structures and disease pathology.

Activity 4: Experimental Data Interpretation (1 Hour)

Students will analyze microscopic data sets or images, identifying structural features like organelles or tissue layers and linking these features to their functional roles.

Activity 5: Critical Review of Research Papers (1 Hour)

Students will review research articles on microscopic studies, summarizing findings, discussing advancements, and explaining insights into structure-function relationships.

Activity 6: Case Presentation on Pathological Changes (1 Hour)

Students will present cases of pathological changes, such as in cancer or fibrosis, analyzing how these changes affect tissue structure and function, supported by microscopic evidence.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** 1. **Concept Mapping:** The teacher will ask students to construct diagrams linking cell cycle regulation, pathology, and regenerative medicine **(15 Marks).**	4

2. Peer Teaching: Each student will prepare a 5-minute explanation of a specific structure (e.g., rough ER, mitotic spindle) and teach it to a small group **(10 Marks).** **3. Microscopy Slide Identification:** Students will identify tissues, cell types, or stages of mitosis on slides or images **(10 Marks).** **4.Histology Sketchbook Assignment:** Students will maintain a notebook with hand-drawn or digitally labeled sketches of microscopic tissues observed during practical sessions **(15 Marks).** 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 assessment. (25 Marks)	

Semester No : 5

Module 5 : اجسام لونیہ وکیمیائے نسیجی (Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry

Module Learning Objectives

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

1. Describe Human Chromosomes, Chromosome Preparation Banding Patterns, Chromosomal Abnormalities, Molecular Genetics, Cytogenetics.Various histo-chemical and Immuno-histochemical Techniques.

2. Conduct Presentation and group Discussion on Human chromosome and its various Abnormalities.

3. Identify Human chromosome and its various Abnormalities.

Unit 1 اجسام لونیہ (Ajsam-e-Launiyah)

5.1.1. علم النسل خلوی (Ilmul Nasal khalwi) Cytogenetics , اجسامِ لونیہ اور ان کی تعداد (Ajsam-e- Launiyah aur un ki Ta'dad) Chromosomes and their Number).

5.1.2. تقسیم اجسام لونیہ (Ta'qseem Ajsam-e- Launiyah) Chromosomes classification.

5.1.3. اجسام لونیہ: ترکیب وترتیب (Ajsam-e- Launiyah tarkeeb-wa-tarteeb) Methods of Chromosome Preparation Banding Patterns.

5.1.4. اجسام لونیہ کے نقائص (Ajsam-e-Launiyah ke naqais) Chromosomal Abnormalities.

5.1.5. اجسام لونیہ مستقلہ کے نقائص (Ajsam-e-Launiyah mustaqillah ke naqais) Autosomal Abnormalities.

References: 149,150,151,152,153,154

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Discuss the introduction of cytogenetics and explain the chromosomes and their numbers,chromosomes classification and methods of chromosome preparation banding pattern.	3	Lecture	CC	Knows-how	L&GD,L&PPT ,L_VC
CO1,CO3, CO4,CO7	Evaluate and corelate the chromosomes and their number, chromosomes classification, methods of chromosome preparation banding pattern.	7	Experiential-Learning5.1	CE	Shows-how	LS,PER,CBL,SDL
CO1,CO3, CO4,CO7	Illustrate and demonstrate the human chromosomes and chromosomes number.	5	Practical5.1	PSY-GUD	Shows-how	FC,D,RP,DIS,PER
CO1,CO4, CO7	Evaluate and relate the autosomes, sex chromosomes and their abnormalities.	6	Experiential-Learning5.2	CE	Shows-how	CD,CBL,DIS,PER, PrBL
CO1,CO4	Discuss the autosomal and sex chromosomal abnormalities.	2	Lecture	CC	Shows-how	L&GD,L_VC,L&PPT
CO1,CO3, CO4,CO7	Illustrate and demonstrate the autosomes and sex chromosomes and their abnormalities.	5	Practical5.2	PSY-GUD	Shows-how	CBL,PER,D,CD,DIS

Unit 2 کیمیائے نسیجی (Kimya-e-Naseeji)

5.2.1. اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities.

5.2.2. علم النسل جزوی (Ilmul Nasal Juzvi) Molecular Genetics.

5.2.3. مختلف نسیجی کیمیاوی تکنیک(Mukhtalif Naseeji Keemyawi Takneek) Various histochemimcal Techniques.

References: 149,150,151,152,153,154

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the molecular genetics.	2	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC
CO1,CO3, CO4,CO7	Explain the molecular genetics.	7	Experiential-Learning5.3	CAN	Does	DIS,PSM,PL,SDL, PER
CO1,CO4, CO7	Illustrate and demonstrate the molecular genetics.	5	Practical5.3	PSY-SET	Shows-how	D,DIS,BS,CBL,SIM
CO1,CO3, CO7	Explain the Various histochemimcal and Immunohistochemical Techniques.	6	Experiential-Learning5.4	CAN	Shows-how	PSM,W,PL,JC,SIM
CO1,CO4, CO7	Describe the various histo-techniques and immuno-histochemical techniques.	3	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD
CO1,CO3, CO4,CO7	Ilustrate and Demonstrate the various histochemimcal and Immunohistochemical Techniques.	5	Practical5.4	PSY-GUD	Shows-how	PER,PBL,CBL,DIS, IBL

Practical Training Activity

Practical Training 5.1 Human Chromosomes.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate the process of karyotyping by showcasing metaphase chromosome spreads using either a microscope or virtual karyotyping software. Then, the teacher will explain the procedures for identifying chromosomes, differentiating autosomes from sex chromosomes, and detecting abnormalities.

Students will observe the karyotyping demonstration, take notes on key steps and techniques, and ask relevant questions to clarify the criteria for chromosome identification.

Activity 2: Case-Based Group Activity (60 Min)

Teacher Will: Present case scenarios involving chromosomal abnormalities, such as Down syndrome (Trisomy 21) and Turner syndrome, and provide karyograms for analysis. Facilitate group discussions to connect karyotype findings to clinical outcomes.

Students will work collaboratively in groups to analyze case scenarios and provided karyograms, identify abnormalities, and prepare a short presentation linking findings to clinical implications.

Activity 3: Flipped Classroom Activity (60 Min)

The teacher will provide pre-class materials, such as video lectures or presentations, focusing on chromosome structures and disorders. During class, the teacher will lead a discussion to connect student insights to practical examples.

Student will review the pre-class materials, take notes on key concepts, participate in class discussions, share their understanding, and ask questions to enhance clarity.

Activity 4: Role-Play Clinical Counseling – Interpreting Chromosomal Analysis (60 Min)

Teacher will distribute mock chromosomal analysis reports, along with patient scenarios, and outline the objectives of the role-play exercise. Guide students in understanding how to effectively communicate findings.

Students will role-play as genetic counselors in groups, explaining chromosomal analysis findings to simulated patients or families. Discuss the health implications and respond to patient questions with empathy and professionalism.

Activity 5: Poster Presentation – Human Karyotype and Disorders (60 Min)

The teacher will assign students to prepare posters or digital infographics illustrating the human karyotype, autosomes, sex chromosomes, and chromosomal abnormalities. Provide guidelines for content and visual representation.

Students will collaborate in groups to design and present informative posters or infographics. Use visuals to explain chromosomal structures, highlight abnormalities, and engage with peers during a gallery walk or presentation session.

Practical Training 5.2 Cytogenetics..

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration – Introduction to Chromosomes

Activity 1: Teacher Explanation and Demonstration (60 Min)

The teacher will explain the structure, number, and classification of chromosomes, differentiating autosomes and sex chromosomes with the aid of charts and 3D models. Additionally, they will demonstrate the karyotyping process using slides or virtual tools, emphasizing the identification criteria for autosomes and sex chromosomes.

Student Role: Students will observe the demonstration, take notes, and engage in interactive questioning to clarify concepts and gain deeper insights.

Activity 2: Student Activity – Hands-On Karyotyping (60 Min)

Students will perform karyotyping using provided chromosomal images or virtual software tools. They will identify and classify autosomes and sex chromosomes, documenting observations to reinforce their learning through practical application.

Activity 3: Student Activity – Case-Based Chromosome Analysis (60 Min)

Students will analyze case studies featuring abnormal karyotypes. They will identify chromosomal abnormalities and explain their implications for cellular and organismal functions, reinforcing their ability to apply theoretical knowledge to real-world scenarios.

Activity 4: Group Activity – Chart/Model Preparation (60 minutes)

Students will collaborate in groups to design detailed charts or 3D models that depict normal autosomes and sex chromosomes. They will compare these representations with charts or models showcasing chromosomal abnormalities, highlighting key differences and their implications.

Activity 5: Q&A Session (60 minutes)

The teacher will conduct a Q&A session to address students' doubts and reinforce important concepts related to chromosomal disorders. They will provide applied insights to connect theoretical learning with clinical applications.

Student Role: Students will present their findings, engage in peer discussions, and respond to clinical questions by applying their understanding.
Practical Training 5.3 Basics of molecular genetics.
Total Learning Hours: 5:00 Hours **Activity 1: Teacher Demonstration – DNA Extraction (60 Min)** **Teacher will** demonstrate the process of extracting DNA from a biological sample, such as fruit (e.g., banana) or buccal swab. Explain the principle behind each step, including cell lysis, the role of reagents (e.g., salt and detergent), and the precipitation of DNA using alcohol. Highlight the significance of DNA extraction in molecular studies. **Student will** observe the demonstration, take detailed notes to understand each step, and ask relevant questions about the techniques and reagents used. Reflect on the importance of DNA extraction in research and diagnostics. **Activity 2: Case-Based Learning– Clinical Genetics Case Analysis (60 Min)** **Teacher will** introduce a clinical case involving a genetic disorder (e.g., cystic fibrosis, sickle cell anemia). Explain how molecular techniques like PCR or karyotyping were used for diagnosis, and provide key data for analysis. **Student will** work in groups to analyze the case, identify the molecular diagnostic methods mentioned, evaluate their effectiveness, and prepare a presentation. Link the molecular findings to the patient's symptoms and clinical outcomes. **Activity 3: Brainstorming Session – Applications of Molecular Genetics (60 Min)** **Teacher will** facilitate a brainstorming session, encouraging students to explore and discuss real-world applications of molecular genetics in areas like forensic science, personalized medicine, agriculture, and gene therapy. **Student will** actively participate in brainstorming, propose innovative applications, and discuss how molecular genetics contributes to solving real-world problems. Document ideas for further exploration. **Activity 4: Clinical Correlation Session – Linking Findings to Treatment (60 Min)** **Teacher will** guide students in correlating molecular findings, such as specific mutations, with patient symptoms. Provide examples of how such findings inform treatment strategies, like gene therapy or targeted drug development.

Student will analyze provided molecular data, correlate findings with observed symptoms, and work in pairs to propose potential treatments. Present proposed strategies and explain their significance in improving patient outcomes. **Activity 5: Visit to Genetic Lab / Virtual Lab Simulation (60 Min)** **Teacher will** arrange a virtual or physical lab visit to a molecular genetics facility. Demonstrate cutting-edge testing techniques, including RT-PCR, sequencing, or microarray analysis. Explain how these tools are utilized in diagnosing and studying genetic conditions. **Student will** observe the demonstration, take notes on lab techniques, and ask questions to understand practical applications. Reflect on how these tools contribute to advances in genetics.
Practical Training 5.4 Histochemimcal and Immunohistochemical Techniques.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

Teacher will begin by introducing the fundamental principles of Histochemical and Immunohistochemical (IHC) techniques. Use engaging visual aids, such as models, flowcharts, and diagrams, to explain their significance, applications, and key differences. Emphasize their importance in diagnosis and research to provide context and relevance.

Students will actively listen to the explanation, carefully observe the visual aids, and take comprehensive notes on the concepts, applications, and distinctions between the two techniques

Activity 2: Microscopic Observation and Slide Interpretation (60 Min)

Teacher will present stained tissue slides under the microscope and guide students through the observation process step by step. They will teach students how to identify positive and negative staining patterns and explain their significance (e.g., staining of the nucleus, cytoplasm, or membrane).

Students will use microscopes to carefully observe their own prepared slides, identify staining patterns, and connect their findings to the principles taught earlier. They will document their observations thoroughly and seek clarification whenever necessary.

Activity 3: Group Discussion and Brainstorming Session (60 Min)

Teachers will facilitate an interactive group discussion to encourage students to compare and contrast findings from Histochemical and Immunohistochemical techniques. They will guide students in identifying challenges, common errors, and strategies for overcoming them while providing clarity on doubts and reinforcing key insights.

Students will actively participate in the discussion by sharing observations, asking questions, and collaborating with peers to explore diverse perspectives and solutions to challenges.

Activity 4: Case-based Learning / Problem-solving Activity (60 Min)

Teacher will present clinical case studies or unknown tissue slides to students, challenging them to apply their knowledge to suggest suitable staining techniques (e.g., for cancer detection). They will provide guidance and foster group collaboration as students analyze and discuss the scenarios.

Student will analyze the provided cases or slides in groups, identify possible solutions, and leverage their understanding of the techniques to determine the most appropriate approach. They will present their findings to the class with logical reasoning and evidence to support their conclusions.

Activity 5: Student Summarization and Reflection Session (60 Min)

Teacher will guide students in summarizing their key learning from all the activities, either individually or collaboratively. They will encourage students to highlight critical takeaways, such as the principles, techniques, and applications of Histochemical and Immunohistochemical staining, and facilitate a reflective discussion on applying these insights in real-world diagnostic scenarios.

Student will prepare concise summaries of the techniques, observations, and insights gained during the sessions. They will reflect on their learning experience, identify areas requiring further clarification, and present their thoughts to the class for collective review and reinforcement.

Experiential Learning Activity
Experiential-Learning Learning 5.1: Identification of chromosomes.
Total Learning Hours: 7:00 Hours **Activity 1: Chromosome Classification Diagram (90 Min)** Students will create detailed diagrams to classify chromosomes into metacentric, submetacentric, acrocentric, and telocentric types. They will annotate diagrams to showcase how centromere position determines classification. **Activity 2: Literature Review on Chromosomal Techniques (90 Min)** Students will review recent research articles focusing on advancements in chromosome preparation and banding techniques. They will summarize methodologies, discuss their significance, and present findings to peers. **Activity 3: Case Study Analysis (60 Min)** Students will analyze clinical case studies involving chromosomal abnormalities, such as translocations or inversions. They will use knowledge of banding patterns and chromosome classification to explain the genetic basis of these abnormalities. **Activity 4: Chromosome Evolution Presentation (90 Min)** Students will research and present on how chromosomes have evolved across different organisms, focusing on changes in chromosome number, structure, or organization. They will relate these changes to genetic diversity and adaptation. **Activity 5: Peer Teaching on Chromosome Structure (90 Min)** Students will collaborate in groups, with each group studying specific chromosome features such as centromeres, telomeres, or chromatid arms. They will present their findings to their peers using models or diagrams for effective teaching.
Experiential-Learning Learning 5.2: Chromosomes and their abnormality.
Total Learning Hours: 6:00 Hours **Activity 1: Chromosome Karyotyping Analysis (60 Min)**

Students will analyze karyotype images to identify autosomes and sex chromosomes. They will document chromosomal arrangements and identify abnormalities such as trisomy (e.g., Down syndrome) or sex chromosome aneuploidy (e.g., Turner or Klinefelter syndrome).

Activity 2: Comparative Chart Creation (60 Min)

Students will create comparative charts outlining the structural and functional differences between autosomes and sex chromosomes. They will include details such as gene content, chromosomal size, and inheritance patterns, linking these features to observed abnormalities.

Activity 3: Case Study Investigation (60 Min)

Students will examine clinical case studies involving chromosomal disorders, such as Down syndrome (trisomy 21) or Turner syndrome (45, X). They will analyze the genetic basis, clinical manifestations, and implications of these conditions.

Activity 4: Real-World Application Research (60 Min)

Students will research how the study of chromosomal abnormalities informs medical practices, such as prenatal screenings or fertility treatments. They will present findings to highlight the relevance of understanding autosomes and sex chromosomes in clinical settings.

Activity 5: Literature Review (60 Min)

Students will conduct a literature review of recent advancements in chromosomal research, such as techniques for detecting abnormalities or novel therapies for chromosomal disorders. They will summarize findings and discuss future directions for research and applications.

Activity 6: Historical Research on Chromosomal Studies (60 Min)

Students will investigate key milestones in the history of chromosomal studies, such as the discovery of sex chromosomes or the identification of Down syndrome. They will present how these findings shaped modern genetics and medical practices.

Experiential-Learning Learning 5.3: Molecular genetics.

Total Learning Hours : 7:00 Hours

Activity 1: Problem-Solving Genetic Disorders (60 Min)

Students will solve hypothetical scenarios involving molecular genetics problems. For example, they might predict the molecular consequences of a defective promoter sequence or analyze how alternative splicing affects protein function.

Activity 2: Literature Review on Molecular Techniques (90 Min)

Students will critically review research articles on molecular techniques like PCR, gel electrophoresis, or genome-wide association studies (GWAS). They will summarize methodologies, results, and implications for understanding genetic regulation.

Activity 3: Journal Club (90 Min)

Students will critically review research articles focused on topics such as gene regulation, molecular techniques, or applications of genome editing. They will summarize findings, evaluate methodologies, and discuss implications for molecular genetics during collaborative presentations.

Activity 4: Peer Learning (90 Min)

Students will work in groups to research specific molecular genetics topics (e.g., alternative splicing, gene silencing) and teach their peers using interactive methods such as presentations, visual aids, or group discussions.

Activity 5: Clinical Correlation on Genetic Disorders (90 Min)

Students will research the molecular genetics underlying specific genetic disorders, such as sickle cell anemia or cystic fibrosis. They will connect the molecular mutations to their phenotypic effects and discuss current therapeutic approaches.

Experiential-Learning Learning 5.4: Various histochemimcal and Immunohistochemical Techniques.

Total Learning Hours: 6:00 Hours

Activity 1: Comparison Exercise (60 Min)

Students will prepare a detailed side-by-side comparison of the results obtained from histochemical and immunohistochemical techniques. They will document differences in staining patterns, intensity, and specificity, critically analyzing the strengths and limitations of each technique.

Activity 2: Problem-Solving Workshops (60 Min)

Students will discuss common challenges encountered during staining and analysis processes, such as uneven staining or reagent issues. They will brainstorm and propose collaborative solutions to optimize the outcomes of these techniques.

Activity 3: Virtual Dissection and Simulation (60 Min)

Using virtual tools or simulations, students will practice staining techniques in a controlled and repeatable environment. They will analyze outcomes, ensuring an accurate understanding of procedural steps and results.

Activity 4: Role-Playing as Diagnosticians (60 Min)

Students will assume the roles of pathologists and analyze hypothetical patient cases. They will apply their knowledge of histochemical and immunohistochemical techniques to diagnose these cases based on provided clinical data, simulating real-world applications.

Activity 5: Peer-to-Peer Teaching (60 Min)

Groups of students will research specific histochemical or immunohistochemical techniques and teach their findings to their peers. This method reinforces their understanding and encourages collaborative and interactive learning.

Activity 6: Journal Club and Literature Review (60 Min)

Students will read and summarize scientific articles related to advancements in histochemical and immunohistochemical techniques. They will present their findings and discuss their implications with peers, staying updated on current research.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** **1**. Short Answer Questions (SAQs) or Multiple choice questions (MCQs)- **(Marks: 10)** (Short Answer Questions or Multiple-choice questions will be asked from each unit) **2**. Case Based Assessment or practical performance or Dissection/ virtual dissection or or exploration through virtual reality - **(Marks: 15)** **3**. Viva Voce or Presentation/Demonstration or critical paper reading or Clinical examination - **(Marks: 10)** **4**. Making model or Poster making- **(Marks: 15)** or	4

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 assessment. (25 Marks)	

Module 6 : اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل (Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی و مناعتی تکنیک (Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques.

Module Learning Objectives

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

1. Describe Single gene pattern inheritance, Autosomal chromosome pattern of inheritance, Sex chromosomal pattern of inheritance and Intermediate pattern of Inheritance. Multiple alleles, Mutations and Genome Imprinting, Non-Mendelian inheritance,Mitochondrial inheritance and parental Disomy.

2. Conduct Presentation and Group Discussion on Genetic inheritance,Mitochondrial inheritance and parental Disomy.

3. Identify Abnormal Genetic inheritance.

Unit 1 علم النسل ورثہ نمطِ یکجینی (Ilmul Nasal Juzvi) Molecular Genetics

6.1.1. ورثہ نمطِ یکجینی (Wirsah Namt-e-yakjeeni) Single gene pattern inheritance.

6.1.2. ورثہ نمط جینی مستقلہ (Wirsah Namt-e-Jeeni mustaqillah) Autosomal chromosome pattern of inheritance.

6.1.3. ورثہ نمطِ جینی جنسی (Wirsah Namt-e-Jeeni Jinsi) Sex chromosomal pattern of inheritance.

6.1.4. ورثہ نمطِ متوسط (Wirsah Namt-e-mutawassit) Intermediate pattern of Inheritance.

References: 149,150,151,152,154

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Single gene pattern inheritance, Autosomal chromosome pattern of inheritance.	3	Lecture	CC	Knows-how	L_VC,L&PPT ,SY,L&GD

CO1,CO4, CO7	Explain and analyse the single gene pattern inheritance and autosomal chromosome pattern of inheritance.	7	Experiential-Learning6.1	CAN	Shows-how	PrBL,CD,IBL,D,DIS
CO1,CO4, CO7	Acquire knowledge of the single gene pattern inheritance and autosomal chromosome pattern of inheritance.	5	Practical6.1	PSY-MEC	Shows-how	IBL,W,BS,DIS,PER
CO1,CO4, CO7	Explain and analyse the sex chromosomal pattern of inheritance and intermediate pattern of inheritance.	6	Experiential-Learning6.2	CAN	Does	PSM,SDL,D,SIM,PER
CO1,CO4	Describe the Sex chromosomal pattern of inheritance and Intermediate pattern of Inheritance.	2	Lecture	CC	Knows-how	L_VC,L&GD,L&PPT
CO1,CO4, CO7	Interpret the sex chromosomal pattern of inheritance and intermediate pattern of inheritance.	5	Practical6.2	PSY-MEC	Shows-how	PER,D,PT,DIS

Unit 2 کیمیاوی تکنیک مناعتی (Naseeji Keemyawi Mana'ati Takneek) Immunohistochemical techniques

6.2.1. متعدد نسبی جوڑے (Muta'addad nasbee jorhe) Multiple alleles.

6.2.2. طفرہ (Tafrah) Mutations.

6.2.3. غیر مندیلی ورثہ (Wirsah-e-Ghair Mendeli) Non-Mendelian inheritance.

6.2.4. ورثہ متقدرہ (Wirsah-e-Mutaqaddirah) Mitochondrial inheritance.

6.2.5. طبعی مجموعہ جینی (Tab'a -e-majmoo'ah-e- Jeeni) Genome Imprinting.

6.2.6. ثنیات الابوین (Sunaiyatul Abawain) parental Disomy.

References: 149,150,151,152,153,154

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

CO1,CO4	Describe the Multiple alleles,Mutations,Non-Mendelian inheritance,Mitochondrial inheritance.	3	Lecture	CC	Knows-how	L&GD,L&PPT ,L_VC
CO1,CO4, CO7	Explain and analyse the multiple alleles, mutations, non-mendelian inheritance and mitochondrial inheritance.	7	Experiential-Learning6.3	CAN	Shows-how	DIS,CBL,LS,PER, D
CO1,CO4, CO7	Acquire knowledge of the multiple alleles, mutations, non-mendelian inheritance and mitochondrial inheritance.	5	Practical6.3	PSY-MEC	Shows-how	PL,DIS,D,W,PBL
CO1,CO4, CO7	Explain and analyse the genome imprinting and parental disomy.	6	Experiential-Learning6.4	CAN	Shows-how	DIS,D,SDL,CBL,P ER
CO1,CO4	Describe the Genome Imprinting and parental Disomy.	2	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC
CO1,CO4, CO7	Demonstrate the genome imprinting and parental disomy.	5	Practical6.4	PSY-GUD	Shows-how	PER,CBL,PL,D,RP

Practical Training Activity

Practical Training 6.1 Single gene pattern inheritance.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (Introduction with Visual Aids) (30 Min)

The teacher will introduce the concepts of single-gene inheritance (dominant and recessive traits) and autosomal chromosome inheritance patterns. Visual aids such as flowcharts, Punnett squares, and family pedigree charts will be used to explain the concepts step-by-step. The demonstration will include practical examples to highlight key differences between inheritance types.

Students will actively observe the demonstration, taking detailed notes on the examples provided and key distinctions between the inheritance patterns. This foundation will prepare students for interactive activities.

Activity 2: Interactive Simulation / Virtual Lab (60 Min)

The teacher will guide students through a virtual simulation demonstrating monohybrid and dihybrid crosses, emphasizing autosomal inheritance patterns. The simulation will visualize genetic combinations, providing clarity on how genotypes determine phenotypes.

Students will practice hands-on simulations to predict genotypes and phenotypes in offspring. They will explore different scenarios and outcomes by altering parental traits, reinforcing their understanding through interactive experimentation.

Activity 3: Group Activity: Pedigree Chart Analysis (60 Min)

The teacher will distribute sample case studies and pedigree charts representing single-gene disorders (e.g., cystic fibrosis) and autosomal inheritance patterns. Instructions will guide students on how to analyze and classify these patterns.

Students will work in groups to analyze the given pedigrees, identify inheritance patterns, and classify each as a single-gene or autosomal pattern. They will discuss their findings within the group and justify their conclusions, encouraging collaboration and critical thinking.

Activity 4: Problem Solving and Worksheet (60 Min)

The teacher will provide problem-based scenarios involving single-gene and autosomal chromosome inheritance. Worksheets will include tasks like predicting inheritance probabilities or analyzing phenotypic ratios.

Students will work in pairs or small groups to solve the problems collaboratively. They will explain the inheritance logic behind each solution, building confidence in applying theoretical knowledge to practical situations.

Activity 5: Brainstorming and Discussion Session (60 Min)

The teacher will facilitate a brainstorming session and group discussion on real-life diseases caused by single-gene mutations (e.g., sickle cell anemia) and autosomal chromosome inheritance disorders (e.g., Down syndrome). Key questions will prompt students to explore causes, impacts, and diagnostic methods.

Students will brainstorm examples of such diseases, share insights from their prior knowledge, and actively participate in discussions. They will ask questions, clarify doubts, and contribute to collective understanding through peer interaction.

Activity 6: Quiz / Peer Teaching / Presentation (30 Min)

The teacher will organize a quiz or assign student groups to prepare short presentations on their assigned inheritance type.

Students will participate in the quiz or present their assigned topic to the class. Peer teaching will allow students to explain inheritance patterns to their peers, reinforcing their grasp of the content while fostering collaboration and communication skills.

Practical Training 6.2 Sex chromosomal pattern and intermediate pattern of inheritance.

Total Learning Hours: 5:00 Hours

Activity 1: Concept Demonstration and Discussion (60 Min)

The teacher will introduce the concepts of sex chromosomal inheritance and intermediate inheritance patterns using visually engaging materials such as diagrams, charts, and multimedia presentations. The session will also involve a detailed explanation of the methods for practical activities; ensuring students understand the objectives and steps of the hands-on tasks. This activity sets a strong theoretical foundation and prepares students for practical applications.

Activity 2: Practical Activity on Chromosomal Analysis (60 Min)

Students will engage in assigned practical tasks to deepen their understanding of sex chromosomal and intermediate inheritance patterns. Activities include:

- **Karyotyping**: Students will visualize chromosomes and identify potential abnormalities.
- **Chromosome Analysis**: Students will analyze patterns of inheritance in sex-linked traits.
- **Genetic Testing**: Students will explore disorders caused by sex chromosomal abnormalities, such as Turner Syndrome or Klinefelter Syndrome.
- **Gene Mapping**: Students will locate specific genes on sex chromosomes to understand inheritance patterns.
- **Virtual Reality Exploration**: For a more immersive experience, students may explore simulated environments demonstrating sex chromosomal and intermediate inheritance mechanisms.

Activity 3: Clinical Examination and Findings Presentation (60 Min)

Students will perform clinical examinations of patients (real or simulated) presenting with disorders linked to sex chromosomal inheritance or intermediate inheritance patterns. They will document their findings, focusing on genetic traits, phenotypic features, and diagnostic markers. Each group will present their analysis to the teacher, fostering a connection between theoretical knowledge and practical clinical application.

Activity 4: Poster or Illustration Development (60 Min)

Students will create detailed and visually appealing posters or illustrations representing sex chromosomal inheritance patterns, intermediate inheritance mechanisms, and related disorders. This activity promotes creativity while reinforcing key concepts. Posters will be displayed for peer review and discussion to enhance collaborative learning.

Activity 5: Practical Activity Report and Summary (60 Min)

Students will compile comprehensive reports summarizing their practical activities, including observations, findings, and interpretations. Each report will reflect the students' understanding of the inheritance patterns and associated disorders. The teacher will conclude the session with a detailed summary of key takeaways, addressing questions and emphasizing the clinical relevance of the topic.

Practical Training 6.3 Alleles,Non-Mendelian inheritance and Mitochondrial inheritance.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration and Concept Introduction (30 Min)

The teacher will introduce and thoroughly explain key concepts such as multiple alleles, types of mutations, non-Mendelian inheritance patterns, and mitochondrial inheritance. Using clinical examples and visual aids like charts, animations, and 3D models, the teacher will illustrate inheritance patterns and associated genetic conditions.

Activity 2: Flipped Classroom Approach (60 Min)

Pre-Class Preparation: Students will watch pre-recorded video lectures or animations explaining inheritance patterns and genetic mechanisms. These materials provide a concise overview of the topic, allowing students to come prepared with basic knowledge.

In-Class Application: During class, students will actively engage in solving genetic problems and analyzing case studies related to inheritance. This time will also include group discussions facilitated by the teacher to clarify doubts and reinforce understanding.

Activity 3: Problem-Based Learning (PBL) (60 Min)

Students will be presented with a complex clinical case that involves traits such as blood groups, genetic mutations, or mitochondrial diseases.

In collaborative groups, they will:

Identify key issues and challenges in the case.

Conduct research using textbooks, online resources, or provided materials to analyze the inheritance mechanisms.

Propose plausible solutions or explanations based on their findings. This activity fosters critical thinking, research skills, and the ability to apply theoretical knowledge in clinical contexts.

Activity 4: Peer Teaching / Jigsaw Method (60 Min)

Students will be divided into small expert groups, each focusing on one specific concept, such as mutations, mitochondrial inheritance, or non-Mendelian patterns.

Each group will delve deeply into their assigned topic, preparing explanatory notes, examples, and visual aids.

Afterward, they will reassemble into mixed groups, teaching their specific concept to peers.

Activity 5: Clinical Correlation Workshop (60 Min)

The teacher will organize an interactive workshop where students correlate their theoretical knowledge with real-world clinical case studies.

Case studies will feature patients with conditions related to non-Mendelian traits, such as mitochondrial disorders or X-linked inheritance.

Students will analyze the cases, identify the inheritance patterns, and connect the observed symptoms with underlying genetic mechanisms. This activity emphasizes the clinical relevance of theoretical knowledge.

Activity 6: Reflection and Group Discussion (30 Min)

Reflection: Students will write a reflection on their learning experience, focusing on what they found most insightful and how the knowledge can be applied in real-world clinical or research settings.

Group Discussion: The session will conclude with a dynamic group discussion where students share their key takeaways, debate interpretations, and clarify lingering questions.

Practical Training 6.4 Genome Imprinting and Parental Disomy.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration and Concept Introduction (60 Min)

The teacher will introduce the concepts of genome imprinting and UPD through detailed illustrations, diagrams, and clinical examples. They will use tools like whiteboards, models, or digital simulations to demonstrate inheritance patterns, emphasizing key genetic mechanisms.

Activity 2: Student Observation and Note-Taking (60 Min)

Students will closely observe teacher demonstrations, recording critical points on mechanisms, genes involved, and imprinting-related disorders. These notes will be shared in a peer-reviewed format for cross-checking.

Activity 3: Hands-On Activity: Inheritance Mapping (60 Min)

Working in small groups, students will construct inheritance maps or Punnett squares to illustrate different scenarios. They can also use genetic simulation apps or software for more dynamic mapping of maternal or paternal disomy cases.

Activity 4: Case-Based Discussion (60 Min)

Teachers will present real or simulated clinical cases related to imprinting disorders. Students will collaborate to dissect the case, identify the genetic disorder, and explain the underpinning mechanisms. Using online forums or collaborative tools can make this more interactive.

Activity 5: Role-Play / Peer Teaching (60 Min)

Students will simulate genetic counseling sessions, where they explain concepts like parental disomy or imprinting disorders to "patients" (peers). Scenarios might include delivering genetic test results or counseling about risks

Experiential Learning Activity

Experiential-Learning Learning 6.1: Single gene pattern inheritance.

Total Learning Hours: 7:00 Hours

Activity 1: Problem-Based Learning (PBL) with Clinical Cases (60 Min)

Students will work in groups to analyze complex clinical cases involving single-gene inheritance and autosomal chromosome inheritance (e.g., cystic fibrosis or Huntington's disease). They will identify the core problem, research relevant inheritance mechanisms, and propose diagnostic or therapeutic solutions. By collaborating, students will apply their theoretical understanding to real-world medical scenarios, honing their problem-solving and teamwork skills.

Activity 2: Inquiry-Based Learning: Exploring Genetic Patterns (60 Min)

Students will develop their own questions related to inheritance patterns, such as “How do mutations affect autosomal traits?” or “What are the exceptions to Mendelian inheritance?” They will design and execute small research projects using resources like scientific literature, databases, or genetic simulation tools to find answers. This activity encourages curiosity, independent learning, and critical inquiry.

Activity 3: Scenario-Based Problem Solving (60 Min)

Students will engage in solving provided genetic scenarios, such as calculating the probability of inheriting a specific single-gene disorder or interpreting pedigree charts and Punnett squares. These scenarios will challenge students to apply genetic principles to practical problems, reinforcing logical reasoning and analytical thinking.

Activity 4: Hypothesis Testing Through Simulation (60 Min)

Using virtual lab tools, students will simulate genetic crosses for single-gene and autosomal inheritance. They will form hypotheses about expected inheritance outcomes, test these predictions through simulations, and analyze their results to confirm or adjust their hypotheses. This activity connects theoretical models with experimental validation in an engaging, interactive way.

Activity 5: Role-Playing Diagnostic Scenarios (60 Min)

Students will role-play as geneticists diagnosing a patient based on genetic testing results, family history, and observed traits. They will determine whether the condition results from autosomal inheritance or single-gene mutations. Students will then communicate their findings, providing recommendations in the form of a simulated patient report or counseling session, fostering real-world application and communication skills.

Activity 6: Collaborative Research Proposal (60 Min)

Students will collaboratively design a research proposal to investigate a genetic disorder related to single-gene or autosomal inheritance. They will outline clear objectives, form hypotheses, and propose methodologies, such as molecular testing or computational models, to explore inheritance patterns. This activity emphasizes creativity, collaboration, and the integration of genetic knowledge.

Activity 7: Reflection and Presentation on Applied Genetics (60 Min)

Students will write reflective reports discussing how single-gene and autosomal inheritance patterns influence genetic counseling, diagnostics, and treatment planning. They will present their reflections along with real-world examples to the class, facilitating peer learning and knowledge synthesis.

Experiential-Learning Learning 6.2: Sex chromosomal pattern and intermediate pattern of inheritance.

Total Learning Hours: 6:00 Hours

Activity 1: Karyotype and Chromosome Analysis (45 Min)

Students will perform karyotyping or chromosome analysis to visualize abnormalities in sex chromosomes. They will explain findings like aneuploidy and structural changes, correlating them with phenotypic and clinical outcomes.

Activity 2: Genetic Counseling Simulation (45 Min)

Students will role-play genetic counselors, explaining sex chromosomal inheritance patterns and intermediate inheritance disorders to simulated patients (peers). This activity fosters empathy, communication skills, and technical accuracy in delivering genetic insights.

Activity 3: Clinical Problem-Solving 45 Min)

Students will interpret genetic test results and clinical data to diagnose sex chromosomal disorders. They will explain intermediate inheritance patterns and their implications, proposing strategies for patient management.

Activity 4: Collaborative Concept Mapping (45 Min)

Students will collaborate to create visual concept maps linking sex chromosomal inheritance patterns, intermediate inheritance mechanisms, genetic disorders, and diagnostic tools. These maps will serve as a resource for peer learning and discussion.

Activity 5: Comparative Study of Genetic Mechanisms (60 Min)

Students will compare sex chromosomal inheritance patterns with other inheritance types, like autosomal inheritance or epigenetic regulation. They will analyze similarities and differences in traits and disorders, presenting their findings as charts or presentations.

Activity 6: Team-Based Project (60 Min)

Objective: Foster collaboration and in-depth exploration of a complex topic.

Students will work in teams to design a comprehensive project on sex chromosomal and intermediate inheritance patterns. The project can include:

Research on a specific genetic disorder (e.g., Turner Syndrome or Mosaicism).

Designing a Patient Education Module: Teams will create materials (brochures, videos, presentations) to educate patients about the disorder.

Data Analysis: Teams can analyze simulated patient data, identify inheritance patterns, and propose diagnostic or treatment approaches.

The project will culminate in a team presentation, allowing students to synthesize knowledge and receive feedback from peers and teachers.

Activity 7: Report Writing (60 Min)

Students will write detailed reflection reports summarizing their learning journey on sex chromosomal inheritance and intermediate inheritance patterns. They will analyze the clinical importance, propose future study areas, and explain how this knowledge can be applied in real-world scenarios.

Experiential-Learning Learning 6.3: Alleles,Non-Mendelian inheritance and Mitochondrial inheritance.

Activity 1: Comparative Mechanism Analysis (60 Min)

Students will compare inheritance mechanisms, such as Mendelian and non-Mendelian inheritance or mutations versus epigenetic modifications. They will create structured comparison charts or tables that include specific examples (e.g., autosomal dominant traits vs. incomplete dominance, point mutations vs. methylation changes). T

Activity 2: Scientific Literature Review (60 Min)

Students will review and critically analyze recent scientific articles on topics like mutations, mitochondrial inheritance, and non-Mendelian patterns. They will identify key advancements, challenges in research, and clinical applications. Summaries will be presented to peers in either oral or visual formats (e.g., slides), enhancing communication or synthesis skills.

Activity 3: Data Analysis Workshop (60 Min)

Students will use software tools or spreadsheets to analyze genetic datasets. Tasks include interpreting SNP variations, mapping mitochondrial DNA sequences, or analyzing allele frequency distributions. They will derive conclusions on inheritance patterns or disease risks and present their findings in structured formats such as graphs or tables.

Activity 4: Role-Playing as Researchers (60 Min)

Students will take on the roles of researchers, designing hypothetical experiments to study genetic traits controlled by multiple alleles, mutations, or mitochondrial inheritance. They will outline objectives, propose methodologies (e.g., PCR or sequencing), predict expected outcomes, and discuss potential challenges or limitations. This fosters problem-solving, creativity, and application of genetic concepts.

Activity 5: Genetic Case Diagnosis Competition (60 Min)

In small groups, students will compete to diagnose genetic disorders based on provided case data. Materials include family histories, genetic test results, and phenotypic information. Teams will work collaboratively to identify inheritance patterns (e.g., mitochondrial disorders, co-dominance) and justify their diagnosis, promoting teamwork and rapid application of knowledge.

Activity 6: Disease Progression Mapping (60 Min)

Students will create visual maps illustrating the progression of genetic disorders caused by mutations, non-Mendelian inheritance patterns, or mitochondrial DNA errors. These maps will trace the impact of genetic mechanisms on the onset, progression, and severity of symptoms, bridging molecular genetics with clinical outcomes.

Activity 7: Group Debate on Genetic Therapies (60 Min)

Students will participate in structured debates, exploring ethical and scientific aspects of modern genetic therapies, such as mitochondrial replacement therapy or CRISPR gene editing. They will research their stance, evaluate the pros and cons, and address societal and ethical implications. This encourages critical analysis and public speaking skills

Experiential-Learning Learning 6.4: Genome Imprinting and parental Disomy.

Total Learning Hours: 6:00 Hours

Activity 1: Case Study Analysis (60 Min)

Students will explore into real or simulated clinical cases to deepen their understanding of genome imprinting and parental disomy disorders. They will examine the genetic mechanisms underlying the cases, identify the specific disorder presented, and propose potential clinical solutions or genetic counseling strategies. This activity encourages analytical thinking and real-world application of theoretical concepts.

Activity 2: Creation of Infographics (60 Min)

Students will channel their creativity by designing visually appealing and informative infographics. These will summarize key processes, such as genome imprinting and parental disomy, breaking down complex concepts into easily digestible visual elements. The final infographics can be used for peer education or displayed in the classroom for review.

Activity 3: Debate or Ethical Discussion (60 Min)

Students will engage in a structured debate or discussion that explores the ethical, social, and clinical implications of genome imprinting and parental disomy. Potential topics include the challenges of genetic testing, patient confidentiality, or societal implications of disorders like Prader-Willi Syndrome. This activity encourages critical thinking, teamwork, and articulation of complex ideas.

Activity 4: Poster or Chart Development (60 Min)

Students will work individually or in small groups to create detailed posters or charts that explain inheritance patterns, genetic mechanisms, and clinical implications of imprinting and disomy. These visual aids will be reviewed and discussed during a classroom display session, promoting peer learning and collaborative feedback.

Activity 5: Problem-Solving Activity (60 Min)

Students will tackle hands-on problem-solving scenarios. These include interpreting pedigree charts, analyzing genetic test data, or diagnosing cases of imprinting errors and disomy. Through this activity, they will hone their critical thinking, data interpretation skills, and ability to connect theoretical knowledge with practice.

Activity 6: Reflection and Report Writing (60 Min)

To consolidate their learning, students will write a reflective report on genome imprinting and parental disomy. They will analyze its relevance to clinical practice, synthesize key takeaways from previous activities, and propose strategies for addressing genetic disorders. This exercise encourages self-reflection and deeper understanding.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** **1. Problem-Solving Scenarios:** The teacher will present hypothetical lab data or test results and ask students to interpret the findings, suggest a diagnosis, and determine the next steps **(15 Marks).**	4

2. Peer-Generated Quiz Questions: The teacher will ask each student to write 2–3 MCQs or short-answer questions on module topics, which will be compiled into a class quiz **(15 Marks).** **3. Summary Posters:** Students will summarize an entire topic (e.g., histochemical staining types) on a single poster for quick revision **(10 Marks).** **4. Discussion on Ethical Issues:** Students will write short essays or participate in group discussions on topics such as prenatal genetic testing, privacy of genetic information, and implications of chromosomal diagnosis etc **(10 Marks).** 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 assessment. (25 Marks)	

Semester No : 6

Module 7 : نمطِ ارثی کے متعدد ترتیبی عوامل(Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی(Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics.

Module Learning Objectives

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

1. Describe Multifactorial Pattern of Inheritance, Criteria for Multifactorial inheritance, Teratology and the Teratogens, Structure of Gene, Molecular Screening, Cancer Genetics, Pharmacogenetics and Haematological malignancies.

2. Conduct Presentation and Group Discussion for Anatomical Abnormalities associated with Teratology and Terotogens.

3. Identify The Anatomical Abnormalities Associated With Terotogens.

Unit 1 نمطِ ارثی(Inheritance)

7.1.1. نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance.

7.1.2. نمطِ ارثی کے متعدد عوامل کا معیار (Namt-e-Irsi ke muta'addad awamil ka Me'ayar) Criteria for Multifactorial inheritance.

7.1.3. علم التشوھات(Ilmul Tashwwuhat)Teratology.

7.1.4. جینی ساخت (Jeeni saakht) Structure of Gene.

References: 86,87,88,89,90,91,92,93,94,95,96,97,98

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Multifactorial Pattern of Inheritance, Criteria for Multifactorial inheritance.	3	Lecture	CC	Knows-how	L_VC,L&GD,L&PPT
CO1,CO4, CO7	Explain and analyse the multifactorial pattern of inheritance and criteria for multifactorial inheritance.	7	Experiential-Learning7.1	CAN	Does	DIS,RP,JC,PER,SDL
CO1,CO4, CO7	Illustrate and demonstrate the multifactorial pattern of inheritance and criteria for multifactorial inheritance.	5	Practical7.1	PSY-SET	Shows-how	PER,D,FC,PAL,SDL
CO1,CO4, CO7	Evaluate the teratology and the structure of gene..	6	Experiential-Learning7.2	CE	Does	PER,JC,CD,IBL,CBL
CO1,CO4	Describe the Teratology and the Structure of Gene.	2	Lecture	CC	Knows-how	L&GD,L&PPT ,L_VC
CO1,CO4, CO7	Evaluate the implications of teratology on gene structure.	5	Practical7.2	CE	Shows-how	D-M,IBL,SIM,PER,D

Unit 2 فحص جزوی(Fa'hs al Juzyi)

7.2.1. فحص جزوی (Fa'hs al Juzyi) Molecular Screening).

7.2.2. علم النسل سرطانی(Ilmul Nasal sartani) Cancer Genetics.

7.2.3. سرطانِ دموی(Sarta'n-e-Damwi) Haematological malignancies.

7.2.4. علم النسل صیدلی (Ilmul Nasal sai'dali) Pharmacogenetics.

References: 86,90,91,92,93,94,95

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Molecular Screening,Cancer Genetics and Pharmacogenetics.	3	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD
CO1,CO4, CO7	Explain and analyse the molecular screening and cancer genetics.	7	Experiential-Learning7.3	CAN	Does	SIM,PER,CBL,DIS, PrBL
CO1,CO4, CO7	Demonstrate and illustrate the molecular screening and cancer genetics.	5	Practical7.3	PSY-GUD	Shows-how	D-M,D,SIM,SDL,DIS
CO1,CO4, CO7	Demonstrate the haematological malignancies and pharmacogenetics.	6	Experiential-Learning7.4	PSY-GUD	Does	IBL,CBL,PSM,JC,DIS
CO1,CO4	Describe the Haematological malignancies.	2	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO4, CO7	Analyze the haematological malignancies and pharmacogenetics.	5	Practical7.4	CAN	Shows-how	D,BL,CD,SDL

Practical Training Activity

Practical Training 7.1 Multifactorial pattern of inheritance

Total Learning Hours:5:00 Hours

Activity 1: Flipped Classroom - Pre-Class Preparation (90 Min)

Before the session, students will independently explore online resources, videos, and reading material on multifactorial inheritance and its criteria. They will review case examples provided by the instructor and complete a short reflective quiz or worksheet to assess their understanding and prepare for the upcoming class discussion.

Activity 2: Teacher Demonstration and Clarification (90 Min)

During the class session, the teacher will address any misconceptions or challenging concepts from the pre-class materials. They will use real-life examples and visual aids, such as charts or animations, to explain multifactorial inheritance patterns, the role of environmental influences, and clinical criteria for assessing these traits.

Activity 3: Group Activity – Case Analysis and Pedigree Mapping (60 Min)

In small groups, students will analyze clinical case studies involving multifactorial traits. They will construct pedigree charts to trace inheritance patterns, identify contributing genetic and environmental factors, and evaluate the risk based on clinical criteria. This activity will encourage collaborative problem-solving and practical application.

Activity 4: Group Presentation, Peer Discussion, and Reflection (60 Min)

Each group will present their case analysis, including their reasoning and conclusions. The session will include peer reviews, open discussions, and an interactive Q&A moderated by the teacher. To conclude, students will write a brief reflective summary documenting their learning experience, highlighting key takeaways, and identifying areas for further exploration.

Practical Training 7.2 Teratology and Gene structure

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will utilize a 3D model of a gene to demonstrate how teratogens—such as radiation, chemicals, or viruses—can induce mutations or structural abnormalities in DNA. By manipulating the 3D model, the teacher will illustrate how a specific teratogen (e.g., radiation) may cause chromosomal breakage or

gene deletion. Additionally, the teacher will enhance understanding by using images or videos showcasing real-life examples of teratogenic effects (e.g., fetal alcohol syndrome, thalidomide), highlighting their connection to genetic structure.

Activity 2: Simulation of Teratogenic Impact on Gene Structure (60 Min)

The teacher will divide students into small groups and provide them with genetic simulation software or physical DNA models.

Students will simulate the effects of various teratogens on a model gene or DNA strand (e.g., altering nucleotide sequences, inducing chromosomal breaks, or causing deletions/duplications).

Each group will modify a genetic sequence to demonstrate how a specific teratogen affects gene structure and function. They will analyze how these changes could disrupt normal gene function, potentially leading to developmental abnormalities.

Activity 3: Analysis of Teratogen Impact Using Microscopic Samples (60 Min)

Students will be provided with prepared slides of cells or organisms exposed to teratogens, alongside control samples. Using microscopes, they will observe and identify structural changes in the cells or chromosomes (e.g., damaged DNA, chromosomal aberrations).

Observations will be recorded in lab notebooks, focusing on the differences between normal and teratogen-exposed samples.

Students will analyze how structural changes could impact gene function and contribute to birth defects or genetic disorders, presenting their observations within their groups.

Activity 4: Group Discussion and Reflection (60 Min)

After completing the simulations and observations, each group will share their findings in a brief presentation, discussing the biological and developmental implications of teratogenic effects on gene structure.

A guided group discussion will follow, where students reflect on the long-term genetic consequences of teratogen exposure. Topics may include the potential for these mutations to be inherited by future generations and the ethical and social considerations of teratogen exposure during pregnancy.

Activity 5: Conclusion (60 Min)

Students will summarize the activities and reinforce key concepts about how teratogens induce genetic mutations and disrupt normal development.

The teacher will encourage reflection on the importance of studying teratology in the context of genetic health, emphasizing preventive measures such as prenatal care and avoiding harmful substances.

Optionally, the teacher can provide additional resources or reading material for students interested in exploring teratology within the fields of genetics and medicine.

Practical Training 7.3 Molecular Screening and Cancer Genetics.

The teacher will demonstrate the molecular screening and cancer genetics and will discuss method of practical activity. (45 Minutes).

The teacher will assign the topic(s) to the students and students will perform practical activity related to the molecular screening and cancer genetics through-

1. DNA extraction from cancer cell using various methods, such as PCR/next-generation sequencing, Genetic mutation analysis of cancer cells using techniques such as Sanger sequencing / PCR and culture of cancer cells in the laboratory, observing their growth and behaviour or DNA extraction from cancer cell, Genetic mutation analysis of cancer cells and culture of cancer cells through virtual reality. (45 Minutes)
2. PCR (Polymerase Chain Reaction) to detect genetic mutations or variations using specific DNA sequences ,DNA sequencing to identify genetic mutations/variations to determine the order of nucleotide bases in a DNA molecule and Microarray analysis to Measure the expression levels of thousands of genes simultaneously to identify patterns associated with disease or exploration of techniques used in molecular screening through virtual reality. (45 Minutes)
3. Demonstration on molecular screening and cancer genetics using 3D/4D models /multimedia presentation/digital tools /softwares/clinical video cases. (45 Minutes)
4. Diagrams illustrating the structure of a gene, including exons, introns, and regulatory elements or illustration related to teratology. (45 Minutes)
5. Group discussion related to teratology and its causes and the structure of Gene.(45 Minutes)

Students will report the practical activity of their assigned topic(s) and teacher will summarize the practical activity to the students. (30 Minutes)

Practical Training 7.4 Haematological malignancies and Pharmacogenetics.

Total Learning Hours: 5:00 Hours

Activity 1: Case Study Analysis with Demonstration (60 Min)

The teacher will initiate the session with a structured demonstration, analyzing a sample case study and meticulously guide students through the process of examining diagnostic test results, identifying haematological malignancy types, and interpreting pharmacogenetic profiles to devise personalized treatment plans. To enhance comprehension, the teacher will incorporate engaging visual aids such as annotated slides, detailed diagrams, or illustrative video clips, ensuring clarity and active student engagement.

Activity 2: Student's Role (60 Min)

Following the demonstration, the teacher will distribute comprehensive case histories to students, featuring examples such as patients diagnosed with leukemia or lymphoma. Each case will include diagnostic results and pharmacogenetic data, providing a foundation for analysis. Students will be tasked with examining these cases either independently or collaboratively in small groups, encouraging critical thinking and application of learned concepts.

Activity 3: Comparative Literature Review (60 Min)

The teacher will assign student groups to review and analyze selected research articles that compare pharmacogenetic approaches in the treatment of haematological malignancies. Each group will critically evaluate the methodologies, findings, and implications of the studies, fostering collaborative learning and deeper insights into current advancements in pharmacogenetics.

Activity 4: Pre-Class Digital Module and In-Class Case Analysis (60 Min)

The teacher will offer an online module comprising videos, readings, and interactive quizzes to introduce the fundamentals of haematological malignancies and pharmacogenetics. Students will complete this self-paced module prior to the class, laying a solid conceptual foundation. During the class session, the teacher will guide students through hands-on analysis of real or simulated case studies, fostering active learning. Discussions will be facilitated throughout, with the teacher providing timely feedback to enhance understanding and application

Activity 5: Diagnostic Q&A (60 Min)

The teacher will present a detailed diagnostic scenario and pose targeted.Students will critically analyze the scenario, formulate responses to the questions, and actively participate in follow-up discussions to deepen their understanding and refine their analytical skills.

Experiential Learning Activity

Experiential-Learning Learning 7.1: Multifactorial Pattern of Inheritance.

Total Learning Hours: 7:00 Hours

Activity 1: Case Study Exploration (60 Min)

Students will analyze real-world case studies involving diseases with multifactorial inheritance, such as diabetes or cardiovascular or any other disorders. They will identify the genetic and environmental factors contributing to these conditions and discuss how these interactions influence the onset and progression of the disease.

Activity 2: Gene-Environment Interaction Analysis (60 Min)

Through simulated scenarios, students will explore how environmental factors like diet, stress, or pollution interact with genetic predispositions. They will create visual diagrams or models mapping the interplay between these factors and their cumulative impact on trait expression.

Activity 3: Family Pedigree Construction (60 Min)

Students will construct family pedigrees for hypothetical or real scenarios, tracing inheritance patterns of multifactorial traits across generations. Emphasis will be placed on analyzing incomplete penetrance and the challenges in detecting clear genetic patterns in such cases.

Activity 4: Data Analysis Project (60 Min)

Students will engage with genetic datasets (real or simulated) to identify inheritance trends and calculate the statistical contributions of multiple factors. This could include creating graphs or charts to illustrate their findings and presenting insights on the complexity of multifactorial inheritance.

Activity 5: Interactive Modeling (60 Min)

Using 3D models or virtual tools, students will explore how multiple genes and environmental factors together shape phenotypes. They can manipulate the model to observe how changes in specific factors alter the expression of a particular trait.

Activity 6: Role-Playing Debate (60 Min)

Students will take on roles such as geneticists, environmental scientists, and ethicists to debate issues related to multifactorial inheritance. Topics could include its implications for public health policies, personalized medicine, or genetic counseling.

Activity 7: Simulation Activity (60 Min)

In this hands-on activity, students will simulate how altering environmental factors such as exposure to toxins, lifestyle changes, or diet impacts the expression of genetically influenced traits. They will observe hypothetical outcomes over several simulated generations

Experiential-Learning Learning 7.2: Teratology and Gene structure.
Total Lerarning Hours: 6:00 Hours **Activity 1: Group Research & Presentation (60 Min)** Students will collaborate in small groups to research specific teratogens, such as drugs, radiation, or infections, and their associated genetic mutations. Each group will create a detailed presentation, highlighting how the structure of genes influences the teratogenic effects. Presentations can include diagrams, charts, or videos for enhanced visual learning. **Activity 2: Case-Based Analysis (90 Min)** Using clinical case studies, students will examine congenital anomalies or genetic disorders. They will identify the potential teratogenic factors and underlying gene defects, explaining mechanisms such as chromosomal breakage, gene deletion, or epigenetic modifications. This activity encourages analytical thinking and real-world application. **Activity 3: Simulation / Virtual Lab Activity (90 Min)** Students will engage in virtual lab simulations to explore the effects of teratogens on embryonic development. They will observe how gene mutations disrupt developmental pathways using online platforms or software. This activity allows students to visualize complex interactions in a controlled digital environment. **Activity 4: Reflective Writing / Concept Mapping (60 Min)** Students will synthesize their knowledge by writing a reflective summary on the connection between teratogens, gene structure, and developmental anomalies. Alternatively, they can create concept maps to visually represent these relationships, fostering deeper understanding and integrative thinking. **Activity 5: Hospital/Clinic Visit (Observational Learning) (60 Min)** Students will visit a genetics or pediatrics department at a hospital or clinic to observe real cases of genetic syndromes or congenital anomalies. They will interact with clinicians to learn how teratogens influence gene structure and how genetic insights aid diagnosis and treatment planning.
Experiential-Learning Learning 7.3: Molecular Screening and Cancer Genetics.
Total Learning Hours: 7:00 Hours **Activity 1: Literature Review (Self-Directed Learning - SDL) (60 Min)**

Students will independently review academic literature on molecular screening methods and the genetic mutations commonly associated with cancer. They will summarize key findings, focusing on the techniques used and the molecular basis of cancer mutations.

Activity 2: Hands-On Practice (Lab Simulation or Virtual Lab) (60 Min)

Through laboratory simulations or virtual labs, students will practice molecular screening techniques, including sample preparation, analysis, and result interpretation. They will gain hands-on experience with techniques such as PCR, electrophoresis, or next-generation sequencing (depending on available resources).

Activity 3: Case-Based Learning (CBL) – Cancer Case Study (60 Min)

Students will work on a clinical case study involving cancer genetics. They will identify specific mutations and biomarkers, determine the molecular diagnostic methods required, and discuss how this information impacts patient diagnosis and treatment plans.

Activity 4: Problem-Based Learning (PBL) – Diagnostic Challenge (60 Min)

In collaborative groups, students will tackle a diagnostic challenge. Using the patient's family history, clinical symptoms, and molecular test results, they will develop a comprehensive genetic screening plan and justify their approach.

Activity 5: Brainstorming Session – Risk Factors and Ethical Concerns (60 Min)

Students will brainstorm both genetic and environmental risk factors for cancer. They will also engage in discussions on the ethical considerations of genetic testing, such as consent, confidentiality, and the potential impact on family members.

Activity 6: Data Analysis and Report Preparation (60 Min)

Students will analyze simulated molecular screening data, identifying relevant mutations and their implications. They will prepare a professional diagnostic report that includes genetic counseling recommendations and suggests next steps for patient care.

Activity 7: Group Presentation and Q&A (60 Min)

Each group will present their analysis of the clinical case, including their screening results, diagnostic plan, and counseling recommendations. Following the presentation, they will engage in a peer-led Q&A session to refine their understanding and receive constructive feedback from instructors.

Experiential-Learning Learning 7.4: Haematological malignancies and Pharmacogenetics.

Total Learning Hours: 6:00 Hours

Activity 1: Digital Portfolio Creation (120 Min)

Students will independently develop a comprehensive digital portfolio analyzing assigned cases. Each portfolio will feature:

Annotated diagnostic images.

In-depth pharmacogenetic evaluations.

Proposed personalized treatment plans. Portfolios will undergo **peer review sessions**, where students provide constructive feedback to one another. The process culminates in **teacher-led feedback sessions**, reinforcing critical concepts, fostering collaboration, and promoting reflective learning.

Activity 2: Collaborative Diagnosis Challenge (90 Min)

Students will be divided into small teams, each provided with distinct diagnostic datasets, such as:

Blood counts.

Genetic markers.

Pharmacogenetic profiles. Teams will collaboratively interpret the data to:

Identify malignancy types.

Propose evidence-based treatment strategies. Each team will present their findings to the class, followed by **peer critiques and Q&A sessions** to deepen the analytical discussion.

Activity 3: Problem-Solving Rotations (90 Min)

Multiple stations will be set up, each featuring a unique diagnostic case or pharmacogenetic problem. Small groups of students will:

Rotate through the stations.

Analyze the cases and solve challenges at each station. After completing all rotations, groups will reconvene to **share their outcomes and insights**, encouraging collaborative evaluation and reflection.

Activity 4: Independent Research Brief (60 Min)

Students will independently explore haematological malignancies and pharmacogenetics by researching scientific articles, clinical guidelines, or databases. Each student will prepare a concise research brief that:

Summarizes their findings. Highlights key concepts or controversies. These briefs will be shared during a class session, fostering **knowledge exchange** and critical evaluation of different perspectives.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** 1. **Case-Based Questions:** The teacher will provide clinical cases involving multifactorial diseases and ask students to identify the genetic and environmental factors involved **(10 Marks).** **2. Poster Presentation:** The teacher will ask students to create posters on topics such as the genetic basis of breast cancer or the pharmacogenetics of anticancer drugs **(15 Marks).** **3**. Viva Voce or Presentation/Demonstration or critical paper reading or Clinical examination - **(Marks: 10)** **4**. Making model or Poster making- **(Marks: 15)** 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 assessment. (25 Marks)	4
Module 8 : علم النسل تناسلی(Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی وعلم المناعت(Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology.	
Module Learning Objectives (At the end of the module, the students should be able to)	

1. Describe Reproduction Genetics, Preimplantation genetics,Assisted reproduction, Male and Female Infertility and its genetical Basis. Prenatal diagnosis, Genetic Counselling. Ethics of Genetics, Principles of Gene therapy and its applied knowledge, Immune system and Cell Types Involved in Defence Mechanism. Clinical Significance of major Histocompatibility complex

2. Conduct Project Activity or Presentation On Reproduction Genetics.

3. Identify infertility with its genetical Basis.

Unit 1 علم النسل تناسلی (Ilmul Nasal Tanasul) Reproductive Genetics

8.1.1. علم النسل تناسلی (Ilmul Nasal Tanasul) Reproduction Genetics.

8.1.2. مردانہ وزنانہ عقم (بانجھ پن) (Mardana wa Zanana uqm) Male and Female Infertility).

8.1.3. تناسلِ مساعد (Tanasul-e-musa'id) Assisted reproduction.

8.1.4. علم النسل قبل الغرس (Ilmul Nasl QablalGharas) Preimplantation genetics.

8.1.5. تشخیص قبل الولادت (Tashkhees-e-Qabl al Wiladah) Prenatal diagnosis).

8.1.6. استشراحِ جینی (Istishrah-e-Jeeni) Genetic Counselling.

References: 86,87,88,89,90,91,92,93

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Reproduction Genetics,Male and Female Infertility,Assisted reproduction.	3	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO4, CO7	Evaluate reproduction genetics, male and female infertility, and assisted reproduction.	7	Experiential-Learning8.1	CE	Does	PSM,PER,IBL,SDL,SIM
CO1,CO4, CO7	Perform and evaluate techniques in Reproductive Genetics, engage with Assisted Reproduction methodologies, and investigate aspects of Male and Female Infertility.	5	Practical8.1	PSY-SET	Shows-how	PL,BS,DIS,D,PER

CO1,CO4, CO7	Investigate the Ethics of Genetics, study the Principles of Gene Therapy and connect its applied knowledge to societal challenges.	6	Experiential-Learning8.2	PSY-ORG	Shows-how	JC,SIM,PBL,SY
CO1,CO4	Describe the Preimplantation genetics, Prenatal diagnosis and Genetic Counselling.	2	Lecture	CC	Knows-how	L&PPT ,L&GD,L_VC
CO1,CO3, CO7	Design Preimplantation Genetics, Conduct an exploration of Prenatal Diagnosis, and Practice the application of Genetic Counselling	5	Practical8.2	PSY-ORG	Shows-how	CD,PER,SDL,SY,D

Unit 2 علاج جینی واطلاقی معلومات(Ilaj-e-Jeeni wa Itlaqi Ma'alumat) Gene therapy and its applied knowledge

8.2.1. اخلاقیات علم النسل(Akhlaqiyat-e-Ilmul Nasl) Ethics of Genetics.

8.2.2. اصولِ علاج جینی واطلاقی معلومات(Usool-e-Ilaj-e-Jeeni wa Itlaqi Ma'alumat) Principles of Gene therapy and its applied knowledge.

8.2.3. نظامِ مناعت اور دفاعی میکانیہ میں شامل ہونے والے خلیات (Nizam-e-Mana'at aur difa'ei makaniyah men shamil hoane wale khaliyat) Immune system and Cell Types Involved in Defence Mechanism.

8.2.4. توافقِ انسجۂ کبیرہ کی سریریاتی اہمیت(Tawa'fuq-e-Ansija-e- Kabeerah ki Sariryati Ahmiyat) Clinical Significance of major Histocompatibility complex.

References: 86,87,88,89,90,91,92,93

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Ethics of Genetics, Principles of Gene therapy and its applied knowledge.	2	Lecture	CC	Knows-how	BL,L_VC,L&PPT
CO1,CO4, CO7	Evaluate the ethics of genetics, principles of gene therapy and its applied knowledge, and the immune system and cell types involved in the defense mechanism.	7	Experiential-Learning8.3	AFT-VAL	Does	IBL,CBL,SDL,CD

CO1,CO4, CO7	Evaluate the Ethics of Genetics, analyze the Principles of Gene Therapy, and reflect on its applied knowledge with sensitivity and understanding	5	Practical8.3	CE	Knows-how	PL,SDL,D,C_L
CO1,CO4, CO7	Evaluate the significance of Cell Types in Defence Mechanism, relating their functions to real-world health scenarios	6	Experiential-Learning8.4	CE	Shows-how	PER,FC,SDL,JC
CO1,CO3	Discuss the Immune system and Cell Types Involved in Defence Mechanism and Clinical Significance of major Histocompatibility complex.	3	Lecture	CC	Knows-how	L&GD,BL,L&PPT ,L_VC
CO1,CO4, CO7	Explore of the Immune System, analyze the Cell Types Involved in the Defence Mechanism, and evaluate the Clinical Significance of the Major Histocompatibility Complex.	5	Practical8.4	PSY-GUD	Shows-how	SIM,DL,CBL,D-M,D

Practical Training Activity

Practical Training 8.1 Reproductive Genetics and Infertility.

Total Learning Hours:5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will introduce the foundational techniques in reproductive genetics, assisted reproduction, and addressing male and female infertility. This may include showing visual aids, explaining step-by-step processes (e.g., sperm analysis, embryo transfer), and demonstrating laboratory methods like handling gametes or cryopreservation using training equipment.

Activity 2: Interactive Labelling of Reproductive Organs (60 Min)

Students will engage with interactive 4D models or augmented reality to identify and label reproductive system components, exploring structural abnormalities contributing to infertility.

Activity 3: Collaborative Problem-Solving Session (90 Min)

The teacher will divide the students into groups and present them with complex case studies on male or female infertility. Each group brainstorms potential causes, reproductive genetic techniques, and assisted reproduction methodologies applicable to the case. Groups then share their findings with the class for peer feedback and further refinement.

Activity 4: Infertility Case Brainstorm Challenge (90 Min)

Teacher will provide to the students, hypothetical scenarios of infertility (e.g., unexplained infertility or recurrent miscarriages). In small groups, they brainstorm diagnostic approaches, assisted reproduction techniques, and genetic tests that can address the issue. The groups then compare their solutions and collectively evaluate the best approach.

Practical Training 8.2 Comprehensive Genetic Applications

Total Learning Hours:5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will introduce the key concepts of preimplantation genetics, prenatal diagnosis, and genetic counseling through a detailed demonstration. This may include the use of models, diagrams, or virtual simulations to explain the processes and their clinical significance. The teacher will also highlight common tools, techniques, and methods used in these practices to set the foundation for student activities.

Activity 2: Prenatal Diagnosis Case Studies (60 Min)

Students will work on anonymized case studies of prenatal diagnosis scenarios (e.g., amniocentesis, chorionic villus sampling) to identify methods, analyze findings, and recommend next steps.

Activity 3: Interactive Seminar/Workshop on Ethical Considerations (90 Min)

The teacher will organize a departmental seminar or Workshop and this will focus on ethical challenges associated with preimplantation genetics and prenatal diagnosis. Students debate real-world cases and present their conclusions.

Activity 4: Counseling Script Writing (90 Min)

Students will write detailed scripts for genetic counseling sessions, covering topics like genetic risks, test results, and patient support.

Practical Training 8.3 Ethics of Genetics and Gene therapy

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will introduce the foundational concepts of the Ethics of Genetics, Principles of Gene Therapy, and their applied knowledge. This includes presenting real-world examples, using visual aids (e.g., charts, videos, or diagrams), and discussing ethical dilemmas related to genetic advancements. The teacher sets the stage for critical thinking and emotional engagement by framing key questions and scenarios.

Activity 2: Q & A Session (90 Min)

After the teacher's demonstration, students participate in an interactive question-and-answer session. They raise queries about the ethics of genetics, principles of gene therapy, and its applications. The teacher guides the discussion, encouraging students to critically evaluate concepts, consider ethical challenges, and clarify their understanding through dialogue.

Activity 3: Ethics Debate (60 Min)

The Teacher will divide the students into groups and assign each group an ethical dilemma related to genetics or gene therapy (e.g., germline editing, genetic selection, or access to therapy). Groups prepare arguments from different perspectives (e.g., patient, scientist, and policy-maker) and debate their case, fostering critical evaluation and reflection.

Activity 4: Concept Mapping (90 Min)

Students will create a concept map linking key ethical principles, applications, and challenges in genetics and gene therapy. This activity encourages both analysis and thoughtful reflection.

Practical Training 8.4 Defense Dynamics and Immune System

Total Learning Hours: 5:00 Hours

Activity 1: Interactive Demonstration (60 Min)

Teacher will discuss and demonstrate the immune system, cell types involved in the defense mechanism, and the clinical significance of the Major Histocompatibility Complex (MHC) using relevant models and scenarios.

Student will perform a hands-on demonstration using models, interactive 4D tools, or augmented reality to showcase and identify the components of the immune system and defense mechanisms.

Activity 2: Case Study Analysis (90 Min)

Teacher will introduce case studies related to immune system functions and malfunctions, explaining practical modalities.

Student will analyze and present solutions for the given case studies, demonstrating an understanding of the immune system, cell types, and the clinical significance of MHC.

Activity 3: Hands-On Activities (90 Min)

Teacher will explain practical activities such as immune system games, puzzles, and simulations.

Students will engage in hands-on tasks (e.g., games, puzzles, or simulations) to reinforce knowledge of immune system components and mechanisms.

Activity 4: Virtual Reality Simulation (60 Min)

Teacher will demonstrate the immune system and defense mechanisms through virtual reality tools.

Students will explore immune system functionality in a virtual environment and summarize leanings in reports or discussions.

Experiential Learning Activity

Experiential-Learning Learning 8.1: Reproduction Genetics and Male and Female Infertility.

Total Learning Hours: 7:00 Hours

Activity 1: Design a Fertility Treatment Plan (90 Min)

The teacher will provide students with fictional patient profiles containing detailed medical histories, lifestyle factors, and genetic data. Students will independently analyze the provided information and develop a comprehensive fertility treatment plan. They will select the most suitable assisted reproduction techniques and provide a well-reasoned justification for their decisions, demonstrating their understanding of the subject matter.

Activity 2: Online Research and Presentation (120 Min)

The teacher will assign each student a specific topic, such as recent advancements in IVF or ethical considerations in reproductive technology. Students will conduct independent research on the assigned topic and develop a presentation to effectively communicate their findings. They will then share their work with the group, fostering collective learning and discussion.

Activity 3: Problem-Solving Method (120 Min)

The teacher will provide students with real-world problems related to infertility and assisted reproduction, such as interpreting complex genetic test results or developing a step-by-step IVF protocol for a fictional patient. Students will independently analyze the provided scenarios, identify viable solutions, and present their rationale in a structured and logical manner, demonstrating critical thinking and problem-solving skills.

Activity 5: Develop a Patient Education Brochure (90 Min)

Students will design an informational pamphlet or brochure for patients explaining reproduction genetics, infertility causes, and assisted reproduction options.

Experiential-Learning Learning 8.2: Genes and Ethics

Total Learning Hours: 6:00 Hours

Activity 1: Ethical Dilemma Symposium (60 Min)

The Teacher will present real-world ethical dilemmas (e.g., choosing embryos based on genetic traits or making decisions after prenatal testing results). Students will work in groups to discuss their perspectives, consider various viewpoints, and debate the potential impact on patients and society.

Activity 2: Patient Journey Simulation (120 Min)

Students will present a role-playing activity where they act as patients, genetic counselors, and family members navigating the emotional and ethical aspects of preimplantation genetics or prenatal diagnosis.

Activity 3: Problem-Based Learning Scenarios (60 Min)

Students will collaboratively solve problems or questions related to hereditary conditions, providing recommendations and linking findings to genetic concepts.

Activity 4: Journal Club (120 Min)

Students will review and present current scientific articles or research papers related to preimplantation genetics, prenatal diagnosis, or genetic counseling. They critically evaluate the study's objectives, methodology, findings, and ethical implications, followed by a group discussion to reflect on the relevance to clinical practice.

Experiential-Learning Learning 8.3: Applied Gene Therapy and Defense Systems Analysis.

Total Learning Hours :7:00 Hours

Activity 1: Case-Based Ethical Discussions (90 Min)

The teacher will present students with real-world case studies highlighting ethical dilemmas, like genetic modification or experimental gene therapy trials. Students will be instructed to critically evaluate the ethical aspects through structured group discussions or independent written analyses, fostering ethical reasoning and collaborative learning.

Activity 2: Debate on Genetic Ethics (60 Min)

The teacher will organize a formal debate in which students take opposing positions on controversial topics such as gene editing, cloning, or genetic privacy. Students will conduct independent research to prepare their arguments and present them during the debate, promoting critical evaluation, ethical reasoning, and effective communication skills.

Activity 3: Conceptual Role Mapping (90 Min)

Students will create a comprehensive map linking key concepts such as genetic ethics, gene therapy mechanisms, and immune system components. They independently identify relationships and interactions, promoting a deeper understanding of the subject.

Activity 4: Creative Scenario Writing (90 Min)

Students will be tasked with drafting fictional scenarios that explore the implications of advanced gene therapy, addressing both ethical and immunological considerations. They will critically evaluate potential outcomes and societal impacts, fostering creativity and deeper analytical thinking.

Activity 5: Visual Ethics Timeline (90 Min)

Students will research and create a timeline that highlights key ethical milestones in genetic research and gene therapy advancements. They will delve into historical precedents and analyze emerging trends to anticipate future ethical challenges, fostering critical thinking and a deeper understanding of the field.

Experiential-Learning Learning 8.4: Cell Types in Defence Mechanism	
Total Learning Hours: 6:00 Hours **Activity 1: Immune Pathway Mapping (90 Min)** Students are instructed to collaboratively create flowcharts or diagrams showing how immune cells interact during an infection. They analyze these pathways, reflecting on the roles of different cell types in protecting the body. **Activity 2: Immune Cell Interviews (90 Min)** Students will be divided into pair, assigning one as a specific immune cell and the other as an interviewer. The interviewer asks questions about the cell's role and importance, encouraging creative and engaging dialogue. **Activity 3: Comparative Exploration (90 Min)** Students will be divided into teams to compare innate versus adaptive immune responses, focusing on the roles of specific immune cells. Teams present their comparisons, highlighting how cell types differ in function and interaction. **Activity 4: Journal Club: Defense Cells and Immunity (90 Min)** Students are divided into small groups, and each group is assigned a recent research article or review paper focusing on cell types involved in the defense mechanism and their roles in immunity.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C **Total Marks for this module: 50** 1. Short Answer Questions (SAQs) or Multiple choice questions (MCQs)- **(Marks: 10)** (Short Answer Questions or Multiple-choice questions will be asked from each unit)	4

2. Case Based Assessment or practical performance or Dissection/ virtual dissection or or exploration through virtual reality - **(Marks: 15)** **3**. Viva Voce or Presentation/Demonstration or critical paper reading or Clinical examination - **(Marks: 15)** **5**. Making model or Poster making- **(Marks: 10)** 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 assessment. (25 Marks)	

Paper No : 2(تشریح البدن وتشریح اطلاقی(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)

Semester No : 3

Module 9 : خطہ رُاس کی ظاہری واطلاقی تشریح(Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.

Module Learning Objectives

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

1. Describe the gross and applied anatomy of head region, osteology of head region, arthrology of head region and myology of head region.

2. Conduct presentation, group discussion and clinical examination regarding gross and applied anatomy of head region, osteology of head region, arthrology of head region and myology of head region.

3. Identify the bones, joints, muscles of the head region and clinical presentations of the head region.

Unit 1 خطہ رُاس(Khitt'a-e- Ra's)Head Region-I

9.1.1. عظامِ راس(Iza'm –e- Ra's) Osteology of Head Region.

9.1.2. مفاصلِ راَس (Mafasil –e- Ra's) Arthrology Of Head Region.

References: 1,2,3,4,5,6,7,8,9,10,11,16,17,19,21,22,23,24,25,26,27,28,29,30,31,35,38,42,43,44,54,57,60,61,63,103,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of Head region.	3	Lecture	CC	Know	L_VC,L&GD,L&PPT
CO1,CO3, CO7	Demonstrate the Arthrology of head region.	3	Practical9.1	PSY-SET	Shows-how	D-M,D,IBL,FC,SDL
CO1,CO3, CO7	Illustrate the osteology of head region.	6	Experiential-Learning9.1	CAP	Does	X-Ray,FC,SDL,D-M,RLE

CO1,CO3, CO7	Illustrate the arthrology of head region.	4	Experiential-Learning9.2	CAP	Does	SDL,D-M,D,FC,IBL
CO1,CO3, CO7	Demonstrate the osteology of head region.	5	Practical9.2	PSY-SET	Does	D-M,FC,SDL,X-Ray
CO1,CO3	Describe the arthrology of head region.	1	Lecture	CK	Know	BL,L_VC,L&GD,L&PPT

Unit 2 خطۂ رأس(Khitt'a-e- Ra's) Head Region-II

9.2.1. ضلاتِ رأس Azla't -e- Ra's (Myology of Head region).

9.2.2. دماغ(Dimagh) Brain.

9.2.3. خطۂ رأس کی ظاہری واطلاقی تشریح(Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.

References: 1,2,3,4,5,6,7,8,9,10,11,16,20,21,22,23,26,27,28,29,30,31,35,38,42,43,44,54,55,57,58,103,104,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the myology of head region.	2	Lecture	CC	Know	L_VC,L&GD,L&PPT ,BL
CO1,CO3, CO7	Demonstrate the myology of head region.	4	Practical9.3	PSY-SET	Shows-how	D,SDL,D-M,IBL,FC
CO1,CO3, CO7	Illustrate the myology of head region.	6	Experiential-Learning9.3	CAP	Does	RP,L_VC,D-M,IBL,D
CO1,CO3	Describe the Anatomy of brain in detail.	2	Lecture	CC	Know	L&GD,L_VC,BL,L&PPT ,L

CO1,CO3, CO5,CO7	Demonstrate the gross and applied anatomy of head region.	4	Practical9.4	PSY-MEC	Shows-how	D,FC,D-M,IBL,SDL
CO1,CO3, CO7	Illustrate the anatomy of brain.	6	Experiential-Learning9.4	PSY-MEC	Shows-how	IBL,D,FC,D-M,SDL
CO1,CO3	Describe the gross and applied anatomy of head region.	2	Lecture	CC	Know	L&GD,L_VC,BL
CO1,CO3, CO7	Demonstrate the anatomy of brain.	4	Practical9.5	PSY-SET	Shows-how	FC,D,SDL,IBL,D-M
CO1,CO3, CO5,CO7	Illustrate the gross and applied anatomy of head region	4	Experiential-Learning9.5	CAP	Does	D,SDL,D-M,FC,IBL

Practical Training Activity

Practical Training 9.1 Arthrology of head region.

Total Learning hours: 3 hours

Activity 1-The teacher will discuss and demonstrate/prosect the joints of head region emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models.(45 mins)

Activity 2-The student will appreciate the different movements produced by joints of the head region and also interpret the muscles involved in the movements (45 mins).

Activity 3 - The student will differntiate the various types of joint present in the head region.(45mins)

Activity 4 -The student will understand the different stages of ossification of the joints in the head region through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models (45mins)

Practical Training 9.2 The head region.
Total learning hours : 5 hours Activity 1-The teacher will discuss and demonstrate the different bones present in the head region using specimens/models/virtual models of bones. . The important bony landmarks of the skull will be identified and their relevance will be emphasised.(1hr) Activity 2- The students will identify the indiviual bones of head region by their charachteristic features.(1hr) Activity 3- The student will appreciate the special features such as groove, foramina, ridges, condyles etc in each bone.(1hr) Activity 4- The student will relate the special features to the associated structures. (1 hr) Activity 5- The student will relate the facial bones to their function. The air sinuse present in the head region and their drainage will be examined.(1 hrs)
Practical Training 9.3 Myology of head region.
Total Learning hours: 4 hours Acivity 1-The teacher will discuss and demonstrate/prosect the muscles of scalp,auricle,eyelids,nose and mouth. through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/ /3D Anatomy software. The teacher will demonstrate the muscular changes in diseased conditions such as Bell`s palsy, infra and supranuclear lesions etc.(1hrs) Acivity 2- The student will familiarise himself with the facial muscles and the movements produced by them in normal activities.(60 mins) Acivity 3- The students will also familiarise himself with the muscles involved in refered pain of associated structures such as tooth ache, ear pain etc.(60 mins) Acivity 4- The students will also familiarise himself with the muscles involved in swelling of muscles due to underlying structure like lymph nodes.(60 mins)
Practical Training 9.4 Gross and applied anatomy of head region.
Total Learning hours:4 hours Activity 1-The teacher will discuss and demonstrate/prosect the gross and applied anatomy of head region in different views, the features present in different views, the interior of base of cranium and craniometry in brief through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs.(1hrs)

Activity 2-The student will make use of measurements and indices of skull in order to learn craniometry.(60 mins) Activity 3-The student will also learn interpret the features in different views in a normal plain X-ray.(60 mins) Activity 4- The student will appreciate the features and division of intra cranial fossa Through dissection/ e- dissection/ speciemens.(60 mins)
Practical Training 9.5 Anatomy of brain.
Total learning hours : 4 hours Activity 1-The teacher will discuss and demonstrate/prosect the anatomy of brain in terms of its cellular architecture, parts of nervous system, meninges of brain and cerebrospinal fluid through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.(2 hr) Acitvity 2-The student will have a indepth understanding of the divisions of Nervous system, classification of neurons, classification of perpheral nerve fibres, myelination, synapses, development of brain, parts of brain, flexures of brainv, blood supply of brain through, dissection, charts, models, videos etc (2 hrs).
Experiential Learning Activity
Experiential-Learning Learning 9.1: Osteology of head region.
Total learning hours: 6 hours he students will engage in the experiential learning by Activity 1- Identifying the difference in features of an adult in comparision to paediatirc bones. (1hr) Activity 2- The students will identify the difference in features of a male to female bones.(1hr) Activity 3- The student will understand the stages of ossification.(1hr) Activity 4- The student will give emphasis to the relevant clinial aspects using specimens or through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.(2hrs) Activity 5- The teacher will analyse the understanding of the student on the topic by Observation, inquiry, case scenarios, common clinical conditions etc (1hrs)
Experiential-Learning Learning 9.2: Arthrology of head region.

Total Learning hours: 4 hours The sudent will perfom the experential activity by Activity 1-The student will learn to interpret the normal bones and suture of head region on a plain X-ray(1hr) Activity 2-The student will learn to interpret the para nasal sinuses and, Deviated Nasal septum etc on a plain X-ray(1hr) Activity 3-The student will try to understand the anatomical basis of clinical conditions such as cleft palate on bed side or by using 3D models/ videos etc (60 mins) Activity 4- The teacher will discuss and help in interpretation of X-ray.(60 mins)
Experiential-Learning Learning 9.3: Myology of head region
Total Learning hours: 6 hours The student will perorm the experential activity by Activity 1-The student will enact/ perform the various expressions/ movements and explain the anatomical basis for the same.(90mins) Activity 2 -The student will identify clinically important deformities in the muscles of facial expression due to conditions such as supranuclear lesions, infranuclearlesions, trigeminal neuralgia etc will be analysed using patients or relevant videosvideos.(90mins) Activity 3- The student will notice the congenital conditions such as cleft lip etc in association with the paeditric Department (1.5 hrs) Activity 4-The teacher will ennumerate the muscles in different regions of the face and its relevence in facial expression.(1.5 hr)
Experiential-Learning Learning 9.4: Anatomy of brain.
Total Learning hours: 6 hours The student will perform he experental activity by Activity 1-The student will practice and learn the anatomical basis of reflexes and reflex actions in the human body in clinical cases/ simulated environment.(2hrs) Activity 2-The student will learn the difference of Lower motor neuron paralysis and upper motor neuron lesion paralysis in clinical cases/ simulated environment.(2hrs) Activity 3-The teacher will discuss the possible tracts involved and differential diagnosis with the help of moalijat department. (2 hrs)

Experiential-Learning Learning 9.5: Gross and applied anatomy of head region	
Total Learning hours: 4 hours The student will perform the experential activity by Activity 1- The student will identify the anatomical structures in plain radiogram of skull in both antero-posterior and lateral views.(1.5 hr) Activity 2- The student will practice some common measurements and indices of craniometry and its application using specimens/ mdels/videos.(1.5 hr) Activity 3- The teacher will guide the student in their learning modality .(1hr)	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Multiple choice questions- 5 questions-each question carrying 1 mark form the topics gross anatomy of head and brain Maps- Mapping of vessels of the head and brain by making charts (10marks) Short answer questions- 4 questions- each question carrying 5 marks from the topics osteology, myology, arthrology of head and Brain Skill assessment- 15 marks For identification/p of structures of the brain (10marks) X-ray reading -plain X-ray of skull and paranasal sinuses AP and lateral views and(5marks) 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 assessment. (25 Marks)	4
Module 10 : خطہ عنق کی ظاہری واطلاقی تشریح (khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.	

Module Learning Objectives

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

1. Describe the gross and applied anatomy of neck region and spinal cord, osteology of neck region, arthrology of neck region , myology of neck region and splanchology of neck region

2. Conduct presentation, group discussion and clinical examination regarding gross and applied anatomy of neck region and spinal cord, osteology of neck region, arthrology of neck region , myology of neck region and splanchology of neck region

3 Identify the bones, joints, muscles and viscera of the neck region and clinical presentation of the neck region.

Unit 1 خطہ عنق(khitt'a Unq)- Neck region-I

10.1.1. عظامِ عنق(Izam-e- Unq) osteology of neck Region.

10.1.2. مفاصلِ عنق(Mafasil -e- Unq) Arthrology Of neck Region.

10.1.3. عضلاتِ عنق(Azla't -e- Unq) Myology of neck Region.

References: 1,2,3,4,5,6,7,8,9,10,11,16,17,19,20,21,22,23,24,25,26,27,28,29,30,31,35,38,42,43,44,54,55,57,60,61,63,103,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of neck region.	2	Lecture	CC	Know	BL,L_VC,L&GD,L&PPT
CO1,CO3, CO7	Illustrate the osteology of neck region.	5	Experiential-Learning10.1	PSY-SET	Knows-how	D,SDL,D-M,IBL,FC
CO1,CO3, CO7	Illustrate the arthrology of neck region.	3	Experiential-Learning10.2	PSY-SET	Knows-how	D,SDL,D-M,IBL,FC
CO1,CO3, CO7	Illustrate the myology of neck region.	3	Experiential-Learning10.3	CAN	Does	D-M,IBL,FC,SDL,PT

CO1,CO3	Describe the arthrology of neck region.	1	Lecture	CC	Know	BL,L&PPT ,L&GD,L_VC
CO1,CO3, CO7	Demonstrate the osteology of neck region.	4	Practical10.1	PSY-MEC	Shows-how	D,FC,D-M,SDL,IBL
CO1,CO3	Describe the myology of neck region.	1	Lecture	CC	Knows-how	BL,L_VC,L&PPT ,L&GD
CO1,CO3, CO7	Demonstrate the arthrology of neck region.	3	Practical10.2	PSY-MEC	Shows-how	D-M,IBL,FC,D,SDL
CO1,CO3, CO7	Demonstrate the myology of neck region.	3	Practical10.3	PSY-SET	Shows-how	D,D-M,SDL,FC,IBL

Unit 2 خطہ عنق(khitt'a Unq)- Neck region-II

10.2.1. احشاءِ عنق(Ahsh'a -e-Unq) Splanchology of neck Region.

10.2.2. خطہ عنق کی ظاہری واطلاقی تشریح(khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.

References: 1,2,3,4,5,6,7,8,9,10,11,16,17,19,20,21,22,23,24,25,26,27,28,29,30,31,35,38,42,43,44,54,55,56,57,58,59,63,103,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO7	Demonstrate the splanchology of neck region.	3	Practical10.4	PSY-MEC	Shows-how	D,SDL,D-M,IBL,FC
CO1,CO3, CO7	Illustrate the splanchology of neck region.	6	Experiential-Learning10.4	CAN	Does	IBL,FC,SDL,D,D-M
CO1,CO3, CO5,CO7	Illustrate the gross and applied anatomy of neck region.	5	Experiential-Learning10.5	CAN	Does	SDL,D-M,FC,IBL,D

CO1,CO3	Describe the gross anatomy and applied anatomy of neck region.	2	Lecture	CC	Know	BL,L_VC,L&PPT ,L&GD
CO1,CO3, CO7	Illustrate the anatomy of the spinal cord.	4	Experiential-Learning10.6	PSY-SET	Does	IBL,D,D-M,FC,SDL
CO1,CO3	Describe the splanchology of neck region.	2	Lecture	CC	Know	L&PPT ,L&GD,BL,L_VC
CO1,CO3, CO7	Demonstrate the gross and applied anatomy of neck region.	4	Practical10.5	PSY-SET	Shows-how	D,SDL,FC,D-M,IBL
CO1,CO3	Describe the anatomy of spinal cord.	2	Lecture	PSY-ADT	Knows-how	SIM,D-M
CO1,CO3, CO7	Illustrate and demonstrate the anatomy of the spinal cord.	3	Practical10.6	PSY-MEC	Does	SDL,D-M,FC,D,IBL

Practical Training Activity

Practical Training 10.1 Osteology of neck region.

Total hours: 4 hrs

The teacher will discuss and demonstrate the different bones present in the neck region using specimens/models/virtual models of bones. . The important bony landmarks of the vertebrae and bones of neck region will be identified and their relevance will be emphasised.(1hrs)

Activity 1-The students will identify the indiviual bones of neck region by their charachteristic features(45mins)

Activity 2-The student will appreciate the special features such as groove, foramina, processess and their attachments etc in each bone.(45mins)

Activity 3-The student will relate the bones and special features to the associated structures.(45mins)

Activity 4 -The blood vessels and nerves related to osteology of neck will be examined using specimens/models/virtual models of bones(45mins)

Practical Training 10.2 Arthrology of neck region.
Total Learning hours: 3 hours Activity1-The teacher will discuss and demonstrate/prosect the joints of neck region emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models.(1hrs) Activity 2-The student will appreciate the different movements produced by joints of the neck region (30mins) Activity 3-The student wil interpret the muscles involved in the movements.(30mins) Activity 4-The student will differntiate the various types of joint present in the neck region.(30mins) Activity 5-The student will also understand the blood supply, nerve supply and the related structures of the joints of neck region (30mins) The abvoe activities wll be cinducted through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models
Practical Training 10.3 Myology of neck region.
Total Learning hours: 3 hours Activity 1-The teacher will discuss and demonstrate/prosect the muscles of neck region. The teacher will demonstrate the muscles of vertebral area, triangles of the neck, the subcutaneous muscles in the neck region through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/ /3D Anatomy software.(60 minss) Activity 2-The student will familiarise himself with the Nuscles of the neck (60 mins) Activity 3-The student wil identiy the structures present in the triangles of the neck, root of the neck and the structures passing through the thoracic inlet. (60 mins)
Practical Training 10.4 Splanchology of neck region.
Total learning hours - 3 hrs Activity 1-The teacher will discuss and demonstrate/prosect the visceral structures of neck region including the glands, blood vessels, nerves, lymphatics(30 mins)

Actvity 2-The student will trace the course of blood vessels, nerves, lymphatics and their branches in the neck region.(60 mins) Actvity 3-The student will note the plcement of structures in neck region. (30 mins) The above mentioed acivities through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy softwarer.(1hr)
Practical Training 10.5 Gross and applied anatomy of neck region.
Total Learning hours: 4 hours Activity 1-The teacher will discuss and demonstrate/prosect the gross and applied anatomy of neck region in different views, the normal lordosis, the important surgical areas for incison etc by Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs.(90ms) Activity 2-The student will make use of X-ray to understand the normal and altered lordosis.(1hr) Activity 2-The student will learn the surface marking ofimportant surgical areas for incison by Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs.(90mins)
Practical Training 10.6 Spinal Cord.
Total learning hours - 3 hrs Activity 1-The teacher will discuss and demonstrate/prosect the anatomy of spinal cord in terms of its internal architecture, tracts of spinal cordand their relation to associated structure through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.(1hr) Activity 2-The student will have a indepth understanding of the tracts of spinal cord with their location, the spinal meninges, the differences between cerebral and spinal dura mater.blood supply of spinal cord through, dissection, charts, models, videos etc (2hrs).
Experiential Learning Activity
Experiential-Learning Learning 10.1: Osteology of neck region.

The students will engage in the experiential learning by (Total 5hrs) Activity 1- identifying the difference in features of typical and atypical bones of neck..(2hrs) The student will give understand the relevant clinial aspects based on attachments and relations using specimens or through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.(2hrs) Activirt 2-The teacher will analyse the understanding of the student on the osteology of neck by Observation, inquiry, case scenarios, common clinical conditions etc (1hrs)
Experiential-Learning Learning 10.2: Arthrology of neck region.
The student will perform the experential activity by (Total 3hrs) Activity 1-The student will learn to interpret the normal vertebral column, craniovertebral joints, intervertebral joints, intervertebral disc spaces etc on a plain X-ray.(1hr) Activity 2-The student will try to understand the anatomical basis of clinical conditions such as cervical rib, disc prolapse etc on OPD/IPD patients or by using models/ videos etc (1hr) Activity 3-The teacher will discuss and help in interpretation of X-ray.(1hr)
Experiential-Learning Learning 10.3: Myology of neck region.
The student will engage in experential activity by (Total 3hrs) Activity1-The student will enact/ perform and explain the various movements and the muscles producing them in the neck region.(45mins) Activity 2-The student will explain the anatomical basis for clinically common conditions restricting and painful movements of the neck region.(45mins) Activity 3-The student will notice the congenital conditions such as torticolis etc (30mins) Activity 4-The teacher will recollect the muscles in different regions of the neck and itheir relevence in movements of the neck.(1hr)
Experiential-Learning Learning 10.4: Splanchology of neck region.
The student will perform the experential activity by (Total 6 hrs)

Activity 1- The student will learn to palpate the superficial structures of the neck. (90mins) Activity 2- The student will learn to appreciate conmmon clinical swellings and enlargements such as lymphadenopathy, tonsillitis, thyroid enlargement etc.(90mins) Activity 3- The studet will gain knowledge of emergency procedures like trachaeostomy, Carotid massage etc.(90mins) Activity 4-The teacher will guide the students in the above activity.(90mins) The above mentioned activities will be performed on clinical cases/ maniquins/ 3Dmodels etc
Experiential-Learning Learning 10.5: Gross and applied anatomy of neck region.
Total Learning hours: 5 hours The student will perform the experential activvity by Actiity 1 -The student will outline the spread of septic embolus from pelvis, malignant cells from prostrate, mammary glands and thyroid up through the plexus into cranial bones and brain using drawings/ maps.(3hrs) Activity 2-The student will appreciate and preset the spinal cord and its realted structures on a CT/MRI .(1hrs) Activity 3-The teacher guide and monitor the students in this activity (1hr)
Experiential-Learning Learning 10.6: Spinal cord.
The student will perform the experential activity by (Total 4hrs) Activity 1- The student will outline the functional tracts with its classification.(1hr) Activity 2- Effects of transevers section of spinal cord and the anatomical basis will be explained by the student with the help of models, charts, videos. (1hr) Activity 3-The student will learn the location and technique of lumbar puncher paralysis in a model. (1hrs) Activity 4-The teacher will discuss the possible tracts involved and differential diagnosis. (1hr)
Modular Assessment

Assessment	**Hour**

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Multiple choice questions- 10 questions- each question carrying 1 mark form the topics gross anatomy of Neck and Spinal Cord Maps- Mapping of important vessels of the neck and spinal cord by making charts (10marks) Short answer questions- 4 questions- each question carrying 5 marks from the topics osteology, myology, arthrology of Neck and Spinal cord skill assessment- 15 marks- For identification/surface projection of thyroid gland, parotid gland, pterion, common carotid artery, internal jugular vein, subclavian vein, jugular vein etc., (10marks) X-ray reading (5marks) 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 assessment. (25 Marks)	4

Semester No : 4

Module 11 : طرف اعلیٰ کی ظاہری واطلاقی تشریح (Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.

Module Learning Objectives

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

1. Describe the gross and applied anatomy of upper limb, osteology of upper limb ,arthrology of upper limb and myology of upper limb.

2 Conduct presentation, group discussion and clinical examination regarding the gross and applied anatomy of upper limb, osteology of upper limb, arthrology of upper limb and myology of upper limb.

3 Identify the bones, joints, muscles of the upper limb and clinical presentations of the upper limb .

Unit 1 طرف اعلیٰ (Taraf-e-A'ala) upper limb-I

11.1.1. عظام طرفِ اعلیٰ (Iza'am-e-Taraf-e-A'ala) Osteology of upper limb.

11.1.2. مفاصلِ طرفِ اعلیٰ (Mafasil -e- Taraf-e-A'ala) Arthrology of upper limb.

References: 1,2,3,4,5,6,7,8,9,10,14,16,17,19,21,22,23,24,25,26,27,28,29,30,31,33,38,42,43,45,54,55,57,60,61,63,100,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of upper limb.	3	Lecture	CC	Know	L&GD,L_VC,D-M,L&PPT
CO1,CO3, CO7	Demonstrate the osteology of upper limb	5	Practical11.1	PSY-SET	Shows-how	D-M,D,L_VC,SDL,IBL
CO1,CO3, CO7	Demonstrate the arthrology of upper limb	5	Practical11.2	PSY-SET	Shows-how	D,SDL,IBL,D-M,FC
CO1,CO3, CO7	Illustrate the osteology of upper limbs.	7	Experiential-Learning11.1	CAN	Does	D,D-M,FC,IBL,SDL
CO1,CO3	Describe the arthrology of upper limb.	2	Lecture	CK	Know	D-M,BL,L&PPT,L_VC,L&GD
CO1,CO3, CO7	Illustrate the arthrology of upper limbs.	6	Experiential-Learning11.2	CAN	Does	SDL,D,IBL,TPW,FC

Unit 2 طرف اعلیٰ (Taraf-e-A'ala) upper limb-II

11.2.1. عضلاتِ طرفِ اعلیٰ (Azla't-e- Taraf-e-A'ala) Myology of upper limb.

11.2.2. طرف اعلیٰ کی ظاہری واطلاقی تشریح (Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.

References: 1,2,3,4,5,6,7,8,9,10,14,16,20,21,22,23,24,25,26,27,28,29,30,31,33,38,42,43,45,54,55,56,57,58,59,63,100,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the gross anatomy and applied anatomy of upper limbs.	2	Lecture	CC	Knows-how	D-M,BL,L_VC,L&PPT ,L&GD
CO1,CO3, CO7	Demonstrate the myology of upper limbs.	5	Practical11.3	PSY-SET	Knows-how	D-M,SDL,D,IBL,L_VC
CO1,CO3, CO5,CO7	Demonstrate the gross and applied anatomy of upper limbs.	5	Practical11.4	PSY-SET	Knows-how	IBL,FC,SDL,D-M,D
CO1,CO3, CO7	Illustrate the myology of upper limbs.	7	Experiential-Learning11.3	CAN	Does	SDL,IBL,D,D-M,FC
CO1,CO3	Describe the Myology of Upper limbs	3	Lecture	CC	Know	L_VC,L&GD,D-M,L&PPT ,BL
CO1,CO3, CO4,CO7	Illustrate the gross and applied anatomy of upper limbs.	6	Experiential-Learning11.4	CAN	Does	SDL,D,IBL,FC,D-M

Practical Training Activity

Practical Training 11.1 Osteology of upper limb

Total Teaching Hours- 5 hrs

Activity 1- The teacher will discuss and demonstrate/prosect the osteology of upper limb using specimens/models. The teacher will ennumerate the attachments and the related structures of the bones of upper limb.(2 hr) Activity 2- The students will identify the indiviual bones of the upper limb by their charachteristic features. The student will appreciate the special features such as groove, foramina, ridges, condyles etc in each bone. The student will relate the special features to the associated structures ligaments and tendons by dissection/ specimens/models. (3 hrs).
Practical Training 11.2 Arthrology of upper limb
Total Learning Hours- 5 hrs Activity 1- The teacher will discuss and demonstrate/prosect the joints of upper limb emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models.(1hr) Activity 2- The student will appreciate the different movements produced by joints of the upper limb and also interpret the muscles involved in the movements. The student will differntiate the various types of joint present in the upper limb. The student will also understand the different stages of ossification of the joints in the upper limb through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models/ X-ray.(4hrs)
Practical Training 11.3 Myology of upper limbs.
Total learning hours : 5 hours Activity 1-The teacher will discuss and demonstrate/prosect the muscles of the upper limb through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/ /3D Anatomy software. The teacher will demonstrate the changes in muscular movements in diseased conditions such as paralysis of upper limb, fractures/ dislocation of .(2hrs)

Acitvity 2-The student will familiarise himself with the muscles of upper limb and the movements produced by them in normal activities. The students will also familiarise himself with the muscles involved in painful conditions of joints of upper limb. The students will also familiarise himself with the compartments of muscles of upper limb. (3hrs)
Practical Training 11.4 Anatomy of upper limbs.
Total learning hours : 5 hours Activity 1- The teacher will discuss and demonstrate/prosect the gross and applied anatomy of upper limbs emphasising on parts like axilla, cubital fossa,anatomical snuff box, thenar eminence etc., through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.(2hr) Acitvity 2- The students will perform practical activity related to the gross and applied anatomy of upper limbs by understanding the boundaries, contents of the parts like axilla, cubital fossa,anatomical snuff box, thenar eminence etc., through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.(3hrs)
Experiential Learning Activity
Experiential-Learning Learning 11.1: Osteology of upper limbs.
Total Learning hours: 7 hours The student will perform the experential activity by Activity 1- The students will learn to identify the difference in features of different bones of the upper limbs. The student will identify and demonstrate the bony landmarks of upper limb such as acromial angle, spine of scapula etc.,(3 hrs) Activity 2- The student will understand the stages of ossification. The student will give emphasis to identify the relevant clinial aspects such as carpal tunnel syndrome, colle`s fracture, displacement of head of humerus etc using specimens or through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.(3 hrs) Activity 3- The teacher will analyse the understanding of the student on the topic by Observation, inquiry, case scenarios, common clinical conditions etc., (1hr)

Experiential-Learning Learning 11.2: Arthrology of upper limbs.
Total Learning hours: 6 hours The student will perform the experential activity by Activity 1- The student will learn to interpret the plain X-ray of Joints of upper limb. The student will try to understand the anatomical basis of clinical conditions such as fractures, dislocation, deformities on OPD/IPD patients with the help of X-rays or by using 3D models/ videos etc., (4hrs) Activity 2- With the help of radiology department the teacher will discuss and help in interpretation of X-ray. The student will practice X-Ray interpretations and its application using specimens/ mdels/videos.(1hr) Activity 3- The teacher will guide the student in their learning modality .(1hr)
Experiential-Learning Learning 11.3: Myology of upper limbs.
Total Learning hours: 7 hours The student will perform the experential activity by Activity 1- The student will enact/ perform the various movements and explain the anatomical basis for the same.(3hr) Activity 2- The student will visit OPD/IPD patients or observe relevant videos and disscued in group disscussion/ presentation of clinically common conditions like rotatory cuff injury, Tennis elbow, ganglion etc., (2hr) Activity 3-The teacher will summarise/ ennumerate the muscles in different regions of the upper limb and its relevence in normal / diseased conditions followed by the students (2 hrs)
Experiential-Learning Learning 11.4: Gross and applied anatomy of upper limbs.
Total Learning hours: 6 hours The student will perform the experential activity by Activity 1- The student will identify the anatomical structures in plain radiogram of upper limbs in both antero-posterior and lateral views.(1 hr)

Activity 2-The student will study brachial plexus, its roots, cords, trunks, branches and supply on models, charts, maps. The student will learn to identify Erb`s paralysis, Klumpke`s paralysis, crutch paralysis, winging of scapula radial nerve injury, ulnar nerve injury and the anatomical basis for the same. The student will identify and demonstrate surface projection of cephalic and basilic veins, palpation of brachial artery, radial artery. (4 hr) Activity 3- The teacher will guide the student in their learning modality .(1hr)	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Model making- (10 marks) making models from the topics of osteology, myology, arthrology of upper limb Long answer questions- 1 questions- each question carrying 10 marks from the topics osteology, myology, arthrology of upper limb Short answer question- 1 question- each question carrying 5 marks from topics opics osteology, myology, arthrology of upper limb skill assessment- 5 marks For Demostration/identification of important bony landmarks such as jugular notch, sternal angle, acromial angle, spine of scapula, inferior angle of scapula etc, the joints, movements and the muscles involved (10m) X-ray reading(10m) 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 assessment. (25 Marks)	4
Module 12 : طرفِ اسفل کی ظاہری واطلاقی تشریح (Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.	

Module Learning Objectives

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

1. Describe the gross and applied anatomy of lower limb, osteology of lower limb ,arthrology of lower limb and myology of lower limb.

2 Conduct presentation, group discussion and clinical examination regarding the gross and applied anatomy of upper limb, osteology of lower limb, arthrology of lower limb and myology of lower limb.

3 Identify the bones, joints, muscles of the lower limb and clinical presentations of the lower limb.

Unit 1 طرفِ اَسفل(Taraf-e-Asfal) Lower limb-I

12.1.1. عظامِ طرفِ اَسفل(Iza'm -e- Taraf-e- Asfal) Osteology of Lower limbs.

12.1.2. مفاصلِ طرفِ اَسفل(Mafasil -e- Taraf-e-Asfal) Arthrology of Lower limbs.

References: 1,2,3,4,5,6,7,8,9,10,15,16,17,19,21,22,23,24,25,26,27,28,29,30,31,34,38,42,43,44,54

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of lower limbs.	3	Lecture	CC	Know	D-M,L&GD,L&PPT ,BL,L_VC
CO1,CO3, CO7	Demonstrate the osteology of lower limbs.	5	Practical12.1	PSY-SET	Knows-how	IBL,D-M,FC,SDL,D
CO1,CO3, CO7	Illustrate the osteology of lower limbs.	6	Experiential-Learning12.1	CAN	Knows-how	D,D-M,SDL,IBL,FC
CO1,CO3, CO7	Demonstrate the arthrology of lower limbs.	5	Practical12.2	PSY-SET	Shows-how	D,D-M,IBL,SDL

CO1,CO3, CO7	Illustrate the arthrology of lower limbs	7	Experiential-Learning12.2	CAN	Knows-how	SDL,FC,D-M,PrBL,IBL
CO1,CO3	Describe the arthrology of lower limbs.	2	Lecture	CAP	Knows-how	L_VC,L&GD,BL,SY,D-M
CO1,CO3, CO7	Illustrate the myology of lower limbs.	6	Experiential-Learning12.3	CAN	Knows-how	FC,SDL,D,D-M,IBL

Unit 2 طرفِ اسفل(Taraf-e-Asfal) Lower limb-II

12.2.1. عضلاتِ طرفِ اسفل(Azla't-e- Taraf-e-Asfal) Myology of Lower limbs.

12.2.2 طرفِ اسفل کی ظاہری واطلاقی تشریح(Taraf-e-Asfal ki Zahiri wa Atlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.

References: 1,2,3,4,5,6,7,8,9,10,15,16,20,21,22,23,24,25,26,27,28,29,30,31,34,38,42,43,45,54

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO7	Demonstrate the myology of lower limbs.	5	Practical12.3	PSY-SET	Shows-how	D,D-M,SDL,FC
CO1,CO3, CO4,CO7	Demonstrate the gross and applied anatomy of lower limbs.	5	Practical12.4	PSY-SET	Shows-how	FC,IBL,SDL,D-M,D
CO1,CO3, CO4,CO7	Illustrate the gross and applied anatomy of lower limbs.	7	Experiential-Learning12.4	CAN	Does	X-Ray,D-M,IBL,SDL,FC
CO1,CO3	Describe the myology of lower limbs.	3	Lecture	CC	Know	D-M,BL,L_VC,L&PPT ,L&GD

CO1,CO3, CO4	Describe the gross anatomy and applied anatomy of lower limbs.	2	Lecture	CK	Knows-how	L&PPT ,L&GD,BL,D-M,L_VC
Practical Training Activity						
Practical Training 12.1 Osteology of lower limbs.						
Total Learning Hours-5 hrs Activity 1- The teacher will discuss and demonstrate/prosect the osteology of lower limb using specimens/models. The teacher will ennumerate the attachments and the related structures of the bones of lower limb.(2.5 hr) Activity 2- The students will identify the indiviual bones of the lower limb by their charachteristic features. The student will appreciate the special features such as groove, foramina, ridges, condyles etc in each bone. The student will relate the special features to the associated structures like ligaments and tendons by dissection/ specimens/models.(2.5 hr).						
Practical Training 12.2 Arthrology of lower limbs.						
Total learning Hours- 5 hrs Activity 1- The teacher will discuss and demonstrate/prosect the joints of lower limb emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models.(1hr) Activity 2-The student will appreciate the different movements produced by joints of the lower limb and also interpret the muscles involved in the movements. The student will differntiate the various types of joint present in the lower limb. The student will also understand the different stages of ossification of the joints in the lower limb through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models/ X-ray.(4hrs)						
Practical Training 12.3 Myology of lower limbs.						

Total Learning Hours- 5 hrs Activity 1- The teacher will discuss and demonstrate/prosect the muscles of the lower limb through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/ /3D Anatomy software. The teacher will demonstrate the changes in muscular movements in diseased conditions such as paralysis of lowr limb, fractures/ dislocation .(2hrs) Activity 2- The student will familiarise himself with the muscles of lower limb and the movements produced by them in normal activities. The students will also familiarise himself with the muscles involved in painful conditions of joints of lower limb. The students will also familiarise himself with the compartments of muscles of lower limb.(3hrs)
Practical Training 12.4 Gross and applied anatomy of lower limbs.
Total Learning Hours- 5 hrs Activity 1- The teacher will discuss and demonstrate/prosect the gross and applied anatomy of lower limbs emphasising on parts like inguinal region, popliteal fossa,femoral triangle, adductor canal etc., (2hrs) Activity 2- The students will perform practical activity related to the gross and applied anatomy of upper limbs by understanding the boundaries, contents of the parts like inguinal region, popliteal fossa,femoral triangle, adductor canal etc through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.(3hrs)
Experiential Learning Activity
Experiential-Learning Learning 12.1: Osteology of lower limbs.
Total Learning Hours- 6 hrs Activity 1- The students will engage in the experiential learning by identifying the difference in features of different bones of the lower limbs. (2 hr) Activity 2 -The student will identify and demonstrate the bony landmarks of lower limb such as condyles, tuberosities, malleolus,spines etc. using specimens or through demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.The student will understand the stages of ossification.(2hrs)

Activity 3- The teacher will analyse the understanding of the student on the topic by Observation, inquiry, case scenarios, common clinical conditions etc (2hrs)
Experiential-Learning Learning 12.2: Arthrology of lower limbs
Total Learning Hours- 7 hrs Activity 1-The student will learn to interpret the plain X-ray of Joints of lower limb seen in anteroposterior and lateral views of various regions of lower limb. (1.5 hr) Activity 2- The student will try to understand the anatomical basis of clinical conditions such as fractures, dislocation, deformities on OPD/IPD patients with the help of X-rays or by using 3D models/ videos etc (4 hrs) Activity 3- With the help of radiology department the teacher will discuss and help in interpretation of X-ray.(1.5 hr)
Experiential-Learning Learning 12.3: Myology of lower limbs.
Total Learning Hours- 6 hrs Activity 1- The student will enact/ perform the various movements and explain the anatomical basis for the same. Also clinically common conditions like hamstring injury, achilles tendinitis, ganglion etc will be analysed in OPD/IPD patients or relevant videos and disscued in group disscussion/ presentation. (3 hrs) Activity 2-The teacher will summarise/ ennumerate the muscles in different regions of the upper limb and its relevence in normal / diseased conditions followed by the students activity(3 hrs)
Experiential-Learning Learning 12.4: Gross and applied anatomy of lower limbs.
Total Learning Hours- 7 hrs Activity 1- The student will study lumbar plexus, its roots, cords, trunks, branches and supply on models, charts, maps. (2 hr) Activity 2- The student will learn to identify foot drop, sciatica, Talipes equino valgu/varus sciatic nerve injury, popliteal nerve injury and the anatomical basis for the same. The student will identify and demonstrate palpation of femoral, popliteal,post tibial, ant tibialand dorsalis pedis blood vessels in a simulated environment. (2 hrs) Activity 3- The student will identify and demostrate surface projection of femoral nerve,sciatic,tibial, common peroneal, deep peroneal nerve in a simulated environment. (1hrs)

Activity 4- The teacher will discuss and summarise the student activity of gross and applied anatomy of low limbs related to the brachial plexus, its roots, cords, trunks, branches and vascular supply.(2hrs)	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Model making- (10 marks) making models from the topics of osteology, myology, arthrology of lower limb Long answer questions- 1 questions- each question carrying 10 marks from the topics osteology, myology, arthrology of lower limb Short Answer question- 1 question- each question carrying 5 marks from topics osteology, myology, arthrology of lower limb skill assessment- 5 marks For Demostration/identification of structures such as femoral, popliteal, posterior tibial, anterior tibial, dorsalis pedis, mid inguinal point etc., the joints, movements and the muscles involved of the lower limb (10m) X-ray reading(10m) 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 assessment. (25 Marks)	4
Semester No : 5	
Module 13 : صدر کی ظاہری، جراحی و سریری تشریح (Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax.	

Module Learning Objectives

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

1. Describe the gross anatomy of the thorax, osteology of thorax, arthrology of thorax and myology of thorax and Splanchology of Thorax.

2 Conduct presentation, group discussion and clinical examination regarding the gross and applied anatomy of the thorax, osteology of thorax, arthrology of thorax and myology of thorax and Splanchology of Thorax.

3 Identify the bones, joints, muscles, viscera of the thorax. and mediastinum and clinical presentation of the thorax.

Unit 1 صدر(Sadr) Thorax-I

13.1.1. عظامِ صدر(Iza'm -e-Sadr) Osteology of Thorax.

13.1.2. مفاصلِ صدر(Mafasil-e-Sadr) Arthrology of Thorax.

References: 1,2,3,4,5,6,7,8,9,10,13,16,17,18,19,21,23,24,25,26,27,28,29,30,31,33,37,38,42,43,44,45,46,54,55,56,57,59,60,61,63,100,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of thorax.	2	Lecture	CC	Knows-how	L&PPT ,D-M,L_VC,L,BL
CO1,CO3, CO7	Illustrate the osteology of thorax.	5	Experiential-Learning13.1	CAN	Does	FC,SDL,D-M,IBL,D
CO1,CO3, CO7	Demonstrate the osteology of thorax.	4	Practical13.1	PSY-SET	Does	FC,D-M,X-Ray,SDL,IBL
CO1,CO3, CO7	Illustrate the arthrology of thorax.	4	Experiential-Learning13.2	CAN	Does	IBL,D-M,PT,SDL,D
CO1,CO3, CO7	Demonstrate the arthrology of thorax.	3	Practical13.2	PSY-SET	Shows-how	SDL,IBL,D,D-M,SIM

CO1,CO3	Describe the arthrology of thorax.	2	Lecture	CC	Knows-how	BL,D-M,L&GD,L_VC,L
CO1,CO3, CO7	Demonstrate the splanchnology of thorax.	4	Practical13.3	PSY-SET	Shows-how	IBL,SIM,D,SDL,D-M

Unit 2 صدر(Sadr) Thorax-II

13.2.1. عضلاتِ صدر (Azlat-e-Sadr) Myology of Thorax.

13.2.2. احشاءِ صدر(Ahsh'a-e- Sadr) Splanchology of Thorax.

13.2.3. صدر کی ظاہری، جراہی و سریری تشریح(Sadr ki Zahiri,Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical anatomy of thorax.

References: 1,2,3,4,5,6,7,8,9,10,13,16,20,21,22,24,25,26,27,28,29,30,31,33,37,38,42,43,44,45,46,54,55,56,57,63

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO4	Describe the gross anatomy, surgical and clinical anatomy of thorax.	2	Lecture	CC	Knows-how	L&GD,L,L_VC,BL,L&PPT
CO1,CO3, CO7	Illustrate the myology of thorax.	5	Experiential-Learning13.3	CAN	Does	IBL,SDL,SIM,D,D-M
CO1,CO3, CO7	Illustrate the splanchology of thorax.	7	Experiential-Learning13.4	CAN	Does	D,SDL,D-M,IBL
CO1,CO3	Describe the Myology of Thorax.	2	Lecture	CC	Knows-how	L&GD,D-M,L&PPT ,L,BL
CO1,CO3	Demonstrate the myology of thorax.	5	Practical13.4	CAN	Shows-how	D,SDL,D-M,IBL,SIM

CO1,CO3	Describe the Splanchology of Thorax.	2	Lecture	CC	Knows-how	FC,L,L_VC,L&GD,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the gross anatomy, surgical and clinical anatomy of thorax.	4	Practical13.5	PSY-SET	Shows-how	IBL,SDL,D,SIM,D-M
CO1,CO3, CO4,CO7	Illustrate the gross anatomy, surgical and clinical anatomy of thorax.	5	Experiential-Learning13.5	CAN	Does	D-M,SIM,SDL,IBL,D

Practical Training Activity

Practical Training 13.1 Osteology of thorax.

Total Learning Hours- 4 hrs

Activity 1- The teacher will discuss and demonstrate/prosect the osteology of thorax related to anatomical features of sternum, typical and atypical ribs, thoracic vertebrae with their attachments using models, specimens, charts etc.,(1 hr)

Activity 2- The student will appreciate the characteristic features of the bones of the thorax and their associated structures such as structures passing in front of the neck of the first rib, structures lying behind manubrium sterni, events occuring at sternal angle etc., using dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software. (3 hrs)

Practical Training 13.2 Arthrology of thorax.

Total Learning Hours- 3 hrs

Activity 1-The teacher will discuss and demonstrate/prosect the arthrology of thorax related to sterno costal joints, sternovertebral joints, inter vertebral joints, sternoclavicular joints with their ligaments, muscles etc., using Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software. (1 hr)

Activity 2- The student will classify the different types of joints in thorax. the student will identify the range and movements produced by the joints of thorax using dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software. (2 hrs)
Practical Training 13.3 Splanchnology of thorax.
Total Learning Hours- 4 hrs Activity1- The teacher will demonstrate the location and features of visceral structures present in the thorax including mediastinum through models, simulators, dissection of cadaver/ artificial cadaver/ e-dissection. (1 hr) Activity2 -The student should identify and demonstrate surface markings of lines of plural reflection, lung borders and fissures, trachea, cardiac borders, apex beat and surface projections of valves of the heart through models, simulators, dissection of cadaver/ artificial cadaver/ e-dissection. (3 hrs)
Practical Training 13.4 Myology of thorax.
Total Learning Hours- 5 hrs Activity 1- The teacher will demonstrate the coverings of the thoracic wall such as skin, superficial fascia, deep fascia and the muscles through Dissection/e-dissection/ simulator and demonstrating using Specimen. (2 hrs) Activity 2- The student will identify and locate the intrinsic muscles of the thoracic wall and the extrinsic muscles of the thoracic wall. The student will try to understand the mechanism of respiration involving the joints and muscles through Dissection/e- dissection/ simulator and demonstrating using Specimen. (3 hrs)
Practical Training 13.5 Gross anatomy, surgical and clinical anatomy of thorax.
Total Learning Hours- 4 hrs Activity 1-The teacher will describe the arch of aorta its course, relations and branches, superior vena cava its formation, course, and its tributaries, pulmonary trunk its formation, course, branches and its tributaries, thoracic duct termination, tributaries, applied anatomy and relations. (1 hr) Activity 2- The student will trace the thoracic duct, azygous and hemi azygous vein, thoracic sympathetic trunks through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/3D Anatomy software. (1 hr)

The teacherwill assign the topic(s) or scenario(s) to the students. The students will perform practical activity related to the gross anatomy, surgical and clinical anatomy of thorax through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/3D Anatomy software. (2 hrs)
Experiential Learning Activity
Experiential-Learning Learning 13.1: Osteology of thorax.
Total Learning Hours- 5 hrs Activity 1- The student will identify the structures seen on a plain X-Ray chest PA view. The student will learn to interpret the normal structures on a chest X-Ray. The student will learn counting of the ribs, costal margins, sub costal angles in simulated environment. The student will learn to identify mid sternal line anterior axillary line , posterior axillary line, mid axillary line. The student will appreciate the bony landmarks such as suprasternal notch, sternal angle, xiphoid process in simulated environment. (4 hrs) Activity 2- The teacher will gude the students in understanding, identifying, locating the bony landmarks of thorax. (1 hr)
Experiential-Learning Learning 13.2: Arthrology of thorax.
Total Learning Hours- 4 hrs Activity 1- The student will identify the clinically important landmarks such as mid sternal line for sternotomy, 3rd intercostal space for acess to trachea, 5th to 7th intercostal space for acess to oesophagus and lower lobes of lungs etc., in models, simulator, videos. (3 hrs) Activity 2- The teacher will monitor and guide the student in experiential learning activities. (1 hr)
Experiential-Learning Learning 13.3: Myology of thorax.
Total Learning Hours- 5 hrs Activity 1- The student will learn to locate the site for paracentesis thoracis, coarctation of aorta, locate the site for thoracotomy, intercostal nerve block in a model, simulators, 3D Anatomy software and 4D interactive Anatomical Models. (4 hrs)

Activity 2- The teacher will monitor and guide in student activity. (1 hr)	
Experiential-Learning Learning 13.4: Splanchology of thorax.	
Total Learning Hours- 7 hrs Activity 1-The student will learn to appreciate the radiological appearance of plural effusion, hilar shadow, cardiac shadow, retrosternal shadow, retro cardiac shadow etc., in chest X-ray in department of radiology. The student will identify the sites of extensions of the plura beyond the thoracic cage, identify the sites of auscultation in simulated environment. (5 hr) Activity 2- The teacher will emphasize the practical importance to appreciate the sites on thorax helpful in diagnosis in diseases. The teacher will guide the student in learning the precise sites of auscultation in simulated environment. (2 hrs)	
Experiential-Learning Learning 13.5: Gross anatomy, surgical and clinical anatomy of thorax.	
Total Learning Hours- 5 hrs Activity 1-The student will identify the aortic knuckle in chest X-Ray. The student will identify and locate the site for pulmonary artery catheterization, sites of obstruction of superior vena cava, site for thoraco-abdominal sympathectomy, sites of referred pain of diaphragm through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiogy/ case presentation/Clinical Examination. (4 hrs) Activity 2- The teacher will emphasize on the clinical importance of the gross anatomy, surgical and clinical anatomy of thorax. the teacher will monitor and guide the student in experiential learning activity. (1 hr)	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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

Clinical scenario - (10 marks) to identify the auscaltatory points, of cardioascular system and Respiratory system Long answer questions- 1 question , each question carrying 10 marks each from the topics osteology, myology, arthrology, splanchnology of thorax Short answer questions- 2 questions each question carrying 5 marks each from the topics osteology, myology, arthrology, spanchnology of thorax skill assessment- 5 marks For Demostration/surface marking of lines of structures such as pleural reflection,lung borders and fissures,trachea,heart borders, apex beat, etc (5 m) X-ray reading (5marks) charts- (5 marks) making charts of major vessels of thorax 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 assessment. (25 Marks)	

Module 14 : بطن کی ظاہری، جراحی و سریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.

Module Learning Objectives

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

1. Describe the gross anatomy, Surgical and Clinical Anatomy of Abdomen, Osteology of Lumbar spine, Arthrology of Lumbar region, Myology of Abdominal wall, Anatomy of Inguinal Canal, Splanchnology of Adomen.

2 Conduct presentation, group discussion and clinical examination regarding the gross anatomy, Surgical and Clinical Anatomy of Abdomen, Osteology of Lumbar spine, Arthrology of Lumbar region, Myology of Abdominal wall, Anatomy of Inguinal Canal, Splanchology of Adomen.

3 Identify the bones, joints, muscles, viscera of the abdomen and clinical presentation of abdomen.

Unit 1 بطن(Batan) Abdomen-I

14.1.1. قطن کے سناسن کی تشریح(Qutn ke sanasin ki Tashreeh) Osteology of Lumbar spine.

14.1.2. مفاصل قطن(Mafasil-e-Qutn)Arthrology of Lumbar region.

14.1.3. عضلاتِ دیوارِ بطن(Azlat-e- Diwar-e-Batan) Myology of Abdominal wall.

References: 1,2,3,4,5,6,7,8,9,10,12,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,34,37,38,42,43,44,45,46,54,56,57,58,60,61,63,102,104,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of lumbar spine	2	Lecture	CC	Knows-how	L&PPT ,L,L_VC,FC,D
CO1,CO3, CO7	Demonstrate the osteology of lumbar spine.	3	Practical14.1	PSY-GUD	Shows-how	SDL,D-M,IBL,SIM,D
CO1,CO3, CO7	Illustrate the osteology of lumbar spine	4	Experiential-Learning14.1	CAN	Does	CBL,SIM,D,IBL,SDL
CO1,CO3, CO7	Demonstrate the arthrology of lumbar spine.	3	Practical14.2	PSY-GUD	Shows-how	SIM,SDL,IBL,D-M,D
CO1,CO3	Illustrate the arthrology of lumbar spine	4	Experiential-Learning14.2	PSY-SET	Does	SIM,D-M
CO1,CO3, CO7	Demonstrate the myology of abdomen.	4	Practical14.3	PSY-GUD	Shows-how	IBL,D,SIM,SDL,D-M

CO1,CO3	Describe the arthrology of lumbar spine.	1	Lecture	CC	Knows-how	L,FC,L_VC,L&GD,L&PPT
CO1,CO3, CO7	Demonstrate the anatomy of inguinal region.	3	Practical14.4	PSY-GUD	Shows-how	D-M,D,SIM,SDL,IBL
CO1,CO3, CO7	Illustrate the myology of abdomen.	5	Experiential-Learning14.3	CAN	Does	D,D-M,L_VC,SDL,FC
CO1,CO3	Describe the myology of abdomen.	2	Lecture	CC	Knows-how	BL,L&GD,L,L&PPT ,L_VC

Unit 2 بطن(Batan) Abdomen-II

14.2.1. قناۃ اُربی کی تشریح(Qan'at-e-Urbi ki Tashreeh) Anatomy of Inguinal Canal.

14.2.2. احشاءِ بطن (Ahsh'a-e-batan) Splanchology of Abdomen.

14.2.3. بطن کی ظاہری، جراہی و سریری تشریح(Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.

References: 1,2,3,4,5,6,7,8,9,10,16,22,24,25,26,27,28,29,30,31,37,38,42,43,44,45,46,54,55,56,57,58,59,63,102,104

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO7	Illustrate the anatomy of inguinal region.	3	Experiential-Learning14.4	CAN	Does	IBL,D-M,SDL,SIM,D
CO1,CO3, CO7	Demonstrate the splanchnology of abdomen.	4	Practical14.5	PSY-SET	Shows-how	SIM,IBL,SDL,D-M,D
CO1,CO3, CO4,CO7	Illustrate the gross, surgical and clinical anatomy of abdomen.	4	Experiential-Learning14.5	PSY-SET	Does	SIM,SDL,D-M,D,IBL

CO1,CO3, CO4,CO7	Demonstrate the gross, surgical and clinical anatomy of abdomen.	3	Practical14.6	PSY-SET	Does	IBL,FC,D-M,SDL,D
CO1,CO3, CO7	Illustrate the splanchology of abdomen.	6	Experiential-Learning14.6	CAN	Does	D-M,D,SDL,IBL
CO1,CO3	Describe the anatomy of inguinal region.	1	Lecture	CC	Knows-how	BL,L&PPT ,FC,L,L&GD
CO1,CO3	Describe the splanchnology of abdomen.	2	Lecture	PSY-MEC	Knows-how	L&PPT ,FC,L&GD,L,BL
CO1,CO3, CO4	Describe the gross, surgical and clinical anatomy of abdomen.	2	Lecture	CAP	Knows-how	L_VC,FC,L,L&PPT ,L&GD

Practical Training Activity

Practical Training 14.1 Osteology of lumbar spine.

Total Learning hours: 3 hours

Activity 1-The teacher will discuss and demonstrate the different bones present in the lumbar region using specimens/models/virtual models of bones. The important bony landmarks of the bones of lumbar region will be identified and their relevance will be emphasised.(1hrs)

Activity 2-The students will identify the indiviual bones of lumbar region by their charachteristic features(30mns)

Activity 3-The student will appreciate the special features such as groove, foramina, processess and their attachments etc in each bone.(30mns)

Activity 4-The student will relate the bones and special features to the associated structures.(30mns)

Activity 5-The blood vessels and nerves related to osteology of lumbar will be examined(30mns)

The above actitiy will be done using specimens/models/virtual models of bones

Practical Training 14.2 Arthrology of lumbar spine.

Total Learning hours: 3 hours Activity 1-The teacher will discuss and demonstrate/prosect the joints of lumbar region emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints (45mins) Activity 2-The student will appreciate the different movements produced by joints of the lumbar region and also interpret the muscles involved in the movements.(45mins) Activity 3-The student will differntiate the various types of joint present in the lumbar region.(45mins) Activity 4-The student will also understand the blood supply, nerve supply and the related structures of the joints of lumbar spine (45mins) The above activities will be done through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models
Practical Training 14.3 Myology of abdominal wall.
Total Learning hours: 4 hours Activity 1-The teacher will discuss and demonstrate/prosect the muscles of abdominal walls. The teacher will demonstrate the muscles of anterior abdominal, posterior abdominal wlls and the associated structures.umblicus, fascia, inguinal region.(1hr) Activity 2-The student will demonstrate the surface marking of regions of abdomen,superficial inguinal ring,deep inguinal ring,Mcburney`s point, renal angle, murphy`s point etc(3hrs)
Practical Training 14.4 Anatomy of inguinal region
Total Learning hours: 3 hours Activity 1-The teacher will discuss and demonstrate/prosect the anatomy of inguinal region related to inguinal canal,femoral canal, inguinal triangle,femoral sheath etc (1hr) Activity 2 -The student will identify, locate the boundaries, contents of inguinal canal,femoral canal, inguinal triangle,femoral sheath etc(2hr)

The above activities will be done through simulated envronment/ Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.
Practical Training 14.5 Splanchnology of abdomen.
Total Learning hours: 4 hours Activity 1-The teacher will discuss and demonstrate/prosect the visceral structures of abdomen including the glands, blood vessels, nerves, lymphatics.(1hrs) Activity 2-The student will trace the course of blood vessels, nerves, lymphatics and their branches in the abdomen region(1hr30mns). Activity 3-The student will note the plcement of structures in abdomen (1hr30mns) The above activities willt b performed through simulated environment/Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software.
Practical Training 14.6 Gross, surgical and clinical anatomy of abdomen.
Total Learning Hours:3:00 Hours Activity1: The teacher will discuss and demonstrate/prosect the gross, surgical and clinical anatomy of abdomen using plain and special radiographs.(1hr) Activity2: The student will describe and identify features of plain X-ray abdomen, special radiographsof abdominopelvicregion such as barium meal, barium enema, cholesystography etc(2hrs)
Experiential Learning Activity
Experiential-Learning Learning 14.1: Osteology of lumbar spine
Total Learning hours: 4 hours Activity 1-The students will engage in the experiential learning by identifying the difference in features of typical and atypical bones of lumbar region.(1hr30mins) Activity 2-The student will give emphasis to the relevant clinial aspects such low back ache, loss of normal lordosis etc based on attachments and relations(1hr30mins)

Activity 3-The teacher will analyse the understanding of the student on the osteology of lumbar region by Observation, inquiry, case scenarios, common clinical conditions etc (1hrs) The above activities will be performed using specimens or through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.
Experiential-Learning Learning 14.2: Arthrology of lumbar spine
Total Learning hours: 4 hours Activity 1-The student will learn to interpret the normal vertebral column, costovertebral joints, intervertebral joints, intervertebral disc etc spaces etc on a plain X-ray in the radiology department and using CT and MRI images where ever necessary. The student will try to understand the anatomical basis of clinical conditions such as Low backache, disc prolapse etc on OPD/IPD patients or by using models/ videos etc (3hrs) Activity 2- The teacher will discuss and help in interpretation of X-ray.(1hr)
Experiential-Learning Learning 14.3: Myology of abdomen.
Total Learning hours: 5 hours Activity 1-The teacher will recall the muscles in different regions of the abdomen and itheir relevence in movements of the trunk.(1hr) Activity 2-The student will enact/ perform the various movements and explain the anatomical basis for the same.(1hr30mins) Activity 3-The student will analyse the clinically common conditions restricting and painful movements of the trunk will be studied involving the joint and muscles of trunk region.(1hr30mins) Activity 4-The student will notice the congenital conditions such as congenital hernia,urinary and fecal fistula etc (1hrs) The above activity wil be done in simulated environment/ 3D models/ Maniquins/ etc
Experiential-Learning Learning 14.4: Anatomy of inguinal region.
Total Learning hours: 3 hours

Activity 1-The student will appreciate the anatomical basis of femoral hernia and its types and differences, the spermatic cord and its coverings, femoral sheath in simulated environment/ models/ videos (2hrs) Activity 2-The teacher in association with department of jarahat monitor and mentor the stunet in their experential learning activity.(1hr)
Experiential-Learning Learning 14.5: Gross, surgical and clinical anatomy of abdomen.
Total Learning hours: 4 hours Activity 1-The student will identify and demonstrate the anatomical basis of surgical incisionsin of abdomen, caput medusa,cremasteric reflex, paramedian incision.simulated environment/ models/ clinical cases(1hr30mins) Activity 2-The student will demonstrate the anatomical basis and role of ERCP, CT abdomen,MRI,arterigraphy in radiodiagnosis of abdomen in radiology department/ simulated environment, case presenation/ videos(1hr30mins) Activity 3 -The teacher guide and monitor the student in the experential activity(1hr)
Experiential-Learning Learning 14.6: Splanchology of abdomen.
Total Learning hours: 6 hours Activity 1-The student will learn to palpate the structures of the abdomen.(1hrs30mins) Activity 2-the student will demonstrate the surface projections of stomach, liver, fundus of gall bladder, spleen, duodenum, pancreas,ileocecal junction, kidneys and root of mesentry(1hrs30mins) Activity 3-The student will learn to appreciate conmmon clinical swellings and enlargements such as lymphadenopathy, hernia, enlargement oof organs etc.(1hrs) Activity 4- The student will understand the Gut-brain axis through maps(30mins) Activity 4-The teacher will guide the students in association with department of jarahat and emergency medicine.(1hrs30mins)
Modular Assessment

Assessment	**Hour**

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Clinical scenario - (10 marks) to identify the planes of abdomen, regions of abdomen, palpation and auscaltatory points of abdomen and impotant clinical and surgical landmarks of abdomen. Long answer questions- 1 question-each question carrying 10 marks from the topics of Osteology of lumber spine,arthrology of lumber spine,myology of abdominal walls, anatomy of inguinal canal and splanchnology of abdomen Short answer questions- 2 questionss-each question carrying 5 marks from the topics Osteology of lumber spine,arthrology of lumber spine,myology of abdominal walls, anatomy of inguinal canal and splanchnology of abdomen Skill assessment- 10 marks- For Demostration/surface projection of structures such as stomach, liver, fundus of gall bladder, spleen, duodenum, pancreas,, ileocecal junction etc (5 marks) X-ray reading (5marks) Short Video making- Explainng the anatomical basis of common clinical conditions like low back ache, pain abdomen and its radiating area in differnet diseases etc (10 marks) 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 assessment. (25 Marks)	4
Semester No : 6	
Module 15 : کمانہ وعجان کی ظاہری، جراحی وسریری تشریح(Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ (Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia.	

Module Learning Objectives

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

1. Describe the Gross anatomy, Surgical and Clinical Anatomy of Pelvis and perineum, Osteology of Pelvis and perineum, Arthrology of Pelvis and perineum, Myology of Pelvis and perineum, Splanchology of Pelvis and perineum and anatomy of male and female external genitalia.

2 Conduct presentation, group discussion and clinical examination regarding the gross anatomy, Surgical and Clinical Anatomy of Pelvis and perineum, Osteology of Pelvis and perineum, Arthrology of Pelvis and perineum, Myology of Pelvis and perineum, Splanchology of Pelvis and perineum and anatomy of male and female genitalia.

3 Identify the bones, joints, muscles, viscera of the Pelvis and perineum and clinical presentation of Pelvis and perineum and anatomy of male and female genitalia

Unit 1 نظام تناسلیہ(Nizam-e-Tanasuliya) Reproductive System-I

15.1.1. عظامِ عانہ وعجان(Izam_e Aanah wa ujan) Osteology of Pelvis and perineum.

15.1.2. مفاصل عانہ وعجان(Mafasil-e- Aanah wa ujan) Arthrology of Pelvis and perineum.

15.1.3. عضلات عانہ وعجان (Azlat-e- Aanah wa ujan) Myology of Pelvis and perineum.

References: 1,2,3,4,5,6,7,8,9,10,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,37,38,42,43,45,54,56,57,60,61,63

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Describe the osteology of pelvis and perineum.	2	Lecture	CC	Knows-how	FC,L&GD,L&PPT ,BL,L_VC
CO1,CO3, CO7	Demonstrate the osteology of Pelvis and perineum.	3	Practical15.1	PSY-SET	Shows-how	IBL,D-M,SIM,SDL,D
CO1,CO3, CO7	Illustrate the osteology of pelvis and perineum.	5	Experiential-Learning15.1	CAN	Does	D,D-M,SDL,SIM,IBL

CO1,CO3, CO7	Demonstrate the arthrology of Pelvis and perineum.	2	Practical15.2	PSY-GUD	Shows-how	SDL,SIM,D,D-M,IBL
CO1,CO3, CO7	Illustrate the arthrology of Pelvis and perineum.	3	Experiential-Learning15.2	CAN	Does	SIM,D-M,IBL,SDL,D
CO1,CO3, CO7	Demonstrate the myology of Pelvis and perineum.	4	Practical15.3	PSY-GUD	Shows-how	SIM,D-M,SDL,IBL,D
CO1,CO3	Describe the arthrology of Pelvis and perineum.	1	Lecture	CC	Knows-how	FC,L&PPT ,BL,L&GD,L
CO1,CO3	Describe the myology of Pelvis and perineum.	2	Lecture	CC	Knows-how	BL,L_VC,FC,L&GD,L&PPT
CO1,CO3, CO7	Illustrate the myology of pelvis and perineum.	4	Experiential-Learning15.3	CAN	Does	SIM,SDL,D-M,D

Unit 2 نظام تناسلیہ(Nizam-e-Tanasuliya) Reproductive System-II

15.2.1. احشاءعانہ وعجان(Ahsh'a-e- Tashreeh-e- Aanah wa ujan) Splanchology of Pelvis and perineum.

15.2.2 خارجی اعضائے تناصولیہ مردانہ وزنہ کی تشریح(Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia.

15.2.3. کمانہ وعجان کی ظاہری، جراہی وسریری تشریح(Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum.

References: 1,2,3,4,5,6,7,8,9,10,16,21,22,24,25,26,27,28,29,30,31,37,38,42,43,45,54,55,56,57,58,59,62,63,64

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO5,CO7	Illustrate the gross, surgical and clinical anatomy of Pelvis and perineum.	3	Experiential-Learning15.4	CAN	Does	SIM,D-M,IBL,SDL,D

CO1,CO3, CO7	Illustrate the splanchology of Pelvis and perineum.	7	Experiential-Learning15.5	CAN	Does	D-M,D,SIM,SDL,IBL
CO1,CO3, CO7	Demonstrate the anatomy of male and female, internal and external genitalia.	3	Practical15.4	PSY-GUD	Shows-how	SIM,D-M,D,IBL,SDL
CO1,CO3, CO7	Demonstrate the splanchology of Pelvis and perineum.	5	Practical15.5	PSY-GUD	Shows-how	D-M,IBL,D,SIM,SDL
CO1,CO3, CO7	Illustrate the anatomy of male and female, internal and external genitalia.	4	Experiential-Learning15.6	CAN	Does	PrBL,SDL,D,D-M,IBL
CO1,CO3	Describe the splanchnology of Pelvis and perineum.	2	Lecture	CC	Knows-how	L,FC,L&PPT ,L_VC,L&GD
CO1,CO3, CO5,CO7	Demonstrate the gross,surgical and clinical anatomy of Pelvis and perineum.	3	Practical15.6	PSY-GUD	Shows-how	SDL,D-M,D,IBL
CO1,CO3	Describe the anatomy of male and female, internal and external genital organs.	1	Lecture	CC	Knows-how	L,L&GD,L_VC,L&PPT ,FC
CO1,CO3, CO4	Describe the gross, surgical and clinical anatomy of Pelvis and perineum.	2	Lecture	CC	Knows-how	BL,L&PPT ,L,L_VC,L&GD
Practical Training Activity						
Practical Training 15.1 Osteology of Pelvis and perineum.						
Total Learning hours: 3 hours						

Activity 1-The teacher will discuss and demonstrate the different bones present in the pelvis and perineum using specimens/models/virtual models of bones. .(30mins) Activity 2The important bony landmarks of the bones of pelvis and perineum will be identified and their relevance will be emphasised.(1hrs) Activity 3The students will identify the indiviual bones of pelvis and perineum by their charachteristic features.(30mins) Activity 4 The student will appreciate the special features such as groove, foramina, processess and their attachments etc in each bone.(30mins) Activity 5 The student will relate the bones and special features to the associated structures. The blood vessels and nerves related to osteology of pelvis and perineum(30mins) The above activity wil be done using specimens/models/virtual models of bones(30 mints)
Practical Training 15.2 Arthrology of Pelvis and perineum.
Total Learning hours:2 hours Activity 1-The teacher will discuss and demonstrate/prosect the joints of Pelvis and perineum. emphasismg on the movements and the muscles producing these movements. The teacher will focus on the blood supply and nerve supply of the joints through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models.(30mins) Activity 2-The student will appreciate the different movements produced by joints of the Pelvis and perineum. and also interpret the muscles involved in the movements.(30mins) Activity 3-The student will differntiate the various types of joint present in the Pelvis and perineum.(30mins). Activity 4-The student will also understand the blood supply, nerve supply and the related structures of the joints of Pelvis and perineum (30mins) The above practical activity willbe done using Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/Simulator/ Demonstration on Models/ 4D interactive Anatomical Models(30mins)
Practical Training 15.3 Myology of Pelvis and perineum.
Total Learning hours:4 hours

The teacher will discuss and demonstrate/prosect the muscles of Pelvis and perineum.(1hr) The teacher will demonstrate the walls of the pelvis and their formation muscles of anterior abdominal, posterior abdominal wlls(1 hr) The teacher will demonstratethe associated structures.umblicus, fascia, inguinal region,(1hr) The student will demonstrate the important features like pelvic diaphragm, pelvic fascia, peritoneum of the pelvis etc (1hr) The above activity will be done using Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/ /3D Anatomy software.
Practical Training 15.4 Anatomy of male and female, internal and external genitalia.
Total Learning hours: 3 hours Activity 1-The teacher will guide the students in learning and interpreting the anatomy of male and female genitalia through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software/ Virtual reality. (1 hr30 mins) Activity 2-The student will learn the anatomy of male and female genitalia, their stuctures, external features, parts, relations, vascular supply, course, branches and tributaries of blood vessels through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software/ Virtual reality. (1 hr30 mins)
Practical Training 15.5 Splanchology of Pelvis and perineum.
Total Learning hours: 5 hours Activity 1-The teacher will discuss and demonstrate/prosect of the visceral structures of Pelvis and perineum including the glands, blood vessels, nerves, lymphatics through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy softwarer.(1hrs30mins) Activity 2-The student will identify the location, external features, relations,(1hrs30mins) Activity 3-The student will strace the course of blood vessels, nerves, lymphatics and their branches in the Pelvis and perineum.(1hr)

Activity 4-The student will note the placement of structures in Pelvis and perineum(1hr) The above activity will be done through Dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy softwarer.
Practical Training 15.6 Gross,surgical and clinical anatomy of Pelvis and perineum.
Total Learning hours: 3 hours The teacher will discuss and demonstrate the gross, surgical and clinical anatomy of Pelvis and perineum through plain and special radiographs / models/ specimens/ vides.(1hr) The student will learn to identify features impotant clinical and surgical landmarks on models/ specimens/simulated environment(1hr) The student will learn to identify features of plain X-ray pelvis, pyelography, barium enema etc., (1hrs)
Experiential Learning Activity
Experiential-Learning Learning 15.1: Osteology of Pelvis and perineum.
Total Learning hours:5 hours The students will engage in the experiential learning by identifying the difference in features of bones of Pelvis and perineum .(1hr) The student will give detailed demonsration to the differnces in male and female pelvis, obstetric pelvic measurements,(90mins) The students will engage in the experiential learning the boundaries and divisions of perinneum etc (90mins) The teacher will analyse the understanding of the student on the osteology of Pelvis and perineum by Observation, inquiry, case scenarios, common clinical conditions etc (1hrs) The above activity will be done usingspecimens or through Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /Anatomy software/case presentation/Clinical Examination.
Experiential-Learning Learning 15.2: Arthrology of Pelvis and perineum.

Total Learning hours:3 hours Actvity 1-The student will learn to interpret the normal joints of Pelvis and perineum , spaces etc on a plain X-ray(1hr) Actvity 2-The student will tunderstand the anatomical basis of clinical conditions such as fracture of pelvis etc on OPD/IPD patients or by using models/ videos etc (1hrs) Actvity 3-The teacher will discuss and help in interpretation of X-ray.(1hr)
Experiential-Learning Learning 15.3: Myology of pelvis and perineum.
Total Learning hours:4 hours Activity 1-The teacher will recall the muscles in different regions of Pelvis and perineum itheir relevence in obstertrics and surgery.(1hr) Activity 2-The student will analyse and present the anatomical basis in obstertrics and surgery. procedures by making short videos(1hr) Activity 3-The student will analyse and explain the clinically common painful conditions of the Pelvis and perineum in simulated environment(1hr) Activity 4-The student will notice the strutures within the perineal puches both in males and females using maniquins/ models/ specimens etc (1hrs)
Experiential-Learning Learning 15.4: Gross, surgical and clinical anatomy of Pelvis and perineum
Total Learning hours:3 hours The student will identify the surgically important landmarks of the pelvis and perineum(1hr) The student will do the surface projection of sacral plexus, and its branches,(30mins) The student will present the anatomical basis of injuries/damages during clinical conditions such as episiotomy, ischiorectal abcess, pudendal nerve block, suprapubic aspiration in simulated environment (1hr) The teacher will guide, monitor the experiential learning activity of the student. (30 minutes)
Experiential-Learning Learning 15.5: Splanchology of Pelvis and perineum.
Total Learning hours:7 hours Activity 1-The student will learn to identify the structres, relations, vascular supply of the Pelvis and perineum.(2hrs)

Activity 2-The student will demonstrate the surface projections of urinary bladder, urethra, sigmoid colon, rectum, anal canal (2hrs)

Activity 3-The student will evaluate the anatomical basis of colonoscopy/proctoscopy etc., (2hrs)

Activity 4-he teacher will guide followed by inquriy about the utility and need of the experiential activity. (1hrs)

The above activity will be done through dissection of cadaver/ artificial cadaver/ online e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy softwarer

Experiential-Learning Learning 15.6: Anatomy of male and female, internal and external genitalia.

Total Learning hours: 4 hours

Activity 1-The student will learn the anatomical basis of per rectal examination, per vaginal examination, hysterosalpingography, pyelography .(1 hr 30 mins)

Activity 2-The student will learn the anatomical basis of common clinical conditions such as prolapse of uterus, culdocentesis, tubectomy, BPH, vasectomy etc., (1 hr 30 mins)

Activity 3-The teacher will guide, monitor the student in his experiential activity (1 hr)

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Long answer questions- 1 question , each question carrying 10 marks from the topics osteology of pelvis and perenium,arthrology of pelvis and perenium,myology of pelvis and perenium,splanchnology of pelvis and perenium and anatomy of male and female internal and external genitalia. Short answer questions- 2 questions, each question carrying 5 marks from the topics osteology of pelvis and perenium,arthrology of pelvis and perenium,myology of pelvis and perenium,splanchnology of pelvis and perenium and anatomy of male and female genitalia.	4

Skill assessment - 10 marks For Demostration on the topics of boundaries of pelvic inlet, pelvic outlet, perineum, obstetric pelvic measurements, walls of pelvis, fossa and pouches of perineum , clinically and surgicaly important landmarks of pelvis and perinium etc (10 marks) Viva voce on the topics of boundaries of pelvic inlet, pelvic outlet, perineum, obstetric pelvic measurements, walls of pelvis, fossa and pouches of perineum etc (10 marks) Short Video making- Explainng the anatomical basis of common clinical conditions like pain in the pelvis and its radiating area in differnet diseases etc (10 marks) 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 assessment. (25 Marks)	

Module 16 : عمومی تشریح بدن(Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح(Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management.

Module Learning Objectives

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

1.Describe the general anatomy of the human body, applied anatomy for unani procedurerof treatment/ management,different embalming procedures, embalming of cadaver, preservation of cadaver and specimen and museum preparation.

2 Conduct the presentation, group discussion/doing procedure, regarding the general anatomy of the body, applied anatomy for unani procedural management and different embalming procedures, embalming of cadaver, preservation of cadaver and specimen, museum preparation

3 Identify the general anatomy of the body, appropriate anatomical sites for unani procedure of treatment/ management, embalming procedures of different type, embalmed cadaver, preservetion of cadaver and specimen, techniques of museum preparation and exhibition.

Unit 1 عمومی تشریح بدن(Umoomi Tashreeh-e-Badan) General Anatomy of Human Body یونانی تدابیر کے لیے اطلاقی تشریح(Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management, مختلف تحنیطی اعمال کا بیان(Mukhtalif Tahneeti Ama'al ka bayan) Descriptions Of Different Embalming Procedures.

16.1.1. عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body.

16.1.2. یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management.

16.1.3. مختلف تحنیطی اعمال کا بیان(Mukhtalif Tahneeti Ama'al ka bayan) Descriptions Of Different Embalming Procedures.

References: 1,2,3,4,5,6,7,8,9,10,16,17,18,21,22,23,24,25,26,27,28,29,30,31,32,38,39,40,41,47,48,49,50,51,52,53

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO7	Demonstrate the General Anatomy of Human Body	5	Practical16.1	PSY-GUD	Shows-how	SDL,SIM,IBL,D,D-M
CO1,CO3, CO5,CO7	Illustrate the Applied Anatomy for Unani Procedures of treatment/Management.	5	Experiential-Learning16.1	CAN	Does	SIM,IBL,D,D-M,SDL
CO1,CO3, CO5,CO7	Demonstrate the Applied Anatomy for Unani Procedures and its treatment/Management.	4	Practical16.2	PSY-GUD	Shows-how	SDL,D,D-M,SIM,IBL
CO1,CO3, CO7	Illustrate the Different Embalming Procedures in detail.	5	Experiential-Learning16.2	AFT-SET	Does	DL,D,IBL,SIM,SDL
CO1,CO3, CO7	Demonstrate the Different Embalming Procedures in detail.	4	Practical16.3	PSY-GUD	Shows-how	SDL,D-M,SIM,DL,IBL
CO1,CO3	Describe the General Anatomy of Human Body.	3	Lecture	CE	Knows-how	L_VC,L&PPT ,L,FC,L&GD

CO1,CO3, CO7	Illustrate the General Anatomy of Human Body.	6	Experiential-Learning16.3	CAN	Does	SDL,IBL,FC,D-M
CO1,CO3, CO4	Describe the Applied Anatomy for Unani Procedures of treatment/Management.	2	Lecture	CC	Knows-how	FC,L_VC,L,L&GD,L&PPT
CO1,CO3	Describe the Embalming Procedures.	2	Lecture	CC	Knows-how	FC,L&GD,L_VC,L,L&PPT
CO1,CO3, CO5,CO7	Demonstrate the steps of Museum preparation for the display of anatomical structures.	2	Practical16.4	PSY-GUD	Shows-how	DL,IBL,D,FC,SDL

Unit 2 تحنیط المیت(Tahneetul maiyit) Embalming of Cadaver, تحفظِ نعش وعینہ(Tahaffuz-e-N'ash wa Einah-e-Tashreeh) Preservation of Cadaver and specimen, تحذیرِ متحف(Tahzeer-e-Mat-haf) Museum preparation.

16.2.1. تحنیط المیت(Tahneetul maiyit) Embalming of Cadaver.

16.2.2. تحفظِ نعش وعینہ(Tahaffuz-e-N'ash wa Einah-e-Tashreeh) Preservation of Cadaver and specimen.

16.2.3. تحذیرِ متحف(Tahzeer-e-Mat-haf) Museum preparation.

References: 47,48,49,50,51

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO5,CO7	Illustrate Embalming of Cadaver.	3	Experiential-Learning16.4	PSY-SET	Does	IBL,D-M,SIM,SDL,D
CO1,CO3, CO7	Demonstrate Embalming of Cadaver.	2	Practical16.5	PSY-GUD	Shows-how	D,DL,SDL,SIM,IBL

CO1,CO3, CO5,CO7	Illustrate the Preservation of Cadaver and specimen	4	Experiential-Learning16.5	CAN	Does	IBL,DL,D,SIM,D-M
CO1,CO3	Describe Embalming of Cadaver.	1	Lecture	CC	Knows-how	L&PPT ,L_VC,FC,L&GD,L
CO1,CO7	Describe the Preservation of Cadaver and specimen	1	Lecture	CC	Knows-how	L&GD,FC,L_VC,L,L&PPT
CO1,CO3	Describe the Museum preparation for the display of anatomical structures.	1	Lecture	CC	Knows-how	L&PPT ,L,L&GD,L_VC,FC
CO1,CO3, CO5,CO7	Demonstrate the Preservation of Cadaver and specimen	3	Practical16.6	PSY-GUD	Shows-how	IBL,D,DL,SIM,SDL
CO1,CO3, CO5,CO7	Explain and analyse the steps of Museum preparation for the display of anatomical structures.	3	Experiential-Learning16.6	AFT-RES	Does	SIM,IBL,D,DL,SDL

Practical Training Activity

Practical Training 16.1 General Anatomy of Human Body

Total Learning hours: 5 hours

Activity 1-The teacher will discuss and demonstrate/prosect the General Anatomy of Human Body related to the introduction to anatomy, levels of organization and tissues of the body, skin and fascia,(1hr15mins)

Activity 2-The teacher will discuss and demonstrate/prosect the skeletal system, muscular system, arthrology,vascular system, lymphatic system, nervous system, splanchnology, radiology, surface anatomy.(1hr15mins)

Activity 3-The student will perfom the practical activity of general Anatomy of Human Body related to types of anatomy,types of tissues,dermatomes,types of fascia,(1hr15mins) Activity 4-The student will perfom the practical activity of types of bones, muscles, joint, nerves, blood vessels, lymphatics etc(1hr15mins) The above activity will be done through Dissection of cadaver/ artificial cadaver/ e-dissection/ virtual dissection/ Demonstration on Models/ 4D interactive Anatomical Models/Analysis of Radiographs /3D Anatomy software/Group Discussion/ case presentation/Clinical Examination / 3D model making/ Illustrations / Augmented Reality/ Virtual reality and will summarise the practical activity to the teacher.
Practical Training 16.2 Applied Anatomy for Unani Procedures and its treatment/Management.
Total Learning hours: 4 hours Activity 1-The teacher will discuss and demonstrate the anatomical points/surface projections and landmarks for the procedures such as hijama, fasad, nutool, dalak etc., in a simulated envirenment/ department of Ilaj bil tadbeer. (1 hr) Activity 2-The students will learn to identify the anatomical points/surface projections and landmarks for the procedures such as hijama, fasad, nutool, dalak etc., in a simulated environment/ department of Ilaj bil tadbeer. (3 hrs)
Practical Training 16.3 Embalming Procedures
Total Learning hours: 4 hours Activity 1-The teacher will discuss and demonstrate the different embalming procedures / the Dry Embalming /cold Embalming / Plastination / Simulated Embalming Procedures / related to the students and related teaching learning method of practical (2 hrs) Activity 2-The students will perform practical activity related to the different different embalming procedures / the Dry Embalming / cold Embalming / Plastination / Simulated Embalming Procedures and will summarise to the teacher. (2 hrs)
Practical Training 16.4 Museum preparation for the display of anatomical structures.
Total Learning hours: 2 hours

Activity 1-The teacher will discuss and demonstrate the different techniques of Museum preparation for the display of anatomical structures / Skinning and Evisceration of the cadaver/ Skeletal preparation/ Taxidermy / Simulated activity. (1hr) Activity 2-The students will perform practical activity related to different techniques of Museum preparation for the display of anatomical structures / Skinning and Evisceration of the cadaver/ Skeletal preparation/ Taxidermy / Simulated activity and will summarise to the teacher.(1hr)
Practical Training 16.5 Embalming of Cadaver.
Total Learning hours: 2 hours Activity 1-The teacher will discuss the basic requirements for embalming and demonstratre the steps of embalming of Cavity, Surface Embalming/ Simulated Embalming activity(1hr) Activity 2-he students will perform practical activity related to the Arterial, Cavity and Surface Embalming/ Simulated Embalming activity and will summarise to the teacher.(1hr) The above activity will be done in simulated environment/ by visit to other colleges
Practical Training 16.6 Preservation of Cadaver and specimen
Total Learning hours: 3 hours Activity 1-The teacher will discuss and demonstrate the different techniques of Preservation of cadaver such as freezing, plastination and refrigeration of the cadaver and specimen. (1 hr) Activity 2-The students will perform practical activity techniques of Preservation of cadaver such as freezing, plastination and refrigeration of the cadaver and specimen. (2 hr) The above activity wil be perfomed in simulated environment/ by visit to other colleges/ departments
Experiential Learning Activity
Experiential-Learning Learning 16.1: Applied Anatomy for Unani Procedures of treatment/Management.

Total Learning hours: 5 hours Activity 1-The student will identify the associated structures affected by the unani treatment procedures of IBT and prepare a catalogue of the landmarks, associated structures and the changes observed over the surface. (4 hrs) Activity 2-The teacher will monitor and guide the student. (1 hr)
Experiential-Learning Learning 16.2: Embalming Procedures
Total Learning hours: 5 hours Activity 1-The students will engage in the experiential learning through the different embalming procedures / Dry Embalming / cold Embalming / Plastination and will summarise to the teacher. (4 hrs) Activity 2-The teacher will guide and mentor the student in experiential activity and arrange for guest lecture/ hands on training on the different embalming procedures. (1 hr)
Experiential-Learning Learning 16.3: General Anatomy of Human Body.
Total Learning hours: 6 hours The student will practice and demonstrate the anatomical positions,various planes,relation, comparision and movements of the body in simulated environment.(2hrs30ins) The student will demostrate the different systems of human body using maps/ posters/ chart/ models.(2hrs30mins) The teacher will discuss and summarise the General anatomy of Human body related to the topic(s) or system(s) done by the students in experiential learning method by group disscussion/ inquiry based learning/ quiz/puzzeles etc.(1hr)
Experiential-Learning Learning 16.4: Embalming of Cadaver.
Total Learning hours: 3 hours Activity 1-The student use the embalming terminologogies, the embalming chemicals, embalming instruments for cavity embalming,arterial embalming, surface embalming in simulated environment.(2hrs)

The teacher will monitor and guide /arrange for the visits/ to other Departments/medical colleges for the experential activtiy of the students.(1hr)	
Experiential-Learning Learning 16.5: Preservation of Cadaver and specimen	
Total Learning hours: 4 hours Activity 1-The student will analyse the difference between ancient and modern techniques of preservation of cadaver/ specimen through extensive review of literature, journals, search engines and present it in group discussion/ seminars/ PPT/Videos. (3 hrs) Activity 2-The teacher will monitor the experiential learning activity of the students. (1 hr)	
Experiential-Learning Learning 16.6: Museum preparation for the display of anatomical structures.	
Total Learning hours: 3 hours Activity 1-The students will engage in the experiential learning related to the different techniques of Museum preparation such as preperation of dry specimenss of bones, preperation of wet specimens, preperation of opaque specimens, preperation of transparent specimens, technique of plastination in the anatomy lab/visit to other medical colleges/ forensic departments,(2hrs30mins) Activity 2-The teacher will co ordinate with other departments/college for the visit/posting for the student activity.(30mins)	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Multiple choice questions- 5 questions, each question carrying 1 mark form the topics embalming of Cadaver, Preservation of Cadaver and specimen, Museum preparation. Demonstration of specimen preperation, mueseum preperation (10 marks)	4

Short answer questions- 2 questios, each question carrying 5 marks from the topics of general anatomy of the human body, anatomy of aging, Applied Anatomy for Unani procedures of treatment/ management. catalogue making - 10 marks for preparing a catalogue of different methods of embalming/preservation/ preperation cadaver/ specimen, types pf chemicals, instruments used for embalming/preservation/ preperation cadaver/ specimen. Short video making- Applied Anatomy for Unani procedures of treatment/ management, (15 marks) 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 assessment. (25 Marks)	

Paper No : 3(تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)

Semester No : 3

Module 17 : نظام عصبی کا تعارف(Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System

Module Learning Objectives

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

1 Describe the Nervous system,Neuron,Synapses,Neurotranmitter and Neuroglial Cell.

2 Conduct group Discussion and Presentation or Clinical Examination on Nervous System

3 Identify the various types of Neurons.

Unit 1 مرکزی نظام عصبی و محیطی کا تعارف(Markazi,Nizam e A'sabi wa Muheeti ka ta.aruf) Introduction of Central and Peripheral Nervous System. عصب واقسام عصب(Asab wa Aqsam-e Asab) Neurons and classification of Neurons. مشابک(Mashabik) Synapses. نقلات عصبی(Naqlaat –e-As'abi) Neurotransmitters. خلایا دبقیہ(khalaya-e-Dabqiya) Neuroglia.

17.1.1. مرکزی نظام عصبی و محیطی کا تعارف(Markazi,Nizam e A'sabi wa Muheeti ka ta.aruf) Introduction of Central and Peripheral Nervous System.

17.1.2. عصب واقسام عصب(Asab wa Aqsam-e Asab) Neurons and classification of Neurons. مشابک(Mashabik) Synapses.

17.1.3. نقلات عصبی(Naqlaat –e-As'abi) Neurotransmitters.

17.1.4. خلایا دبقیہ(khalaya-e-Dabqiya) Neuroglia.

References: 1,2,3,5,6,10,11,16,18,21,23,24,25,27,28,31,32,35,38,39,41,42,46,53,54,58,62,65,66,69,71,82,95,100,101,103,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Synapses, Neurotransmitters and Neuroglia.	3	Lecture	CC	Knows-how	D-M,L&PPT ,L_VC,L&GD,BL
CO1,CO3, CO7	Demonstrate the Neurons and classification of Neurons	5	Practical17.1	PSY-GUD	Shows-how	CBL,PSM,D

CO1,CO3, CO7	Analyze the Synapses, Neurotransmitters and Neuroglia.	7	Experiential-Learning17.1	CAN	Shows-how	PL,DIS,PrBL,JC
CO1,CO3, CO7	Analyze the Neurons and classification of Neurons.	6	Experiential-Learning17.2	CAN	Does	DIS,SDL,CD,JC
CO1,CO4	Discuss the Introduction of Central and Peripheral Nervous System and Describe the Neurons and classification of Neurons.	2	Lecture	CK	Knows-how	D-M,L&GD,L&PPT ,L_VC,BL
CO1,CO3, CO7	Demonstrate the Synapses, Neurotransmitters and Neuroglia.	5	Practical17.2	PSY-GUD	Shows-how	PSM,SDL,D,PER,CBL

Unit 2 نظام عصبی غیر ارادی(Nizam e A'sabi Ghair Iradi) Autonomic nervous system. شرکی نظامِ عصبی(Shirkee Nizam e A'sabi) sympathetic nervous system. غیر شرکی نظامِ عصبی(Ghair Shirkee Nizam e A'sabi) para sympathetic nervous system. نظام عصبی معوی(Nizam e A'sabi Mew) enteric nervous system. نظام عصبی جسدی(Nizam e A'sabi Jasdi) Somatic nervous system.

17.2.1. نظام عصبی غیر ارادی(Nizam e A'sabi Ghair Iradi) Autonomic nervous system.

17.2.2. نظام عصبی معوی(Nizam e A'sabi Mewi) Enteric nervous system.

17.2.3. نظام عصبی جسدی(Nizam e A'sabi Jasdi) Somatic nervous system.

References: 1,2,3,4,5,6,10,11,18,21,23,24,25,26,28,31,32,35,38,39,40,41,42,46,53,54,58,62,65,66,67,75,82,101,103,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO3, CO7	Demonstrate the Enteric nervous system.	3	Practical17.3	PSY-GUD	Shows-how	PL,PSM,D,SDL,PER
CO1,CO3, CO7	Demonstrate the Autonomic nervous system.	3	Practical17.4	PSY-GUD	Shows-how	PBL,SIM,RP,D,PER

CO1,CO3, CO7	Analyze the Autonomic nervous system.	4	Experiential-Learning17.3	CAN	Does	SIM,SDL,LS,JC
CO1,CO3, CO7	Analyze the Enteric nervous system.	4	Experiential-Learning17.4	CAN	Does	SDL,DIS,CD
CO1,CO4	Describe the Somatic Nervous System.	2	Lecture	CC	Knows-how	L&GD,BL,L&PPT ,L_VC
CO1,CO4	Describe the Autonomic nervous system.	2	Lecture	CC	Knows-how	BL,L&GD,L&PPT ,L_VC
CO1,CO4	Describe the Enteric nervous system.	1	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO3, CO7	Demonstrate the Somatic Nervous System.	4	Practical17.5	PSY-GUD	Shows-how	L&PPT ,SIM,DIS,CBL,D
CO1,CO3, CO7	Analyze the Somatic Nervous System.	5	Experiential-Learning17.5	CAN	Does	CBL,JC,IBL,PER

Practical Training Activity

Practical Training 17.1 Neurons and Classification of Neurons

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will use a diagram or model to visually demonstrate the anatomy of a neuron, including the cell body, dendrites, axon, and more. Functional types (sensory, motor, interneurons) and structural types (unipolar, bipolar, multipolar neurons) will be explained, emphasizing their roles in the nervous system.

Students will replicate the neuron diagram or model on paper or with craft materials, label all parts, and write brief descriptions of each classification.

Activity 2: Problem-Solving Simulation (60 Min)

The teacher will present scenarios or case studies involving neurons, such as neural pathways in reflex actions, and assign neuron classifications to groups for detailed study.

Students will collaborate to map out pathways involving sensory neurons (detecting stimuli), interneurons (processing), and motor neurons (generating responses). They will present their analysis to the class.

Activity 3: Hands-On Experimental Activity (60 Min)

The teacher will conduct a simple simulation (digital or physical) or experiment to demonstrate neuron signal transmission and functional classifications in neural circuits.

Students will actively participate in the experiment, record their observations, and connect the activity to both the structural and functional classifications of neurons. Findings will be summarized in reports or discussions.

Activity 4: Concept Mapping (60 Min)

The teacher will facilitate a guided brainstorming session to construct a concept map of neuron types, structures, and functions, using collaborative input from students.

Students will create individual or group concept maps, organizing and connecting key information about neurons visually.

Activity 5: Hands-On Crafting (60 Min)

The teacher will introduce a craft activity using materials like pipe cleaners, beads, and clay to create 3D neuron models representing various structural types.

Students will design and construct models, label the parts, and explain how the models represent the structural and functional classifications of neurons.

Practical Training 17.2 Synapses, Neurotransmitters and Neuroglia.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration with Models/Animations (60 Min)

The teacher will demonstrate synaptic transmission, types of synapses, neurotransmitter release and the role of neuroglia using 3D models or animations.

Students will observe the demonstration, note key points and identify the structures and functions of each component.

Activity 2: Histology Lab / Virtual Microscopy (60 Min)

The teacher will demonstrate the microscopic features of neuroglia cells (astrocytes, oligodendrocytes, microglia) using slides or virtual microscopy tools.

Students will examine and sketch the microscopic structures of neuroglia cells, noting their distinct roles in the nervous system.

Activity 3: Clinical Case Discussion / Problem-Based Learning (90 Min)

The teacher will present clinical cases involving neurotransmitter imbalances or neuroglial dysfunctions, such as Parkinson's disease or multiple sclerosis.

Students will analyze the cases, discuss the roles of neurotransmitters, answer questions and relate the findings to synaptic physiology.

Activity 4: Group Activity – Flowchart/Pathway Illustration (90 Min)

The teacher will guide students in creating detailed diagrams to visualize synaptic transmission and neuroglia functions.

Students will illustrate neurotransmitter pathways, label synapse types and present their understanding to peers, facilitating an interactive Q&A session.

Practical Training 17.3 Enteric nervous system.

Total Learning Hours:- 3 Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will conduct a live demonstration of the Enteric Nervous System using anatomical models, diagrams, or multimedia presentations. The focus will be on explaining the structure and functions of components like the myenteric and submucosal plexuses.

Based on the demonstration, students will create their own models or diagrams, labeling all components and providing written or oral explanations of their functions.

Activity 2: Interactive Peer Teaching (60 Min)

The teacher will divide students into small groups, assigning each group a specific aspect of the Enteric Nervous System (e.g., gastrointestinal motility, secretion processes, or reflex actions) to study. Initial guidance will be provided.

Students will collaboratively research their assigned topic and then teach their peers by explaining key concepts using simple diagrams or short presentations.

Activity 3: Problem-Solving Simulation (30 Min)

The teacher will present real-world problems or case studies related to the Enteric Nervous System, such as disruptions impacting digestion or gut health, and guide the analysis through probing questions.

Students will work in teams to analyze the problem, propose solutions, and present their findings supported by logical reasoning and examples of the Enteric Nervous System's role. Activity 4: Hands-On Experimental Activity (60 Min) The teacher will set up a simulation or visual lab experiment, such as demonstrating the effects of neurotransmitters or stimuli on gut motility using animations or lab apparatus. Students will perform the experiment, record observations, analyze data, and relate the results to the structure and function of the Enteric Nervous System.
Practical Training 17.4 Autonomic Nervous System.
Total Learning Hours :- 3Hours Activity 1: Teacher Demonstration (30 Min) The teacher will explain the anatomy and divisions of the autonomic nervous system (ANS) using charts, models, and animations. Students will observe the demonstration, note key points, and clarify concepts by engaging in discussions. Activity 2: Interactive Simulation / Virtual Physiology Lab (60 Min) The teacher will guide students through an interactive simulation showcasing ANS responses, such as changes in heart rate during stress and rest phases. Students will interact with the simulation, observe ANS responses in real-time, and record their observations for discussion. Activity 3: Clinical Case / Problem-Based Learning (30 Min) The teacher will present clinical cases highlighting autonomic dysfunctions, like orthostatic hypotension, and guide problem-based analysis. Students will analyze the cases, identify the involved ANS pathways, and collaboratively discuss potential solutions. Activity 4: Group Activity – Role Play / Scenario-Based Discussion (60 Min) The teacher will assign roles to students, such as enacting sympathetic and parasympathetic responses during scenarios like 'Fight or Flight'. Students will role-play the scenario, explain physiological effects, and engage in a dynamic Q&A session with peers to reinforce their understanding.
Practical Training 17.5 Somatic Nervous System

Total Learning Hours : 4:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate the structure and pathway of the somatic nervous system using anatomical models, charts and diagrams, focusing on sensory and motor neuron pathways.

Students will observe the demonstration, take detailed notes and identify key components for further discussion.

Activity 2: Dissection or Virtual Lab Activity (60 Min)

The teacher will guide students through the exploration of nerve pathways and connections using animal models or virtual dissection tools.

Students will perform guided dissection or virtual exploration to trace somatic nerve pathways and examine skeletal muscle innervation.

Activity 3: Case-Based Learning (CBL) with Q&A Session (60 Min)

The teacher will present clinical cases of somatic nerve injuries or disorders like sciatic nerve injury or carpal tunnel syndrome, engaging students in problem-solving.

Students will analyze cases, participate in Q&A and explain how somatic nervous system involvement leads to clinical symptoms.

Activity 4: Group Activity - Interactive Diagram Drawing & Presentation (60 Min)

The teacher will facilitate group work by guiding students in drawing detailed flowcharts of somatic pathways.

Students will collaborate in groups to create and present diagrams of somatic nerve circuits, emphasizing sensory and motor components and answering peer questions.

Experiential Learning Activity

Experiential-Learning Learning 17.1: Structure and function of synapses

Total Learning Hours: 7:00 Hours

Activity 1: Peer Teaching (90 Min)

Students will *research* synapses, neurotransmitters, and neuroglia, then *create and present* visual aids (e.g., diagrams, flowcharts) to teach peers.

They will *engage* in interactive discussions and *respond* to peer questions to reinforce learning.

Activity 2: Journal Club (90 Min)

Students will *read* research articles on topics like synaptic plasticity or neuroglia functions.

They will *present* findings, *critique* methodologies, and *discuss* clinical relevance in group sessions.

Activity 3: Project-Based Learning (90 Min)

They will *design and construct* models of synapses and neuroglia, integrating neurotransmitter mechanisms.

They will *apply* their knowledge to real-world cases (e.g., neurodegenerative disorders) and *present* their projects, explaining physiological and clinical connections

Activity 4: Investigate Neurotransmitter Function (90 Min)

The student will study various neurotransmitters, their types (e.g., excitatory and inhibitory), and their role in neural communication. They will analyze how neurotransmitters affect synaptic transmission and how imbalances can lead to neurological disorders.

Activity 5: Explore the Role of Neuroglia in the Nervous System (60 Min)

The student will learn about neuroglial cells (e.g., astrocytes, oligodendrocytes, microglia) and their support functions in the nervous system. They will explain how neuroglia maintain homeostasis, support neurons, and contribute to neural signaling and protection.

Experiential-Learning Learning 17.2: Neuron structure, classification neurons

Total Learning Hours: 6:00 Hours

Activity 1: Exploration and Identification (60 Min)

Students will explore neuron structure using anatomical models, histological slides, and interactive digital simulations. They will identify key components such as the cell body, dendrites, axon and synapses, understanding their roles in neural communication.

Activity 2: Peer Teaching (90 Min)

Students will research, collaborate, and teach neuron structure and classification using models and interactive presentations, followed by peer Q&A.

Activity 3: Journal Club (90 Min)

Students will analyze research articles on neuronal diversity, present key findings and evaluate their relevance to clinical and functional aspects of neurons.

Activity 4: Comparative Analysis of Neuron Types (60 Min)

Students will classify neurons based on structure (unipolar, bipolar, multipolar) and function (sensory, motor, interneurons). Through guided discussions and case studies, they will analyze how different neurons contribute to sensory input, motor control and reflex pathways.

Activity 5: Application in Clinical Context (60 Min)

Students will apply their knowledge by evaluating real-world scenarios where neuronal dysfunction leads to neurological disorders. They will engage in discussions on conditions such as multiple sclerosis, neuropathies and spinal cord injuries, proposing diagnostic approaches and possible interventions.

Experiential-Learning Learning 17.3: Autonomic Nervous System (ANS)

Total Learning Hours: 4:00 Hours

Activity 1: Clinical Shadowing Simulations (60 Min)

Students will engage in role-play as healthcare professionals, *diagnosing* autonomic nervous system disorders using detailed patient scenarios.

They will analyze symptoms, *correlate* them with affected pathways, and *propose* diagnostic or therapeutic interventions.

Activity 2: Journal Club (90 Min)

Students will *read* and critically *analyze* research articles related to the autonomic nervous system, such as studies on autonomic dysfunction or stress responses.

They will *present* key findings, *evaluate* methodologies, and *discuss* the clinical relevance in a collaborative setting.

Activity 3: Library Session (90 Min)

Students will utilize library resources, such as textbooks, journals, and online databases, to *research* key topics about the autonomic nervous system.

They will compile findings into short reports or summaries to *share* with their peers, fostering independent study and resource usage skills.

Experiential-Learning Learning 17.4: Enteric Nervous System

Total Learning Hours: 4:00 Hours

Activity 1: Investigation and Analyzation–(60 Min)

Students will explore the anatomical organization and physiological functions of the enteric nervous system (ENS) through models, interactive digital resources, and case-based learning. They will examine how the ENS regulates digestive processes independently of the central nervous system.

Activity 2: Compare and Discuss –(90Min)

Students will analyze real-world clinical cases of ENS dysfunction, such as Hirschsprung's disease or irritable bowel syndrome (IBS). They will discuss the impact of these disorders on gut motility, secretion, and overall digestive health, comparing normal and pathological conditions.

Activity 3: Application of Knowledge –(90 Min)

Based on their analysis, students will propose evidence-based diagnostic approaches and potential treatment strategies for ENS-related disorders, considering pharmacological, surgical, and lifestyle interventions. They will also evaluate the role of emerging research in improving ENS-related healthcare outcomes.

Experiential-Learning Learning 17.5: Somatic Nervous System.

Total Learning Hours: 5:00 Hours

Activity 1: Exploration (60 Min)

Students will study the structure and function of the somatic nervous system, including its role in voluntary movements and sensory processing. They will analyze case studies or real-life scenarios where somatic nervous system dysfunction affects motor control or sensation.

Activity 2: Inquiry-Based Learning (60 Min)

Students will work collaboratively to analyze clinical scenarios involving somatic nerve injuries, focusing on identifying affected pathways and understanding the physiological impact.

Students will trace somatic neural pathways using provided diagrams or simulations, pinpointing the origin of injuries. They will then propose diagnostic methods or therapeutic approaches supported by anatomical and clinical principles.

Groups will take on specific roles such as neurologists, physiotherapists, or patients to simulate diagnostic and treatment sessions, fostering deeper understanding and teamwork.

Activity 3: Journal Club (90 Min)

Students will be assigned research articles on topics such as somatic reflex arcs, motor neuron disorders, or clinical advancements in rehabilitation.

Groups or individuals will present a summary of the article's key findings, explaining its relevance to the somatic nervous system and clinical practice.

Students will evaluate research methodologies and limitations, connecting the study's insights to real-world clinical applications, such as diagnosing or managing somatic nerve disorders.

Activity 4: Hands-on Application (60 Min)

Students will engage in interactive activities, such as tracing neural pathways, mapping dermatomes, or conducting reflex tests to understand sensory and motor responses. They will document observations and compare normal and abnormal nervous system functions.

Activity 5: Discussion and Case-Based Analysis (30 Min)

Students will present their findings, discuss the implications of somatic nervous system impairments, and debate real-world clinical cases. They will collaborate to propose diagnostic or treatment approaches based on their knowledge.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Total Hours of the Assessment: 4:00 Hours 1. Multiple-Choice Questions (MCQs) – 15 Marks 2. Diagram Labeling & Short Explanation – 10 Marks Label key structures on a diagram of a neuron, synapse, or autonomic nervous system pathways (5 Marks) Provide a brief explanation of their functions (5 Marks) **3. Case-Based Analysis – 15 Marks** Students analyze a case scenario and answer structured questions **4. Reflex Experiment & Self-Reflection – 10 Marks**	4

Each student performs a simple **reflex test** (e.g., knee-jerk reflex) on themselves or a peer and writes a **reflection** including: Description of the reflex pathway (2 Marks) Explanation of the role of neurons involved (4 Marks) Discussion of what happens if the reflex arc is damaged (4 Marks) 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 assessment. (25 Marks)	

Module 18 : نظام اعصاب کی بالیدگی (Nizam-e- A'asab ki Baleedgi) Development of the Nervous System.

Module Learning Objectives

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

1. Describe the Development of central nervous system, peripheral nervous system, Autonomic nervous system, Enteric nervous system.

2. Conduct the presentation, group discussion regarding the development of central nervous system, peripheral nervous system, autonomic nervous system, enteric nervous system.

3. Identify the different stages of the development of central nervous system, peripheral nervous system, autonomic nervous system, enteric nervous system.

Unit 1 نظام عصبی مرکزی کی بالیدگی (Nizam e A'sabi Markazi ki Baleedgi) Development of central nervous system. نظام عصبی محیطی کی بالیدگی (Nizam e A'sabi Muheeti ki Baleedgi) Development of peripheral nervous system.

18.1.1. نظام عصبی مرکزی کی بالیدگی (Nizam e A'sabi Markazi ki Baleedgi) Development of central nervous system.

18.1.2. نظام عصبی محیطی کی بالیدگی (Nizam e A'sabi Muheeti ki Baleedgi) Development of peripheral nervous system.

References: 1,2,3,5,6,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

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

CO1,CO4	Describe the Development of central nervous system.	3	Lecture	CC	Knows-how	L&PPT ,L_VC
CO1,CO3, CO7	Demonstrate the development of central nervous system	5	Practical18.1	PSY-GUD	Shows-how	BS,D-M,PER,CBL,PBL
CO1,CO4, CO7	Analyze the development of the central nervous system.	7	Experiential-Learning18.1	CAN	Does	DIS,PrBL,PL,CBL,PER
CO1,CO4	Describe the Development of peripheral nervous system	2	Lecture	CC	Knows-how	L_VC,EDU,L&PPT
CO1,CO3, CO7	Demonstrate the development of the peripheral nervous system.	5	Practical18.2	PSY-GUD	Shows-how	CD,D-M,CBL
CO1,CO4, CO7	Analyze the development of peripheral nervous system.	6	Experiential-Learning18.2	CAN	Does	DIS,PL,SDL,CD

Unit 2 نظام عصبی غیر ارادی کی بالیدگی(Nizam e A'sabi Ghair Iradi ki Baleedgi) Development of Autonomic nervous system. نظام عصبی معوی کی بالیدگی(Nizam e A'sabi Mewi ki Baleedgi) Development of Enteric nervous system.

18.2.1. نظام عصبی غیر ارادی کی بالیدگی(Nizam e A'sabi Ghair Iradi ki Baleedgi) Development of Autonomic nervous system.

18.2.2. نظام عصبی معوی کی بالیدگی(Nizam e A'sabi Mewi ki Baleedgi) Development of Enteric nervous system.

References:

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the development of autonomic nervous system	3	Lecture	CC	Knows-how	ML,L&PPT ,L_VC
CO1,CO3, CO7	Demonstrate the development of the autonomic nervous system.	5	Practical18.3	PSY-GUD	Shows-how	DIS,FC,D-M

CO1,CO4, CO7	Evaluate the development of autonomic nervous system.	7	Experiential-Learning18.3	CE	Does	PER,JC,IBL,DIS,SDL
CO1,CO4	Describe the development of enteric nervous system	2	Lecture	CC	Know	L_VC,L&PPT
CO1,CO3, CO7	Demonstrate the development of enteric nervous system.	5	Practical18.4	PSY-GUD	Shows-how	FC,PER,CBL,D,PL
CO1,CO4, CO7	Evaluate the development of enteric nervous system.	6	Experiential-Learning18.4	CE	Does	SDL,CBL,DIS,JC

Practical Training Activity

Practical Training 18.1 Development of Central Nervous System

Total Learning Hours : 5 Hours

Activity 1: 3D Model Demonstration (60 Min)

The teacher will use 3D embryology models to explain the formation of the neural tube, brain vesicles, and spinal cord, illustrating the progression of CNS development and its anatomical milestones.

Students will observe and engage in discussions to clarify concepts, enhancing their understanding of embryological processes.

Activity 2: Microscopic Slide Analysis (60 Min)

The teacher will guide students through histological slides of developing neural tissue at various stages of development, emphasizing cellular differentiation and anatomical changes.

Students will analyze slides to correlate microscopic observations with the gross anatomical development of the CNS.

Activity 3: Embryological Staging Chart Preparation (60 Min)

Teacher will outline the timeline of CNS development stages and provide resources for chart creation.

Students will create charts summarizing embryological stages, including neural tube formation, brain vesicle differentiation, and spinal cord development, integrating time frames and critical features.

Activity 4: Problem-Based Learning (PBL) with Clinical Cases (60 Min)

The teacher will present clinical cases of neural tube defects such as spina bifida and anencephaly.

Students will analyze the cases, connecting developmental abnormalities to clinical outcomes and proposing diagnostic and therapeutic strategies.

Activity 5: Brainstorming Session (60 Min)

The teacher will facilitate group brainstorming to explore factors affecting CNS development, including nutrition, teratogens, and genetic influences.

Students will discuss these factors collaboratively, developing insights into preventive and therapeutic approaches for developmental disorders.

Practical Training 18.2 Development of the Peripheral Nervous System

Total Learning Hours:5:00 Hours

Activity 1: Demonstration (60 Min)

The Teacher will present an overview of the peripheral nervous system (PNS) development, explaining neural crest cell migration, differentiation, and formation of peripheral nerves and ganglia. Anatomical models and diagrams will be used for visual understanding.

Activity 2: Student Hands-On Illustration (90 Min)

Students will create detailed illustrations or flowcharts depicting the developmental stages of the PNS, highlighting key structures such as spinal nerves, cranial nerves, and autonomic ganglia.

Activity 3: Practical Application and Case Analysis (90 Min)

Students will analyze case studies of congenital PNS disorders (e.g., peripheral neuropathies, Hirschsprung's disease) to understand developmental anomalies and their clinical implications.

Activity 4: Discussion and Q&A Session (60 Min)

Students will present their findings and illustrations, engage in peer discussions, and participate in a Q&A session to reinforce learning and clarify concepts.

Practical Training 18.3 Development of the Autonomic Nervous System
Total Learning Hours : 5 Hours **Activity 1: Demonstration (60 Min)** Teacher will use 3D models to explain the embryological origin of sympathetic and parasympathetic components of the autonomic nervous system (ANS) from the neural crest. This includes the formation of sympathetic ganglia, adrenal medulla, and parasympathetic neurons. Students will observe the demonstration and engage in discussions to clarify the developmental processes. **Activity 2: Histology Slide Review (60 Min)** Teacher will guide students in analyzing histological slides depicting developing sympathetic ganglia, adrenal medulla, and parasympathetic neurons. Students will examine the slides, connecting microscopic structures to their developmental origins and functional roles. **Activity 3: Flipped Classroom Activity (90 Min)** Teacher will assign preparatory materials on ANS embryology for students to review independently, such as videos or readings. Students will come prepared to class, participate in interactive discussions, and present their insights on key embryological milestones. **Activity 4: Clinical Correlation Discussion (90 Min)** Teacher will facilitate discussions on how developmental defects in the ANS lead to clinical conditions like adrenal hyperplasia, neuroblastoma, or autonomic failure. Students will analyze cases and explain the anatomical and embryological basis of these conditions, linking theory to clinical practice.
Practical Training 18.4 Development of the Enteric Nervous System
Total Learning Hours: 5:00 Hours Activity 1: Instructor Demonstration (60 min) The teacher will present an overview of the enteric nervous system (ENS) development, explaining neural crest cell migration, differentiation and organization within the gastrointestinal tract using anatomical models and diagrams. Activity 2: Identification (90 Min)

Students will sketch and label the key stages of NS development, identifying critical structures such as the myenteric and submucosal plexuses. They will analyze histological slides or 3D models to visualize ENS formation.

Activity 3: Case-Based Discussion (90 min)

Students will examine clinical cases involving ENS abnormalities (e.g., Hirschsprung's disease), correlating developmental defects with functional implications and discussing diagnostic and treatment approaches.

Activity 4: Peer Review & Q&A Session (60 Min)

Students will present their findings, compare insights, and engage in peer discussions. The session will conclude with a Q&A segment to clarify concepts and reinforce understanding.

Experiential Learning Activity

Experiential-Learning Learning 18.1: Development of the Central Nervous System

Total Learning Hours: 7:00 Hours

Activity 1: Review and Analyze CNS Development (90 Min)

The student will begin by reviewing the stages of central nervous system (CNS) development, including the formation of the neural tube, which gives rise to the brain and spinal cord, and the subsequent differentiation of neural progenitor cells into various types of neurons and glial cells. This will include an in-depth analysis of the key milestones in CNS development such as the closure of the neural tube, the development of the forebrain, midbrain, and hindbrain, and the maturation of brain structures. The student will also explore the factors influencing CNS development, such as genetic signals, environmental factors, and disruptions that may lead to neurological conditions.

Activity 2: Peer Teaching Activity (90 Min)

Students will work in groups to research specific aspects of ANS development, such as neural crest migration, formation of sympathetic/parasympathetic components, or plexus development. Each group will teach their findings to peers using diagrams, models, or case-based examples, followed by an interactive Q&A session for knowledge reinforcement.

Activity 3: Project-Based Learning (90 Min)

Students will research ANS development, create 3D models or visuals depicting neural crest migration and formation of sympathetic/parasympathetic components, and include clinical cases like neuroblastoma or autonomic neuropathies. They will present findings and receive peer feedback, connecting theory to clinical applications.

Activity 2: Apply Knowledge to Case Studies (90 Min)

The student will apply their theoretical knowledge to real-life case studies or hypothetical clinical scenarios where developmental issues in the CNS are present. This may involve analyzing conditions such as spina bifida, anencephaly, or hydrocephalus, understanding the embryological causes, and discussing the impact of these disorders on the patient's health. They will assess the clinical implications of CNS malformations, explore the underlying genetic or environmental causes, and discuss possible prevention strategies and therapeutic interventions. This hands-on application will deepen their understanding of the practical aspects of CNS development in a clinical context.

Activity 3: Discussion and Q&A (60 Min)

In this final step, the student will engage in a group discussion or Q&A session where they will have the opportunity to ask questions, clarify concepts, and share insights gained from the case study analysis. The facilitator will guide the discussion to emphasize the clinical relevance of CNS development and its implications for diagnosing and managing neurological disorders. The discussion will foster critical thinking, enabling students to integrate their theoretical knowledge with real-world clinical challenges.

Experiential-Learning Learning 18.2: Development of Peripheral Nervous System

Total Learning Hours: 6:00 Hours

Activity 1: Conceptual Understanding (1.5 Hours)

The student will explain the stages of the development of the peripheral nervous system (PNS), covering key processes such as neural crest formation, migration, differentiation, and synaptogenesis.

Activity 2: Peer Teaching Activity (1.5 Hours)

Students will collaborate in groups to research the development of the PNS, focusing on neural crest migration, differentiation, and nerve formation. Each group will teach a specific aspect, using visuals and clinical correlations such as neural crest disorders. Interactive Q&A sessions will follow to reinforce concepts and deepen understanding.

Activity 3: Analysis and Case Studies (1.5 Hours)

The student will analyze the molecular and genetic factors influencing PNS development, discussing how disruptions during these stages can lead to congenital disorders, using real or hypothetical case studies to illustrate these concepts.

Activity 4: Clinical Implications and Q&A (1.5 Hours)

The student will discuss the clinical implications of PNS development, particularly in relation to peripheral neuropathies and other disorders, and engage in a Q&A session to address any questions regarding the development process and its impact on health.

Experiential-Learning Learning 18.3: Development of Autonomic Nervous System

Total Learning Hours: 7:00 Hours

Activity 1: Review Developmental Stages (90 Min)

The student will review and explain the key stages in the development of the enteric nervous system,highlighting the role of neural crest cells and molecular signaling pathways.

Q&A: Students will answer questions related to the stages of development and the factors influencing the process.

Activity 2: Journal Club (90 Min)

Students will review and present research articles or case studies on the embryological development of the autonomic nervous system (ANS), focusing on neural crest cell migration, differentiation into sympathetic and parasympathetic components and plexus formation. Discussions will emphasize clinical correlations, such as autonomic neuropathies or congenital anomalies like Hirschsprung’s disease, to connect theory with clinical practice.

Activity 3: Inquiry-Based Learning (90 Min)

Students will engage in inquiry-based learning by formulating questions related to ANS development, They will research queries, analyze their findings and collaboratively present conclusions, integrating theoretical and clinical insights.

Activity 4: Analyze Genetic and Molecular Factors (90 Min)

The student will analyze the genetic and molecular factors involved in the formation and differentiation of enteric neurons, focusing on key genes and regulatory proteins.

Q&A: Students will be asked to discuss how specific genetic mutations or disruptions can impact the development of the enteric nervous system.

Activity 5: Apply Knowledge to Case Studies (60 Min)

The student will apply their knowledge to examine clinical case studies that illustrate disorders related to the enteric nervous system, discussing how developmental anomalies affect gastrointestinal function and health.

Q&A: The session will involve a discussion on case study analysis, where students will propose potential diagnoses and relate them to developmental issues in the enteric system.

Experiential-Learning Learning 18.4: Development of Enteric Nervous System

Total Learning Hours: 6:00 Hours

Activity 1: Analyze the Developmental Stages (90 Min)

The student will explore the embryological origins and stages of development of the enteric nervous system, identifying key milestones such as neural crest cell migration and differentiation.

Activity 2: Journal Club (90 Min)

Students will review and present research articles or case studies focused on the embryological development of the enteric nervous system. Discussions will include topics such as the migration of neural crest cells, the formation of plexuses (Auerbach’s and Meissner’s), and genetic or environmental factors influencing development. Clinical correlations, such as Hirschsprung's disease and its developmental basis, will be emphasized to bridge theoretical knowledge and applied science.

Activity3: Investigate Molecular and Genetic Factors (90 Min)

The student will investigate the molecular signaling pathways, genes, and factors involved in the development of the enteric nervous system, including RET and GDNF signaling.

Activity 4: Case Study Analysis (90 Min) The student will analyze case studies or research articles related to developmental disorders of the enteric nervous system (e.g., Hirschsprung's disease) to understand the clinical implications of developmental issues in the enteric system. They will present their findings and discuss potential treatment options based on the developmental process.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Total Hours of the Assessment: 4:00 Hours 1.Viva Voce – 10 Marks Students answer oral questions about the embryological development of the CNS and PNS, discussing critical processes and their disorders 2. Research-Based Essay – 20 Marks Students write a structured essay (1000–1200 words) on a topic related to nervous system development. 3. Histological & Developmental Stage Identification – 10 Marks Microscopic slide identification of embryonic neural tissues under a virtual/digital microscope or histology images. Students must identify key structures (e.g., neural plate, neural tube, neural crest migration) and explain their roles. 4. Critical Appraisal of a Research Paper – 10 Marks Students are given a recent research paper on nervous system development and must critically analyze: • Study hypothesis and methodology (4 Marks) • Key findings and their significance (8 Marks)	4

• Limitations and future directions (8 Marks) 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 assessment. (25 Marks)	

Semester No : 4

Module 19 : طریق حسی مخصوصہ(Tariq-e- Hissi Makhsoosa) Special Sensory Pathways

Module Learning Objectives

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

1 Describe the olfactory,optic pathways, cochleovestibular and gustatory pathways.

2 Conduct the presentation, group discussion and clinical examination regarding the olfactory,optic pathways, cochleovestibular and gustatory pathways.

3 Identify the different structures of olfactory, optic pathways, cochleovestibular and gustatory pathways.

Unit 1 شمی طریق (Tariq-e- Shammi) Olfactory pathway. بصری طریق(Tariq-e- Basari) optic pathway.

19.1.1. شمی طریق (Tariq-e- Shammi) Olfactory pathway.

19.1.2. بصری طریق(Tariq-e- Basari) optic pathway.

References: 1,2,3,5,6,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Olfactory Pathway.	3	Lecture	CC	Know	L&GD,L&PPT ,L_VC,BL

CO1,CO4, CO7	Demonstrate the olfactory pathways.	5	Practical19.1	PSY-GUD	Shows-how	D-M,D,CBL
CO1,CO3, CO4,CO7	Analyze the olfactory pathway.	6	Experiential-Learning19.1	CAN	Shows-how	CBL,CD,PrBL
CO1,CO4	Describe the optic pathway.	2	Lecture	CC	Know	L_VC,L&PPT ,L&GD,BL
CO1,CO4, CO7	Demonstrate the optic pathways.	5	Practical19.2	PSY-GUD	Shows-how	D,PSM,RP,SIM
CO1,CO3, CO4,CO7	Analyze the optic pathway.	7	Experiential-Learning19.2	CAN	Shows-how	PL,X-Ray,JC,IBL

Unit 2 طریق قوقعی(Tariq-e- Qauqa'ei) Cochleovestibular Pathway. طریق ذوقی(Tariq-e- Zawaqa) Gustatory pathway.

19.2.1. طریق قوقعی (Tariq-e- Qauqa'ei) Cochleovestibular Pathway. 19.2,2. طریق ذوقی(Tariq-e- Zawaqa) Gustatory pathway.

References: 1,2,3,5,6,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the Cochleovestibular pathway.	3	Lecture	CC	Know	L&PPT ,BL,L_VC,L&GD
CO1,CO3, CO4,CO7	Demonstrate the cochleovestibular pathways	5	Practical19.3	PSY-GUD	Shows-how	SIM,CBL,RP,D
CO1,CO3, CO4,CO7	Analyze the Cochleovestibular Pathway.	6	Experiential-Learning19.3	CAN	Does	SIM,RP,DIS,LS,CD
CO1,CO4	Describe the gustatory pathway.	2	Lecture	CC	Know	L&GD,L&PPT ,L_VC

CO1,CO3, CO4,CO7	Demonstrate the gustatory pathway.	5	Practical19.4	PSY-GUD	Shows-how	D,CBL,PrBL,PER
CO1,CO3, CO4,CO7	Analyze the gustatory pathway.	7	Experiential-Learning19.4	CAN	Does	SDL,PL,CBL,LS,DIS

Practical Training Activity

Practical Training 19.1 Olfactory Pathways.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will use anatomical models, diagrams, or multimedia to illustrate the olfactory pathway, covering structures like the olfactory epithelium, bulb, tract and cortex. Emphasis will be placed on olfactory nerves and limbic system connections.

Students will replicate the pathway using labeled diagrams or craft models, identify each structure and explain their roles in signal relay.

Activity 2: Clinical Correlation with Disorders (90 Min)

The teacher will present case studies of olfactory disorders, such as anosmia or hyperosmia, incorporating imaging or diagrams showing affected pathway areas.

Students will analyze the cases, pinpoint disruptions in the olfactory pathway and propose interventions or treatments based on their understanding of anatomy and physiology.

Activity 3: Creative Diagramming (60 Min)

The teacher will encourage students to create artistic representations of the olfactory pathway, such as flowcharts, cartoons or infographics.

Students will design diagrams to depict the flow of olfactory signals, highlighting both anatomical structures and functional processes.

Activity 4: Historical Perspective (90 Min)

The teacher will discuss key discoveries of the olfactory pathway, including early studies on olfactory receptors or limbic system connections.

Students will research and present brief histories of discoveries or scientists, linking them to current knowledge of olfactory processing.

Practical Training 19.2 Optic Pathways.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will use a detailed diagram or anatomical model to demonstrate the structure of the optic pathways, including the retina, optic nerve, optic chiasma, optic tract, lateral geniculate nucleus (LGN) and visual cortex. The explanation will highlight the pathway of visual signals from the eye to the brain, emphasizing decussation at the optic chiasma.

Students will replicate the diagram in notebooks or create a visual representation with modeling materials, label key parts, and describe how visual signals are processed.

Activity 2: Problem-Solving Simulation (60 Min)

The teacher will present clinical scenarios related to optic pathway lesions, such as damage to the optic nerve, optic chiasma, or visual cortex and explain their impact on visual perception.

Students will analyze case studies in groups, identify the lesion location and explain the corresponding visual field defects using diagrams and logical reasoning.

Activity 3: Role-Playing the Pathway (60 Min)

The teacher will assign roles to students, representing different components of the optic pathway (e.g., retina, optic nerve, LGN, visual cortex) and provide props like arrows or colored balls to symbolize signal transmission.

Students will act out the optic pathways, demonstrating signal flow and explaining the function of each component in visual processing.

Activity 4: 3D Pathway Creation (60 Min)

The teacher will supply craft materials like wires, clay, or thread for students to construct 3D models of the optic pathways.

Students will collaboratively create the models, label key structures and present their work to the class, explaining the functional significance of each part.

Activity 5: Flowchart and Mapping (60 Min)

The teacher will assist students in designing a detailed flowchart or map of the optic pathways, illustrating how visual signals move through different regions.

Students will develop the flowchart individually or in groups, marking critical points like decussation at the optic chiasma and lateralized processing in the visual cortex.

Practical Training 19.3 Cochleovestibular Pathways

Total Learning Hours : 5 Hours

Activity 1: Teacher Demonstration (60 Min)

Teacher will use a detailed model or diagram to demonstrate the cochleovestibular pathways, including cochlear and vestibular nerves, and their connections to the brainstem and cortex. The explanation will focus step-by-step on anatomy and function, highlighting auditory and balance components.

Students will replicate the diagram in notebooks or using digital drawing tools, labeling key structures like cochlear nuclei, vestibular nuclei, inferior colliculus, and auditory cortex.

Activity 2: Role-Playing (60 Min)

Teacher will organize a role-play where students act as different components of the cochleovestibular pathways (e.g., cochlea, vestibular nerve, brainstem, auditory cortex). A scenario will be set to simulate auditory and balance signal transmission.

Students will perform the role-play, demonstrating the flow of signals and explaining the role of each "component" in the process.

Activity 3: 3D Pathway Modeling (60 Min)

Teacher will provide crafting materials like clay, wires, and labels for students to create a 3D model of the cochleovestibular pathways.

Students will collaborate to construct the model, label key parts, and use it to explain how signals flow from the cochlea and vestibular apparatus to the brain.

Activity 4: Experimental Simulation (60 Min)

Teacher will conduct a digital simulation or virtual lab to illustrate real-time generation and processing of cochleovestibular signals. Auditory and vestibular stimuli responses will be demonstrated.

Students will interact with the simulation, observe and analyze responses, and connect findings to the anatomy and physiology of the pathways.

Activity 5: Flowchart Creation (60 Min)

Teacher will guide students in breaking down the sequence of signal transmission through the cochleovestibular pathways, explaining how auditory and balance signals move from the cochlea and vestibular apparatus to the brainstem and higher centers. Key nuclei and signal integration points will be emphasized. Students will create a detailed flowchart that visually maps the pathways, labeling all key components, including cochlear nuclei, vestibular nuclei, inferior colliculus, and auditory cortex, to demonstrate their understanding.
Practical Training 19.4 Gustatory Pathway.
Total Learning Hours: 5 Hours Activity 1: Teacher Demonstration (60 Min) The teacher will explain the anatomy of taste buds, cranial nerves, and the gustatory pathway with visual aids like charts, 3D models, and diagrams. Students will observe the demonstration, identify key structures and pathways, and clarify concepts during the Q&A session. Activity 2: Virtual Simulation / Interactive Digital Tool (90 Min) The teacher will guide students through a digital simulation that illustrates nerve conduction from taste receptors to the brain. Students will engage in the virtual experiments, observe neural responses, and document their findings for review. Activity 3: Case-Based Learning / Problem-Solving Activity (90 Min) The teacher will present clinical cases, such as loss of taste due to nerve damage, and lead an interactive discussion. Students will analyze the cases, trace the gustatory pathway implicated, and discuss potential diagnoses and implications collaboratively. Activity 4: Group Activity – Taste Testing and Sensory Mapping (60 Min) The teacher will supervise a taste test where students identify distinct taste zones (sweet, salty, sour, bitter, umami) on the tongue. Students will perform the taste test, map sensory regions, and connect their observations to the gustatory pathway, participating in an engaging Q&A session.
Experiential Learning Activity
Experiential-Learning Learning 19.1: Structure and function of the olfactory pathway
Total Learning Hours: 6:00 Hours

Activity 1: Understand the Olfactory Pathway (60 Min)

The student will explain the anatomical structure of the olfactory system, identifying the key components such as the olfactory receptors, olfactory bulb and olfactory cortex. They will analyze how sensory information is processed along the pathway from the nose to the brain.

Activity 2:Library Session (90 Min)

Students will utilize library resources such as textbooks, journals, and online databases to study the anatomy and physiology of the olfactory pathway, gather information on olfactory receptors, neural pathways and connections to the limbic system, emphasizing sensory and emotional integration and compile their findings into concise summaries, annotated diagrams, or reports to share with peers in a collaborative learning environment.

Activity 3 :Project-Based Learning (90 Min)

Students will design a detailed model of the olfactory pathway, illustrating key structures such as the olfactory epithelium, bulb, tracts, and cortical areas, incorporate clinical aspects, such as anosmia or changes in olfactory function in neurological disorders and present their models, explaining the physiological significance and clinical relevance of each component and propose diagnostic or therapeutic solutions.

Activity 4: Analyze Olfactory Pathway in Action (60 Min)

The student will explore case studies or real-world examples where olfactory dysfunction occurs (e.g., anosmia) and analyze how disruptions along the olfactory pathway can impact the sense of smell.

Activity 5: Application to Clinical Diagnosis (60 Min)

The student will apply their understanding of the olfactory pathway to diagnose potential olfactory disorders, identifying possible causes of dysfunction based on anatomical and physiological knowledge. They will discuss the clinical significance of each stage of the olfactory pathway.

Experiential-Learning Learning 19.2: Optic pathway

Total Learning Hours: 7:00 Hours

Activity 1: Understanding the Anatomy of the Optic Pathway (90 Min)

Students will explain the anatomy of the optic pathway, including the structure and function of the optic nerve, optic chiasm, optic tract, and visual cortex. They will analyze how light signals are processed from the retina to the brain.

Activity 2: Inquiry-Based Learning (60 Min)

Students will investigate real-world scenarios such as hearing impairments or balance disorders.They will formulate questions about the cochleovestibular pathway's role in these conditions, conduct collaborative research, and propose solutions based on their findings.Groups will present their answers, emphasizing the physiological and clinical relevance of their discoveries.

Activity 3: Journal Club (90 Min)

Students will read selected research articles on cochlear functions, vestibular balance mechanisms, or related disorders like vertigo.

Groups will analyze key findings, evaluate methodologies, and present how these studies advance understanding of the cochleovestibular pathway.

A class discussion will follow, focusing on connections between research and clinical applications (e.g., vestibular rehabilitation techniques).

Activity 4: Peer Teaching (60 Min)

Groups will study specific components of the cochleovestibular pathway .Each group will prepare visual aids like diagrams, presentations, or role-play sessions to teach their peers about their assigned topic. After teaching, students will engage in discussions to clarify concepts and reinforce learning.

Activity 5: Visual Pathway Function and Disorders (60 Min)

Students will analyze the role of the optic pathway in visual perception and discuss common disorders that affect this pathway, such as optic neuropathy and visual field defects. They will connect theoretical knowledge with clinical applications through case studies.

Activity 6: Practical Application and Clinical Scenarios (60 Min)

Students will apply their understanding by assessing clinical cases involving visual impairments linked to damage in the optic pathway, proposing diagnostic approaches and treatment options based on their analysis of the pathway.

Experiential-Learning Learning 19.3: Cochleovestibular Pathway

Total Learning Hours : 6 Hours

Activity 1: Role-Playing Diagnosis (90 Min)

Students will collaborate in groups, role-playing as audiologists, neurologists and patients in simulated diagnostic sessions.

Each group will analyze presented symptoms, such as dizziness, hearing loss, or vertigo and identify affected parts of the cochleovestibular pathway.

Students will propose diagnostic techniques (e.g., audiometric tests, balance assessments) and outline possible treatment strategies or rehabilitation plans.

Activity 2: Library Research (90 Min)

Students will utilize library resources, including anatomy textbooks, medical journals and online databases, to study the structure and function of the cochleovestibular pathway.

They will synthesize their findings into concise summaries or visual aids (e.g., flowcharts or annotated diagrams).

Each student will share their research with peers, fostering collaborative learning and enhancing resource usage skills.

Activity 3: Journal Club (90 Min)

Students will read assigned research articles on cochlear and vestibular function, including studies on signal transmission and neural disorders.

Groups will critically analyze methodologies, results and conclusions, focusing on how the research contributes to understanding the cochleovestibular pathway.

Students will present their findings and lead discussions on the clinical relevance of the research (e.g., implications for hearing aids or balance therapy).

Activity 4: Project-Based Learning (90 Min)

Students will design and construct detailed models or presentations illustrating the cochleovestibular pathway, including anatomical structures and neural connections.

They will integrate examples of clinical applications, such as auditory prosthetics or vestibular rehabilitation techniques.

Projects will culminate in group presentations where students demonstrate the models and explain their significance.

Activity 5: Case Study Analysis (60 Min)

Students will evaluate patient case studies featuring conditions like Ménière's disease or vestibular neuritis.

They will identify affected components of the cochleovestibular pathway, analyze how the dysfunction impacts hearing or balance and propose suitable interventions.

Groups will present their analysis and discuss diverse approaches to diagnosis and treatment.

Experiential-Learning Learning 19.4: Gustatory pathway

Total Learning Hours: 7:00 Hours

Activity 1: Peer Teaching (90 Min)

Students will research sections of the gustatory pathway (e.g., taste receptor mechanisms, cranial nerves involved and brain regions for processing), prepare visual aids (e.g., flowcharts of the pathway) and teach their peers with interactive presentations that emphasize sensory mechanisms and neural connections and collaborate through discussions and answer questions to reinforce understanding of the pathway's complexity.

Activity 2: Library Session (120 Min)

Students will explore library resources like textbooks, journals and online databases to deepen their understanding of the gustatory pathway, compile relevant information into concise summaries or diagrams for class sharing and apply their findings to explain physiological and clinical implications (e.g., taste disorders).

Activity **3**: Review and Understand the Gustatory Pathway (90)

Students will review the anatomy and physiology of the gustatory pathway, focusing on the structures involved in taste perception, such as taste buds, cranial nerves (VII, IX, X) and the brain's gustatory cortex.

Activity 4: Analyze the Process of Taste Sensation (60 Min)

Students will analyze the process through which taste stimuli are received, transmitted and processed, identifying any disruptions in the pathway that may lead to taste disorders.

Activity 5: Apply Knowledge to Case Studies and Clinical Scenarios (60 Min)

Students will discuss and evaluate real-world clinical cases where taste perception is affected by neurological conditions or damage, proposing potential diagnostic approaches and treatment strategies.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Total Hours of Assessment: 4:00 Hours	4

Diagnostic Imaging Quiz – 20 Marks Provide **images (e.g., MRI/CT)** of **brain lesions** affecting sensory pathways (olfactory bulb, optic tract, cochlea) and identify the **location of the lesion** and **associated deficits.** **2. Short Answer Questions – 10 Marks** Answer **short questions** on the **function and anatomy** of each pathway (olfactory, optic, gustatory, cochleovestibular). **3. Pathway Mapping Exercise – 10 Marks** Students draw and label a **pathway diagram** for each sensory pathway (olfactory, optic, gustatory, cochleovestibular), indicate **key structures** involved and the **flow of information**. **4. Interactive Scenario Simulation – 10 Marks** Provide an **interactive scenario** where students simulate a diagnosis based on symptoms related to one or more sensory pathways (e.g., patient with vision loss or hearing difficulty). 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 assessment. (25 Marks)	
Module 20 : طرائق عصبی(Taraiq-e- A'sabi) Neural Pathways	
Module Learning Objectives (At the end of the module, the students should be able to) 1 Describe the motor and sensory pathways, central autonomic pathway. 2 Conduct the presentation, group discussion and clinical examination regarding the motor, sensory pathways and central autonomic pathway. 3 Identify the motor, sensory pathways and central autonomic pathway.	
Unit 1 طریق حرکی،(Tariq-e- Harki) Motor Pathways. طریق حسی(Tariq-e- Hissi) Sensory Pathways.	

20.1.1. طریق حرکی(Tariq-e- Harki) Motor Pathways.

20.1.2. طریق حسی(Tariq-e- Hissi) Sensory Pathways.

References: 1,2,3,5,6,7,8,9,10,11,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the motor pathways.	3	Lecture	CC	Know	L_VC,L&GD,L,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the sensory pathway.	5	Practical20.1	PSY-GUD	Shows-how	D-BED,RP,CBL,D-M,SIM
CO1,CO3, CO4,CO7	Analyze the motor pathway.	7	Experiential-Learning20.1	CAN	Does	SDL,CBL,PER,RP
CO1,CO3, CO4,CO7	Demonstrate the motor pathway.	5	Practical20.2	PSY-GUD	Shows-how	CD,CBL,RP,SIM
CO1,CO3, CO7	Analyze the sensory pathway	6	Experiential-Learning20.2	CAN	Does	SDL,RLE,BS,CBL
CO1,CO4	Describe the sensory pathways.	2	Lecture	CC	Knows-how	BL,L&GD,L_VC,L&PPT

Unit 2 طریق مرکزی غیر ارادی کا تعارف(Tariq-e- Markazi Ghair iradi ka Ta'aruf) Introduction of Central Autonomic Pathways. محور کظری نخامی تحتانی(Mehwar-e-Kuzri tahtani) Hypothalamic-pituitary-adrenal (HPA) axis. طریق شرکی تحتانی(Tareeq-e- shirki Tahtani) Hypothalamic-sympathetic pathway. طریق ساقی جار شرکی(Tareeq-e-saqi jar shirki) Brainstem-parasympathetic .pathway. انعکاسِ شرکی نخامی(Ine'ikas-e-shirki nukhae'i) Spinal-sympathetic reflex.

20.2.1. طریق مرکزی غیر ارادی کا تعارف(Tariq-e- Markazi Ghair iradi ka Ta'aruf) Introduction of Central Autonomic Pathways.

20.2.2. محور کظری نخامی تحتانی(Mehwar-e-Kuzri tahtani) Hypothalamic-pituitary-adrenal (HPA) axis.

20.2.3. طریق شرکی تحتانی(Tareeq-e- shirki Tahtani) Hypothalamic-sympathetic pathway.

20.2.4. طریقِ ساقی جارشرکی (Tareeq-e-saqi jar shirki) Brainstem-parasympathetic .pathway.

20.2.5. انعکاسِ شرکی نخاعی (Ine'ikas-e-shirki nukhae'i) Spinal-sympathetic reflex.

References: 1,2,3,4,5,6,7,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Discuss the introduction of the central autonomic pathways and Describe the Hypothalamic-pituitary-adrenal (HPA) axis and Hypothalamic-sympathetic pathway.	3	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD,BL
CO1,CO3, CO4,CO7	Demonstrate the Hypothalamic-pituitary-adrenal (HPA) axis and Hypothalamic-sympathetic pathway.	5	Practical20.3	PSY-GUD	Shows-how	D-M,CBL,DIS,PL,RP
CO1,CO3, CO4,CO7	Analyze the hypothalamic-pituitary-adrenal (HPA) axis and Hypothalamic-sympathetic pathway.	7	Experiential-Learning20.3	CAN	Does	JC,PL,W,CBL
CO1,CO3, CO4,CO7	Demonstrate the Brainstem-parasympathetic pathway and Spinal-sympathetic reflex.	5	Practical20.4	PSY-GUD	Does	PL,D-M,CBL,RP,DIS
CO1,CO3, CO4,CO7	Analyze the Brainstem-parasympathetic pathway and Spinal-sympathetic reflex.	6	Experiential-Learning20.4	CAN	Shows-how	SDL,SIM,D-M,IBL,FC
CO1,CO4	Describe the Brainstem-parasympathetic pathway and Spinal-sympathetic reflex.	2	Lecture	CC	Knows-how	L_VC,L&PPT ,BL,L&GD

Practical Training Activity

Practical Training 20.1 The Sensory Pathway
Total Learning Hours: 5 Hours Activity 1: Teacher Demonstration (60 Min) The Teacher will provide an overview of the sensory pathway, illustrating key components such as sensory receptors, ascending tracts (dorsal column-medial lemniscus, spinothalamic, and spinocerebellar tracts), and their role in transmitting sensory information to the brain. Live or digital anatomical models may be used. Activity 2: Sensory Mapping with Hands-On Models (60 Min) The teacher will provide models or 3D simulations, explain the key structures involved in the sensory pathway, and demonstrate how a stimulus travels through the pathway. The student will use the models to trace the pathway themselves, labeling structures and explaining the flow of sensory input from receptors to the brain. Activity 3: Role-Playing (60 Min) The teacher will designate roles (e.g., receptor, sensory neuron), set up the classroom to represent different parts of the pathway, and guide the students on how information is relayed step-by-step. The student will act out their assigned roles, passing along "signals" or "stimuli" with props or verbal cues, and collaboratively demonstrate the sensory pathway in action. Activity 4: Interactive Simulation with Technology (60 Min) The teacher will set up and introduce digital or VR simulations, explain how to interact with the technology, and highlight the visualization of the sensory pathway. The student will engage with the simulation, applying different stimuli inputs, and observe or report on how the pathway reacts in real-time. Activity 5: Experimental Activity: Reflexes and Perception (60 Min) The teacher will set up experiments like the knee-jerk reflex test and provide tools for perception tests while explaining their connection to the sensory pathway. The student will conduct the reflex and perception experiments in pairs or groups, record their observations, and link their findings back to theoretical concepts.
Practical Training 20.2 The Motor Pathway

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The Teacher will illustrate the motor pathway using anatomical models, diagrams, and digital simulations, and explain the corticospinal and extrapyramidal tracts.

Activity 2: Anatomical Mapping with Models (60 Min)

The teacher will use anatomical models or diagrams of the central and peripheral nervous system to highlight structures involved in the motor pathway.

Students will trace the pathway from the motor cortex, through the brainstem and spinal cord, to the peripheral nerves and muscles, labeling each part and explaining its role in movement.

Activity 3: Role-Playing the Pathway (60 Min)

The teacher will assign students roles such as the motor cortex, upper motor neurons, lower motor neurons, and target muscles.

Students will act out the transmission of motor signals, demonstrating how instructions from the brain result in muscle contractions.

Activity 4: Hands-On Reflex Activity (60 Min)

The teacher will set up reflex experiments, like testing the stretch reflex (e.g., knee-jerk reflex) or withdrawal reflex.

Students will perform the experiments and discuss how motor signals are transmitted via the spinal cord for automatic movement responses.

Activity 5: Simulated Motor Tasks (60 Min)

The teacher will design activities like throwing a ball or gripping an object, while guiding students to analyze the movement.

Students will break down the process into steps, identifying the involvement of the motor cortex, spinal cord, peripheral nerves, and muscles in executing the task.

Practical Training 20.3 The HPA Axis and Hypothalamic-Sympathetic Pathway

Total Learning Hours: 5:00 Hours

Activity 1: Demonstration (60 min)

The teacher will illustrate the HPA axis and hypothalamic-sympathetic pathway using anatomical models, diagrams, and multimedia presentations. Key hormonal interactions, neural circuits, and physiological responses to stress will be highlighted.

Activity 2: Flowchart Modeling with Interactive Props (60 Min)

The teacher will create a flowchart representing the sequential activation of the HPA axis and hypothalamic-sympathetic pathway on a large board or screen.

The students will use labeled props (e.g., cortisol for adrenal glands, CRH for the hypothalamus, ACTH for the pituitary) to place them on the flowchart in the correct sequence. They can also use arrows to trace the signaling flow between these structures.

Activity 3: Case Study and Problem-Solving (60 Min)

The teacher will present real-world or hypothetical scenarios, such as stress responses in athletes or patients with adrenal disorders.

The students will analyze these cases in groups, map out the involvement of the HPA axis and hypothalamic-sympathetic pathway, and discuss the physiological outcomes. They can also brainstorm clinical implications or treatments.

Activity 4: Simulation or Role Play (60 Min)

The teacher will assign roles to students, such as the hypothalamus, pituitary, adrenal glands, and sympathetic ganglia.

Students will act out the activation of the pathways by "releasing" hormones or neurotransmitters (represented by cards or props) and passing them to the next step in the sequence. This role play will demonstrate how stress stimuli lead to coordinated physiological responses.

Activity 5: Experimental Activity: Stress Response Measurement (60 Min)

The teacher will set up stress-response experiments, like measuring heart rate, blood pressure, and skin conductivity in response to mild stimuli (e.g., solving puzzles under time pressure).

Students will record their data and link their findings to the activation of the hypothalamic-sympathetic pathway and HPA axis, discussing the role of cortisol and autonomic changes.

Practical Training 20.4 The Brainstem-parasympathetic pathway and Spinal-sympathetic reflex.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (90 Min)

The teacher will use anatomical models, diagrams, and digital simulations to illustrate the brainstem-parasympathetic pathway and spinal-sympathetic reflex.

They will explain the functional roles and interactions of these pathways in autonomic regulation.

Activity 2: Guided Hands-on Identification (60 Min)

Students will identify key structures related to these pathways on anatomical models, cadaveric specimens, or virtual dissection tools. They will trace the neural connections involved in autonomic reflexes.

Activity 3: Case-Based Application (90 Min)

Students will analyze clinical scenarios involving dysfunctions of the parasympathetic and sympathetic pathways, discussing their impact on physiological responses. They will propose diagnostic approaches based on their understanding.

Activity 4: Discussion & Peer Learning (60 Min)

Students will present their findings, engage in peer discussions, and receive feedback from the instructor. A Q&A session will reinforce key concepts and clarify doubts.

Experiential Learning Activity

Experiential-Learning Learning 20.1: The Motor Pathway

Total Learning Hours:7:00 Hours

Activity 1: Case-Based Analysis (60 Min)

Students will analyze clinical cases involving motor pathway dysfunctions (e.g., stroke, spinal cord injury).

They will identify affected components of the motor pathway (e.g., upper and lower motor neurons) and propose diagnostic strategies and treatment plans.

Activity 2: Simulation Experiments (90 Min)

Students will engage with interactive simulations that demonstrate motor pathway functions, such as voluntary and reflex movements.

They will manipulate variables (e.g., lesion sites) to observe how disruptions in the motor pathway impact muscle activity.

Activity 3: Role-Playing Neurological Examination (90 Min)

Students will role-play as neurologists and patients, performing neurological exams like reflex testing and muscle strength assessments.

They will interpret findings and correlate symptoms with specific motor pathway disruptions.

Activity 4: Motor Circuit Mapping (90 Min)

Students will create detailed diagrams or flowcharts of the motor pathway, including corticospinal and extrapyramidal tracts. They will highlight key structures and illustrate clinical correlations, such as how damage to the basal ganglia affects motor control. Activity 5: Literature Review and Presentation (90 Min) Students will research recent studies on motor pathway function or dysfunction (e.g., advancements in neuroplasticity or motor rehabilitation). They will present their findings, discussing the research implications for clinical practice and motor recovery techniques.
Experiential-Learning Learning 20.2: The Sensory Pathway
Total Learning Hours:6:00 Hours Activity 1: Brainstorming and Group Discussion (90 Min) Students will collaboratively brainstorm in small groups to identify the significance of specific sensory pathways. They will discuss clinical scenarios related to each pathway, such as loss of pain or vibration sensation and share their insights with the class, ensuring diverse perspectives. Activity 2: Clinical Case-Based Discussion (90 Min) Students will analyze real patient cases involving sensory impairments (e.g., loss of touch or pain sensation). Through group discussions, they will relate symptoms to disruptions in specific sensory pathways and propose diagnostic strategies or interventions. Activity 3: Literature Search (90 Min) Students will research rare sensory disorders (e.g., congenital insensitivity to pain) or recent advances in sensory pathway studies. Findings will be summarized and presented to peers, highlighting clinical implications and current scientific understanding. Activity 4: Real-Life Sensory Testing / Experiment (90 Min) Students will conduct sensory tests on peers, such as light touch, vibration and proprioception assessments. They will document observations, correlate findings with pathway anatomy and reflect on their understanding of sensory processing and potential dysfunctions
Experiential-Learning Learning 20.3: The hypothalamic-pituitary-adrenal (HPA) axis and Hypothalamic-sympathetic pathway

Total Learning Hours: 7:00 Hours Activity 1: Case Study Analysis (90 Min) Students will analyze detailed patient cases involving stress-related disorders such as chronic stress or adrenal insufficiency. They will identify affected components of the HPA axis or hypothalamic-sympathetic pathway and develop diagnostic strategies. Students will propose tailored treatment plans, including lifestyle modifications, medication, or stress management techniques. Activity 2: Reflective Writing (90 Min) Students will write reflections on how the HPA axis and hypothalamic-sympathetic pathway contribute to acute and chronic stress responses. They will connect concepts to clinical relevance, discussing implications for health issues like hypertension, anxiety, or adrenal dysfunction. Reflections may include personal insights or hypothetical scenarios for broader exploration. Activity 3: Journal Club Presentation (90 Min) Students will select journal articles on the HPA axis or hypothalamic-sympathetic pathway, focusing on studies examining stress responses or adrenal function. They will present findings to peers, including research outcomes and experimental methodologies. Collaborative discussions will highlight the relevance of these studies to clinical applications, such as advancements in stress management therapies. Activity 4: Clinical Correlation Workshop (90 Min) Students will participate in workshops presenting clinical cases like stress-related hypertension or adrenal dysfunction. They will trace pathways involved in these disorders, illustrating connections between hormonal imbalances and symptoms. Groups will create flowcharts demonstrating feedback loops, neural control, and proposed interventions, enhancing visual comprehension. Activity 5: Evaluate Clinical Applications (60 Min) Students will explore clinical scenarios where dysregulation of these pathways is involved, such as in stress-related disorders, adrenal insufficiency, or autonomic dysfunction and suggest potential therapeutic interventions.
Experiential-Learning Learning 20.4: Brainstem-parasympathetic pathway and Spinal-sympathetic reflex
Total Learning Hours: 6 Hours

Activity 1: Clinical Case-Based Discussion (90 Min)

Students will analyze clinical cases such as autonomic dysreflexia or vagal overactivity.

They will identify the affected autonomic pathways (sympathetic or parasympathetic) and explain the underlying mechanisms.

Students will propose diagnostic approaches and treatment strategies

Activity 2: Problem-Based Learning (90 Min)

A problem such as orthostatic hypotension will be presented.

Students will investigate the cause, apply their knowledge of autonomic pathways and propose diagnostic and therapeutic solutions (e.g.,compression stockings, medications).

Each group will present and justify their solutions, fostering critical thinking.

Activity 3: Video/Animation Review and Reflection (90 Min)

Students will watch medical animations or videos explaining autonomic pathways and reflex mechanisms.

They will then write reflective summaries, connecting the visual content to clinical relevance

Group discussions will follow to share and compare insights.

Activity 4: Journal Club Presentation (90 Min)

Students will select and analyze a scientific article related to autonomic reflexes or brainstem parasympathetic pathways.

Groups will present their findings, evaluate methodologies and discuss how the research enhances understanding of theoretical and clinical aspects.

Peer discussions will allow students to reflect on the research relevance and share perspectives.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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

Total Hours of the Assessment: 4:00 Hours **Case-Based Scenario with Pathway Mapping – 15 Marks** Analyze a clinical case (e.g., motor/sensory/autonomic dysfunction), map affected pathways, and discuss pathophysiology and diagnosis. **2. Objective Structured Practical Examination (OSPE) – 15 Marks** • **Stations:** Motor Reflex Testing Sensory Pathway Testing Autonomic Reflex Testing HPA Axis Understanding **3. Concept Map & Pathway Integration – 10 Marks** Create a concept map linking motor, sensory, and autonomic pathways, including the HPA axis and reflex arcs. **4. Clinical Case Discussion (Viva) – 10 Marks** Discuss a clinical case involving pathway dysfunction (e.g., stroke or autonomic disorder) and propose diagnostic tests and treatment. 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 assessment. (25 Marks)	
Semester No : 5	
Module 21 : نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system	

Module Learning Objectives

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

1 Describe the hypothalamo-hypophyseal system,limbic system,basal nuclei, reticular system.

2 Conduct the presentation, group discussion and clinical examination regarding hypothalamo-hypophyseal system, limbic system, basal nuclei, reticular system.

3 Identify the different structures of Hypothalamo-Hypophyseal System, Limbic system, Basal Nuclei, Reticular System.

Unit 1 نظام تحت السریری و تحت النخاعی(Nizam-e-Tahataassareeri wa Tahtan-Nukha,ei) Hypothalamo-Hypophyseal System. نظام جوفی(Nizam e Jaufi) Limbic system.

21.1.1. نظام تحت السریری و تحت النخاعی(Nizam-e-Tahataassareeri wa Tahtan-Nukha,ei) Hypothalamo-Hypophyseal System. نظام جوفی(Nizam e Jaufi) Limbic system.

References: 1,2,3,4,5,6,7,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe hypothalamo-hypophyseal system in detail.	3	Lecture	CC	Know	BL,L_VC,L&PPT ,L&GD
CO1,CO3, CO4,CO7	Demonstrate the hypothalamo-hypophyseal system.	5	Practical21.1	PSY-GUD	Shows-how	CBL,DIS,D-M,FC
CO1,CO4, CO7	Analyze the hypothalamo-hypophyseal system.	7	Experiential-Learning21.1	CAN	Does	JC,RP,PER,DIS,PL
CO1,CO4	Describe the limbic system in detail.	2	Lecture	CC	Knows-how	BL,L&GD,L_VC,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the limbic system.	5	Practical21.2	PSY-GUD	Shows-how	DIS,BS,D-M
CO1,CO4, CO7	Analyze the limbic system.	6	Experiential-Learning21.2	CAN	Does	DIS,PER,CBL,JC,PL

Unit 2 نواۃ قاعدی(Nawat-e-Qa'edi) Basal Nuclei. نواۃ شبکی(Nizam-e-Shabki) Reticular System.

21.2.1. نواۃ قاعدی(Nawat-e-Qa'edi) Basal Nuclei.

21.2.2. نواۃ شبکی(Nizam-e-Shabki) Reticular System.

References: 1,2,3,5,6,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the basal nuclei system in detail.	3	Lecture	CK	Knows-how	L&PPT ,L_VC,L&GD,BL
CO1,CO3, CO4,CO7	Demonstrate the basal nuclei.	5	Practical21.3	PSY-GUD	Shows-how	RP,D-M,CBL
CO1,CO4, CO7	Analyse the reticular system.	6	Experiential-Learning21.3	CAN	Does	FC,CBL,JC,DIS,D
CO1,CO4	Describe the reticular system.	2	Lecture	CC	Knows-how	L&GD,BL,L_VC,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the reticular system.	5	Practical21.4	PSY-GUD	Shows-how	PER,PL,CBL,D-M,IBL
CO1,CO4, CO7	Analyze the basal nuclei.	7	Experiential-Learning21.4	CAN	Does	PER,JC,DIS,PL

Practical Training Activity

Practical Training 21.1 Hypothalamo-Hypophyseal System.

Total Learning Hours: 5 Hours

Activity 1: Demonstration (60 Min)

The teacher will explain the anatomical structures and functional zones of the hypothalamus and pituitary gland using 3D models, virtual anatomy software, or holographic projections. Connections between the hypothalamus and pituitary will be highlighted, along with their roles in endocrine regulation.

Students will observe the demonstration, take notes, and ask clarifying questions to reinforce understanding.

Activity 2: Clinical Case Discussion (PBL) (60 Min)

The teacher will introduce clinical scenarios involving pituitary tumors or hormonal imbalances such as diabetes insipidus and acromegaly, providing patient history and imaging data.

Students will analyze cases in groups, correlating symptoms with anatomical and functional abnormalities, and propose diagnostic strategies and treatment plans.

Activity 3: Neuroendocrine Pathway Mapping (90 Min)

The teacher will provide examples of hormonal release pathways and feedback mechanisms.

Students will draw flowcharts mapping hormone release pathways from the hypothalamus to the pituitary gland and peripheral endocrine glands. They will present their pathways, explaining the importance of feedback mechanisms and identifying areas prone to dysfunction.

Activity 4: Flipped Classroom (90 Min)

The teacher will provide preparatory materials such as videos or readings about the hypothalamo-hypophyseal system prior to the session.

Students will prepare by reviewing these materials independently and engage in an interactive discussion during class, participating in quizzes to test their knowledge and address misconceptions.

Practical Training 21.2 Limbic System.

Total Learning Hours : 5 Hours

Activity 1: Teacher Demonstration (60 Min)

Teacher will explain the anatomical structure and functional zones of the dorsal thalamus using 3D models, virtual anatomy software, or holographic projections. Key nuclei, their connections, and sensory relay functions will be highlighted.

Students will observe the demonstration and take notes to reinforce their understanding, actively engaging by asking questions for clarification.

Activity 2: 3D Model / Poster Creation (90 Min)

Teacher will provide guidance and resources for designing 3D models or educational posters that showcase the dorsal thalamus's anatomy, nuclei, connections, and clinical relevance.

Students will design 3D models (using clay, printed, or digital methods) or posters in groups. They will present their creations to the class, explaining the anatomical and functional features, as well as emphasizing clinical correlations.

Activity 4: Imaging Interpretation Session (90 Min)

Teacher will demonstrate how to interpret CT/MRI brain images, focusing on identifying the dorsal thalamus and pathological changes.

Students will review imaging findings in small groups, correlating them with clinical presentations and anatomical structures. They will collaborate to identify pathology and discuss its implications.

Activity 5: Brainstorming & Quiz Session (60 Min)

Teacher will facilitate a brainstorming session covering the anatomy, functions, and clinical significance of the dorsal thalamus, followed by a rapid quiz round to consolidate knowledge.

Students will participate actively in brainstorming ideas, discussing challenging concepts, and answering quiz questions to test their understanding and deepen engagement.

Practical Training 21.3 Basal Nuclei

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate the anatomy, location, and connections of the basal nuclei using 3D models, virtual anatomy software, or holographic projections. Emphasis will be placed on the functional zones and circuits involved in motor control and behavior modulation.

Students will observe the demonstration, take notes, and ask clarifying questions to enhance their understanding of the basal nuclei's structural and functional relationships.

Activity 2: Brain Dissection / Prosection / Virtual Lab (90 Min)

The teacher will guide students through the examination of brain specimens or virtual dissections, focusing on locating basal nuclei structures such as the caudate nucleus, putamen, globus pallidus, subthalamic nucleus, and substantia nigra. Students will actively engage with preserved specimens or virtual tools to identify these structures and discuss their roles in sensory-motor integration and functional circuits. Activity 3: Neuroimaging Review (CT / MRI Interpretation) (90 Min) The teacher will demonstrate how to interpret CT and MRI brain imaging, focusing on basal nuclei regions and pathological changes such as lacunar infarcts or atrophy. Students will review imaging slides collaboratively, identifying basal nuclei structures and correlating findings with clinical conditions. They will discuss implications for diagnosis and management. Activity 4: Group Debate or Role Play (60 Min) The teacher will facilitate a structured debate or role play where students take on roles such as physicians, neurologists, or researchers to discuss basal nuclei-related disorders, diagnosis, and treatment strategies. Students will collaboratively engage in debates or role plays to evaluate contrasting perspectives on diagnostic approaches and interventions, fostering critical thinking and teamwork.
Practical Training 21.4 Reticular System.
Total Learning Hours : 5 Hours Activity 1: Demonstration (30 Min) The teacher will demonstrate the structure and functions of the reticular system using 3D anatomical models, virtual simulation software, or holographic projections. The focus will be on key components such as reticular formation, ascending and descending pathways, and their roles in motor control and alertness. Students will observe the demonstration, take notes, and engage in labeling diagrams to visually map the system’s connections and functions. Activity 2: Clinical Case-Based Learning (90 Min)

The teacher will introduce clinical scenarios involving dysfunctions of the reticular system, such as impaired consciousness or disrupted motor reflexes. MRI/CT scans will provide visual insights.

Students will analyze cases in groups, correlating anatomical knowledge with imaging data and clinical symptoms. They will discuss possible diagnoses and treatment strategies.

Activity 3: Group Presentation and Peer Teaching (90 Min)

The teacher will facilitate group presentations where students explain the anatomy and functions of the reticular system.

Students will work in groups to design educational posters or digital presentations, focusing on applied aspects such as its role in wakefulness, motor control, and clinical relevance. They will present their findings to peers and clarify concepts through Q&A.

Activity 4: Simulation and Inquiry-Based Learning (90 Min)

The teacher will create simulated environments to demonstrate reticular system functions, such as its role in alertness.

Students will engage in inquiry-based learning by posing questions related to real-world applications of the reticular system. They will interact with simulations, observe outcomes, and propose hypotheses for further exploration, deepening their understanding through hands-on inquiry.

Experiential Learning Activity

Experiential-Learning Learning 21.1: Hypothalamo-Hypophyseal System

Total Learning Hours:7:00 Hours

Activity 1: Interactive Histology Session (60 Min)

Students will identify histological features of the hypothalamus and pituitary gland using histological slides or virtual tools. They will connect their observations to disorders such as adenomas, discussing how structural abnormalities can impact hormonal regulation.

Activity 2: Clinical Pathology Review (60 Min)

Students will analyze clinical cases focusing on hormonal imbalances and hypothalamic-pituitary imaging findings. They will work in groups to correlate case details with anatomical and functional abnormalities, presenting their conclusions and proposed solutions.

Activity 3: Imaging Correlation Session (60 Min)

Students will examine CT/MRI data to identify abnormalities within the hypothalamic-pituitary axis. They will interpret findings and correlate them to clinical conditions such as pituitary adenomas, hormonal deficiencies, or dysfunctions, fostering practical diagnostic skills. Activity 4: Collaborative Problem Solving (60 Min) Students will work in teams to analyze real-world hormonal excess or deficiency problems. They will integrate their understanding of anatomy, physiology, and clinical aspects to develop diagnostic and therapeutic strategies and share their solutions with the class. Activity 5: Journal Club (JC): (90 Min) Students will review and present research articles focusing on the anatomy, regulation, and disorders of the hypothalamo-hypophyseal system. Groups will analyze methodologies, critique findings, and discuss potential future research directions, emphasizing critical thinking and collaborative learning. Activity 6: Library Session (90 Min) Students will conduct in-depth research using library resources to explore topics such as hormonal pathways, imaging techniques, and clinical conditions affecting the hypothalamo-hypophyseal system. They will compile their findings into reference guides or group presentations, improving their research and synthesis skills.
Experiential-Learning Learning 21.2: Limbic System
Total Learning Hours: 6:00 Hours Activity 1: Journal Club Activity: Limbic System (2 Hours) Students will review and present research articles or case studies exploring the anatomy, functions, and clinical relevance of the limbic system. Discussions will focus on topics such as emotional regulation, memory processing, and limbic system disorders like PTSD or epilepsy. Groups will critically analyze findings and propose future research directions. Activity 2: Case-Based Learning (CBL) Activity: Limbic System (1 Hour) Students will analyze clinical cases involving limbic system dysfunctions, such as memory loss or emotional disturbances. Groups will examine anatomical correlations, interpret imaging findings, and propose diagnostic approaches and treatment strategies. Activity 3: Peer Teaching Activity: Limbic System (2 Hours)

Students will collaborate to prepare presentations on the anatomy and applied aspects of the limbic system. They will explain key concepts to their peers, such as circuit connections and functions, using visual aids like diagrams or models. Discussions will emphasize clinical applications and understanding. Activity 4: Discussion and Q&A Session (1 Hour) Students will engage in a structured discussion, answering questions related to the limbic system's function, clinical implications, and its interaction with other brain regions. They will debate different viewpoints and clarify concepts based on peer and instructor feedback.
Experiential-Learning Learning 21.3: Reticular System
Total Learning Hours: 6:00 Hours Activity 1: Journal Club Activity: Reticular System (2 Hours) Students will review and present research articles focused on the anatomy, functions, and clinical relevance of the reticular system. Discussions will explore topics like arousal, sleep-wake cycles, and motor coordination, integrating clinical applications such as consciousness disorders and motor impairments. Activity 2: Simulation Activity: Reticular System (1.5 Hours) Students will interact with virtual simulations showcasing the reticular system's neural pathways, analyzing variables like stimuli affecting arousal or motor reflexes. Groups will examine how disruptions impact consciousness and motor control, linking simulations to clinical scenarios Activity 3: Case Study and Application (1.5 Hours) Students will examine clinical cases related to reticular system dysfunction, such as coma, sleep disorders, and attention deficits. They will interpret neurological findings and discuss their implications in patient care. Activity 4 : Q&A and Discussion (1 Hour) A guided Q&A session will allow students to clarify complex concepts and engage in discussions on the significance of the reticular system in daily physiological functions and neurological disorders.
Experiential-Learning Learning 21.4: Basal Ncclei
Total Learning Hours :7:00 Hours

Activity 1: Exploration and Conceptual Understanding (2 Hours)

Students will review the anatomical structures, functions, and neural connections of the basal nuclei. They will analyze its role in motor control, cognition, and behavior through interactive discussions and multimedia resources.

Activity 2: Journal Club Activity: Basal Nuclei (2 Hours)

Students will review and present journal articles focused on the functional anatomy, disorders and clinical relevance of the basal nuclei. Groups will critically analyze findings and discuss implications for diagnosis, treatment, and research.

Activity 3: Problem-Based Learning (PBL) Activity: Basal Nuclei (1 Hour)

Students will work on a simulated clinical case involving basal nuclei dysfunction, analyzing symptoms, imaging data, and anatomical correlations. Groups will propose diagnostic steps and treatment strategies, presenting their findings and discussing solutions collaboratively.

Activity 4: Application and Analysis (1 Hour)

Students will examine real-world clinical cases involving basal nuclei dysfunctions, such as Parkinson's disease and Huntington's disease. They will analyze how damage to specific basal nuclei structures affects movement and behavior.

Activity 5: Q&A and Critical Thinking Discussion (1 Hour)

Students will engage in a structured Q&A session, discussing key concepts, clarifying doubts, and debating the impact of basal nuclei disorders on neurological function. They will propose possible treatment approaches and diagnostic strategies based on their learning.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **Interactive Quiz with Instant Feedback – 10 Marks**	4

Students take an **online quiz** with multiple-choice and short-answer questions on the function and dysfunction of the **hypothalamo-hypophyseal system**, **limbic system**, **basal nuclei**, and **reticular system**. **2. Role-Playing & Simulation – 12 Marks** Students engage in **role-playing exercises** simulating **patient care scenarios** where they must diagnose and propose treatment for disorders related to these systems. **3. Conceptual Poster Presentation – 8 Marks** Students create a **poster** summarizing the key concepts related to each system (hypothalamo-hypophyseal, limbic, basal nuclei, and reticular system). **4. Critical Review of Recent Research – 10 Marks** Students will be assigned a **recent research paper** on one of the systems (e.g., the role of the **hypothalamo-hypophyseal axis** in stress response, or **neurodegeneration** in the basal nuclei). They will **critically review**. **5. Diagnostic Imaging Interpretation – 10 Marks** Students are provided with **MRI or PET scan images** showing abnormalities in the **hypothalamo-hypophyseal**, **limbic**, **basal nuclei**, or **reticular system**. They must: Identify **affected areas** and propose a **diagnostic approach** and **management plan** based on imaging 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 assessment. (25 Marks)	
Module 22 : تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy	
Module Learning Objectives (At the end of the module, the students should be able to)	

Describe the cross sectional anatomy of brain and spinal cord and Applied aspects of Nervous System.

Conduct the presentation, group discussion related to the cross sectional anatomy of brain and spinal cord and the presentation, group discussion and clinical examination regarding the applied aspects of Nervous system.

Identify the cross sectional anatomy of brain and spinal cord and applied aspects of Nervous system.

Unit 1 دماغ ونخاع کا مستعرض تراشہ (Dimagh wa Nukha ka Tashreehi Musta'raz Tarsha) Cross Sectional anatomy of Brain and Spinal cord.

22.1.1. دماغ ونکاع کا مستعرض تراشہ Dimagh wa Nukha ka Tashreehi Musta'raz Tarsha (Cross Sectional anatomy of Brain and Spinal cord.

References: 1,2,3,5,6,7,8,9,10,11,16,20,21,23,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the cross-sectional anatomy of brain.	3	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD,D-M
CO1,CO3, CO4,CO7	Demonstrate the cross sectional anatomy of brain.	5	Practical22.1	PSY-GUD	Shows-how	DIS,D-M,CBL,BS
CO1,CO4, CO7	Analyze the Cross Sectional anatomy of the brain.	7	Experiential-Learning22.1	CAN	Does	CBL,IBL,FC,DIS,SDL
CO1,CO3, CO4,CO7	Analyze the Cross Sectional anatomy of spinal cord.	6	Experiential-Learning22.2	CAN	Does	DIS,CBL,JC,SDL
CO1,CO4	Describe the cross sectional anatomy of the spinal chord.	2	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the cross sectional anatomy of the spinal cord.	5	Practical22.2	PSY-GUD	Shows-how	SIM,D-M,CBL

Unit 2 نظام عصبی کے اطلاقی پہلو(Nizam e-A'sbi ke Itlaqi Pehlu) Applied aspects of Nervous System.

22.2.1. نظام عصبی کے اطلاقی پہلو(Nizam e-A'sbi ke Itlaqi Pehlu) Applied aspects of Nervous System.

References: 1,2,3,4,5,6,7,8,9,10,11,13,14,15,16,21,24,25,26,27,28,30,31,35,38,42,44,45,46,53,54,62,75,77,79,101,103,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4, CO7	Describe the applied aspects of the central nervous system in detail.	3	Lecture	CC	Know	BL,L_VC,L&GD,L&PPT
CO1,CO4, CO7	Demonstrate the applied aspects of the peripheral nervous system.	5	Practical22.3	PSY-GUD	Shows-how	D,BS,DIS
CO1,CO4, CO7	Analyze the applied aspects of the peripheral nervous system.	6	Experiential-Learning22.3	CAN	Does	CD,CBL,D,DIS
CO1,CO4, CO7	Describe the applied aspects of the peripheral nervous system in detail.	2	Lecture	CC	Knows-how	BL,L&GD,L_VC,L&PPT
CO1,CO3, CO4,CO7	Demonstrate the applied aspects of the Central nervous system.	5	Practical22.4	PSY-GUD	Shows-how	D,BS,SIM
CO1,CO4, CO7	Analyze the applied aspects of the central nervous system.	7	Experiential-Learning22.4	CAN	Does	RLE,PL,SDL,DIS

Practical Training Activity

Practical Training 22.1 Cross Sectional Anatomy of the Brain

Total Learning Hours: 5 Hours

Activity 1: 3D Anatomical Model Demonstration (60 Min)

The teacher will use 3D brain models to demonstrate major brain structures and sectional planes, emphasizing spatial relationships and the functional importance of each section.

Students will observe and interact with the models to reinforce their understanding of gross anatomy.

Activity 2: Histology Slide Analysis (60 Min)

The teacher will guide the examination of histological slides showing brain tissue features, connecting microscopic structures to gross sectional anatomy.

Students will analyze these slides to identify key components and discuss their relevance to neurological function and pathology.

Activity 3: Brainstorming Session (90 Min)

The teacher will facilitate discussions on the clinical applications of brain sectional anatomy in fields such as neurology, neurosurgery and imaging.

Students will brainstorm ideas and explore real-world scenarios where cross-sectional knowledge aids in diagnosis and treatment planning.

Activity 4: Clinical Simulation / Case-Based Scenarios (90 Min)

The teacher will present simulated cases involving brain injuries or pathologies, emphasizing the diagnostic importance of cross-sectional anatomy.

Students will analyze these scenarios, correlating anatomy with clinical presentations and propose diagnostic and management strategies.

Practical Training 22.2 Cross Sectional Anatomy of the Spinal Cord.

Total Learning Hours : 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate spinal cord cross-sections, highlighting grey and white matter, spinal tracts, nuclei and their clinical relevance using 3D models or virtual anatomy software.

Students will observe the presentation, note the anatomical details and ask questions to clarify concepts.

Activity 2: Case-Based Learning (60 Min)

The teacher will present clinical cases involving spinal cord injuries, syringomyelia, or multiple sclerosis, providing patient history and imaging data.

Students will work in groups to analyze the cases, connect symptoms to specific spinal levels and propose diagnostic and treatment approaches.

Activity 3: Poster / Chart Making (90 Min)

The teacher will provide guidance for creating educational charts on spinal tracts, nuclei and the applied anatomy of cross-sections.

Students will collaborate in groups to design charts or posters, visually representing CNS structures and their clinical significance. These will be shared and explained during presentations.

Activity 4: Simulation-Based Activity (90 Min)

The teacher will demonstrate the use of simulation models to illustrate spinal cord injuries and their effects at various levels.

Students will interact with the simulation models, practicing identification of injury levels and explaining functional impairments to peers.

Practical Training 22.3 Applied Aspects of the Peripheral Nervous System

Total Learning Hours : 5 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will explain the anatomy of peripheral nerves, nerve roots, and plexuses using 3D anatomical models and virtual dissection tools. Focus will be on their structure, course, and functional components (motor, sensory and autonomic).

Students will observe the demonstration, engage with questions and take notes to solidify their understanding.

Activity 2: Cross-Sectional Diagram Drawing & Labeling (60 Min)

The teacher will provide an overview of the structural organization of major peripheral nerves and plexuses.

Students will draw and label detailed diagrams, including motor, sensory and autonomic components, ensuring clarity and anatomical accuracy.

Activity 3: Imaging Interpretation Session (60 Min)

The teacher will introduce imaging modalities (MRI, ultrasound, nerve conduction studies) and their relevance in diagnosing peripheral nerve pathologies.

Students will interpret given images, identify conditions such as neuropathies and nerve entrapments and correlate findings with clinical symptoms.

Activity 4: Brainstorming Session (60 Min)

The teacher will facilitate a brainstorming discussion about real-life scenarios of peripheral nerve injuries, such as carpal tunnel syndrome or sciatic nerve injury.

Students will discuss the functional impact of these injuries, proposing ideas for clinical evaluation and treatment strategies.

Activity 5: Surface Anatomy & Palpation Activity (60 Min)

The teacher will demonstrate the surface anatomy and landmarks for identifying major peripheral nerves (e.g., sciatic, median and ulnar nerves).

Students will practice palpating the course of these nerves on peers, enhancing their understanding of peripheral nerve location and clinical examination techniques.

Practical Training 22.4 Applied Aspects of the Central Nervous System.

Total Learning Hours: 5:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate the anatomical and functional aspects of the brain, spinal cord and CNS pathways using 3D models or virtual anatomy applications.

Clinical examples such as spinal cord injuries or neural pathway disruptions will be emphasized.

Students will observe the demonstration, note key anatomical and applied features and engage in discussions to clarify concepts.

Activity 2: Brain and Spinal Cord Dissection / Virtual Lab (90 Min)

The teacher will guide students through dissections or virtual labs focusing on CNS structures, fiber tracts and their applied clinical anatomy.

Students will observe or perform dissections, identifying key CNS regions and discussing their functional relevance to conditions such as demyelination or spinal cord trauma.

Activity 3: Histology / Microscopy of CNS Structures (60 Min)

The teacher will demonstrate the histological examination of CNS tissues, highlighting features of neurons, glial cells and pathological changes.

Students will observe and analyze histological slides, correlating their findings with disease conditions such as gliomas or multiple sclerosis.

Activity 4: Brainstorming / Interactive Q&A (90 Min)

Teacher will facilitate brainstorming sessions to explore the clinical relevance of CNS anatomy and functions.

Students will actively participate in discussions, share ideas, and engage in a rapid Q&A session to reinforce their understanding of applied CNS concepts

Experiential Learning Activity

Experiential-Learning Learning 22.1: Cross Sectional Anatomy of the Brain.
Total Learning Hours: 7:00 Hours Activity 1: Understanding the Cross-Sectional Anatomy of the Brain (2 Hours) Students will begin by studying the structural organization of the brain using cross-sectional views. They will analyze key anatomical structures, including the cerebral cortex, basal nuclei, thalamus, hypothalamus, brainstem and cerebellum. Special emphasis will be placed on the differentiation of white and gray matter, the ventricular system and major sulci and gyri. They will also explore coronal, sagittal and axial cross-sections to understand spatial relationships between brain regions. Activity 2: Peer Teaching Activity: Cross-Sectional Anatomy of the Brain (2 Hours) Students will collaborate in groups to prepare and teach specific brain cross-sections (e.g., cortex, basal ganglia, thalamus). Lessons will include visuals and clinical correlations, such as strokes or neurodegeneration. Following the teaching, they will facilitate Q&A sessions, reinforcing understanding through interactive peer-led discussions. Activity 3: Case-Based Analysis and Clinical Correlation (1.5 Hours) Students will examine clinical case studies involving brain pathologies such as stroke, traumatic brain injury, tumors, and neurodegenerative diseases (e.g., Alzheimer's and Parkinson's disease). They will interpret cross-sectional imaging (MRI/CT scans) to identify key anatomical structures and pathological changes. Students will discuss how damage to specific brain areas affects cognition, motor control and sensory processing. Activity 4: Q&A Session and Peer Discussion (1.5 Hours) Students will participate in an interactive Q&A session where they present their case analyses, discussing the significance of cross-sectional brain anatomy in clinical diagnosis and treatment. They will answer questions related to brain structure-function relationships, the impact of lesions, and potential interventions such as neurosurgical procedures and neurorehabilitation. Peer discussions will encourage debate on emerging technologies in brain imaging, including functional MRI (fMRI) and diffusion tensor imaging (DTI).
Experiential-Learning Learning 22.2: Cross Sectional Anatomy of Spinal Cord
Total Learning Hours: 6:00 Hours

Activity 1: Understanding the Cross-Sectional Anatomy of the Spinal Cord (2 Hours)

Students will begin by reviewing the structural organization of the spinal cord, including its gray and white matter distribution, major tracts, and functional zones. They will study the arrangement of dorsal and ventral horns, central canal, and surrounding meninges. Additionally, they will explore key features such as the division of the spinal cord into cervical, thoracic, lumbar, sacral, and coccygeal regions, each with distinct anatomical characteristics. Special emphasis will be placed on understanding the role of different spinal cord levels in motor and sensory functions.

Activity 2: Journal Club (1.5 Hours)

Students will review and discuss research articles or case studies focusing on the cross-sectional anatomy of the spinal cord and its clinical correlations. Topics may include spinal cord injuries, demyelination disorders, or nerve root compressions. Discussions will emphasize understanding the arrangement of grey and white matter, spinal tracts and their significance in motor and sensory pathways, fostering critical thinking and clinical application.

Activity 2: Case-Based Analysis and Clinical Correlation (1 Hour)

Students will analyze clinical cases involving spinal cord injuries and disorders, such as spinal cord compression, herniated discs, and diseases like multiple sclerosis or spinal cord tumors. They will interpret cross-sectional imaging (MRI/CT scans) to identify key anatomical structures and pathological changes. Additionally, they will examine how specific lesions in different spinal cord regions affect sensory and motor pathways, leading to conditions like paraplegia, quadriplegia, or Brown-Séquard syndrome.

Activity 3: Q&A Session and Peer Discussion (1.5 Hours)

Students will engage in an interactive Q&A session where they will present findings from their case analyses and discuss clinical implications. They will answer questions related to spinal cord anatomy, functional impairments due to injuries, and potential treatment approaches, including surgical interventions and neurorehabilitation. Peer discussion will encourage debate on emerging advancements in spinal cord research, such as regenerative medicine and spinal cord stimulation therapies.

Experiential-Learning Learning 22.3: Applied Aspects of the Peripheral Nervous System

Total Learning Hours: 6:00 Hours

Activity 1: Introduction to the PNS and Its Clinical Relevance (2 Hours)

The student will begin by reviewing the anatomical and physiological structure of the peripheral nervous system (PNS) and its role in transmitting signals between the central nervous system (CNS) and the rest of the body. They will explore its function in sensory input, motor control, and autonomic regulation. Special attention will be given to clinical relevance, such as the diagnosis and treatment of PNS disorders (e.g., peripheral neuropathies, carpal tunnel syndrome, and Guillain-Barré syndrome). The student will then discuss how disruptions in the PNS can lead to sensory, motor, or autonomic dysfunctions in patients.

Activity 2: Analyzing Clinical Scenarios and Case Studies (2 Hours)

In this step, the student will analyze real-world clinical case studies that involve PNS disorders. For example, they will examine cases of diabetic neuropathy, traumatic nerve injuries, and conditions like sciatica or Bell's palsy. The student will assess how these conditions affect patients' quality of life, how diagnosis is performed (e.g., nerve conduction studies, electromyography), and the treatment options available. They will explore how healthcare providers address these issues through both medical and therapeutic interventions, understanding the pathophysiology and potential recovery processes.

Activity 3: Interactive Discussion and Q&A Session (2 Hours)

The student will participate in an interactive Q&A session, where they will present and discuss their understanding of the applied aspects of the PNS. This includes questions related to the management of PNS disorders, emerging treatment strategies (e.g., nerve regeneration techniques or targeted therapies), and ethical considerations in patient care. Students will analyze and debate current clinical practices, offering insights on how the healthcare system can improve diagnosis, prevention, and management of PNS disorders. Peer discussion and feedback will encourage critical thinking and refinement of knowledge.

Experiential-Learning Learning 22.4: Applied Aspects of the Central Nervous System.

Total Learning Hours: 7 Hours

Activity 1: Understanding the Applied Aspects of the CNS (2 Hours)

The student will begin by reviewing the structure and function of the central nervous system (CNS) in relation to clinical and medical practices. This includes examining how the CNS impacts various bodily functions, neurological disorders and treatments. The student will identify key areas where the CNS plays a role in patient care, such as neurological assessments, diagnostic imaging and surgical interventions.

Activity 2: Analyzing Real-World Clinical Scenarios (1.5 Hours)

The student will analyze clinical case studies where CNS dysfunctions are prevalent, such as strokes, neurodegenerative diseases and brain injuries. They will examine the implications of these conditions on patient health, diagnostic techniques and treatment plans. Students will apply their understanding of CNS structure and function to these cases, exploring how the system's health directly influences clinical outcomes and care decisions.

Activity 3:Journal Club (JC): Applied Aspects of the Central Nervous System (2 Hours)

Students will review and present research articles or case studies focusing on applied aspects of the central nervous system, such as neural control of motor functions, cognitive processing and clinical conditions like stroke or multiple sclerosis. Discussions will emphasize the connection between anatomy, physiology and clinical practice, fostering critical thinking and collaborative analysis.

Activity 4: Discussion, Critical Thinking and Q&A Session (1.5 Hours)

During this interactive step, students will engage in a Q&A session where they will address real-world questions about the CNS's applied aspects, such as how emerging therapies or interventions can address CNS conditions. Students will discuss the limitations, ethical considerations and advancements in CNS research and treatments. They will present their own analyses and suggestions for improving clinical practices related to CNS disorders, encouraging peer discussion and feedback.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **Cross-Sectional Imaging Interpretation – 15 Marks** • **Task:** Students are given **cross-sectional images** (MRI/CT scans) of the **brain** and **spinal cord** for interpretation. **2. Applied Case Study Analysis – 12 Marks**	4

• Present students with **clinical case studies** that involve **applied aspects of the nervous system**, such as spinal cord injury, stroke, or neurodegenerative diseases. **3. Concept Map Creation – 8 Marks** Students will create a **concept map** that integrates **cross-sectional anatomy of the brain and spinal cord** with **clinical applications** (e.g., pathologies like multiple sclerosis, spinal cord lesions). **4. Objective Structured Practical Examination (OSPE) – 15 Marks** In this practical exam, students rotate through various stations focused on **cross-sectional anatomy and applied aspects** of the nervous system. Stations might include: **Brain anatomy station:** Identification of **key regions** on MRI/CT scans. **Spinal cord station:** Interpretation of **spinal cord injuries** or **pathologies** (e.g., disc herniation). **Clinical signs station:** Observing clinical symptoms and matching them to **specific brain/spinal cord lesions**. 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 assessment. (25 Marks)	

Semester No : 6

Module 23 : عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.

Module Learning Objectives

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

1 Describe the cranial and spinal nerves, upper motor neuron and lower motor neuron

2 Conduct the presentation, group discussion and clinical examination regarding the cranial and spinal nerves, upper motor neuron and lower motor neuron

3 Identify the cranial and spinal nerves, upper motor neurons and lower motor neurons.

Unit 1 عصب مرکزی(Asab-e- Markazi) Central Nerve. عصب محیطی(Asab-e- Muheeti) Peripheral Nerve. عصبی ضفیرات(Asabi Zafiraat) Nerve Plexuses.

23.1.1. عصب مرکزی(Asab-e- Markazi) Central Nerve.

23.1.2. عصب محیطی(Asab-e- Muheeti) Peripheral Nerve.

23.1.3. عصبی ضفیرات(Asabi Zafiraat) Nerve Plexuses.

References: 1,2,3,4,5,6,8,10,11,16,18,21,24,25,27,30,31,35

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the central nerves.	2	Lecture	CC	Know	BL,L&PPT ,L_VC,L&GD
CO1,CO4, CO7	Demonstrate the central nerves and their applied aspects.	4	Practical23.1	PSY-GUD	Shows-how	SIM,RLE,CBL,D
CO1,CO4, CO7	Analyze the central nerves and their applied aspects.	5	Experiential-Learning23.1	CAN	Does	DIS,PL,CBL,SDL
CO1,CO4, CO7	Analyze the Peripheral nerves and nerve plexuses.	4	Experiential-Learning23.2	CAN	Does	DIS,D,PL,CBL
CO1,CO4	Describe the peripheral nerves.	2	Lecture	CC	Know	L_VC,L&PPT ,BL,L&GD
CO1,CO4, CO7	Demonstrate the Peripheral nerves and nerve plexuses.	3	Practical23.2	PSY-GUD	Shows-how	SDL,D,D-M,SIM,IBL
CO1,CO4	Describe the Nerve plexuses.	1	Lecture	CC	Knows-how	L_VC,L&PPT ,BL,L&GD

CO1,CO4, CO7	Analyze the applied aspects Peripheral nerves and nerve plexuses.	4	Experiential-Learning23.3	CAN	Shows-how	CBL,DIS,SDL,CD
CO1,CO4, CO7	Demonstrate the applied aspects of Peripheral nerves and nerve plexuses.	3	Practical23.3	PSY-GUD	Does	D-M,D,PL,CBL

Unit 2 عصبیہ حرکی اعلیٰ(Asabiyah Harki, A'la) Upper motor Neuron. عصبیہ حرکی اسفل(Asbiyah Harki asfal) Lower motor Neuron.

23.2.1. عصبیہ حرکی اعلیٰ(Asabiyah Harki, A'la) Upper motor Neuron.

23.2.2. عصبیہ حرکی اسفل(Asbiyah Harki asfal) Lower motor Neuron.

References: 1,2,3,4,5,6,7,8,9,10,11,16,21,24,25,27,30,31,35,42,53,54,58,75,79,101,105

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the upper motor neurons in detail.	3	Lecture	CC	Know	BL,L&GD,L_VC,L&PPT
CO1,CO4, CO7	Demonstrate the Upper motor Neurons and their applied aspects.	5	Practical23.4	PSY-GUD	Shows-how	CBL,D-BED,PL,SIM,D
CO1,CO4, CO7	Analyze the upper motor neuron and their applied aspects.	6	Experiential-Learning23.4	CAN	Does	DIS,FC,BS,JC,PER
CO1,CO4, CO7	Analyze the Lower motor Neurons and their applied aspects.	7	Experiential-Learning23.5	CAN	Does	D,CBL,SIM,D-BED
CO1,CO4	Describe the lower motor neurons in detail.	2	Lecture	CC	Know	PL,L&PPT ,BL,L_VC,L&GD

CO1,CO4, CO7	Demonstrate the lower motor Neurons and their applied aspects.	5	Practical23.5	PSY-MEC	Shows-how	D,SIM,CD,D-BED

Practical Training Activity

Practical Training 23.1 Applied Aspects of Central Nerves.

Total Learning Hours: 4:00 Hours

Activity 1: Teacher Demonstration (1 Hour)

The Teacher will provide an overview of central nerves, their anatomical pathways and clinical significance using models, diagrams and imaging techniques. Real-life cases will be introduced to highlight applied aspects.

Activity 2: Student Hands-on Illustration (1 Hour)

Students will create detailed anatomical illustrations of central nerves, labeling key structures and pathways. They will analyze case-based scenarios where central nerve dysfunctions impact neurological function.

Activity 3: Functional Demonstration & Group Discussion (1 Hour)

Students will collaborate in small groups to demonstrate nerve functions using interactive activities and simulations. They will discuss clinical manifestations of central nerve damage and possible diagnostic approaches.

Activity 4: Q&A and Case Analysis (1 Hour)

A Q&A session will be conducted where students will analyze case studies related to central nerve disorders. They will present findings and discuss their clinical applications, reinforcing theoretical and practical understanding.

Practical Training 23.2 Peripheral nerves and nerve plexuses

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 min)

The instructor will provide an overview of peripheral nerves and nerve plexuses, explaining their anatomical organization, functions, and clinical significance. A live or digital demonstration will illustrate key nerve pathways and common nerve injuries.

Activity 2: Student Illustration and Mapping (60 min)

Students will sketch and label major peripheral nerves and plexuses (e.g., brachial, lumbar, sacral) on anatomical charts or models. They will identify key landmarks and trace nerve distributions to specific muscles and sensory areas.

Activity 3: Hands-on Demonstration (60 min)

Students will work in groups to locate and palpate nerve landmarks on each other or anatomical models. They will simulate nerve conduction pathways and discuss potential dysfunctions related to nerve compression or trauma.

Activity 4: Case-Based Application and Q&A (30 min)

Students will analyze case studies involving nerve injuries, such as carpal tunnel syndrome or sciatica. They will propose diagnostic and treatment approaches, followed by a Q&A session to reinforce their understanding of applied aspects.

Practical Training 23.3 Applied Aspects of Peripheral Nerves and Nerve Plexuses

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 min)

The teacher will illustrate the anatomy, function and clinical significance of peripheral nerves and nerve plexuses using anatomical models, diagrams and digital imaging. Key applied aspects, such as nerve injuries, neuropathies and surgical implications, will be explained.

Activity 2: Student Hands-on Illustration (60 min)

Students will create labeled diagrams of major nerve plexuses (cervical, brachial, lumbar, sacral) and their clinical correlations. They will analyze nerve pathways and mark potential sites of injury.

Activity 3: Case-Based Discussion & Application (60 min)

Students will examine real or simulated clinical cases involving nerve damage (e.g., carpal tunnel syndrome, sciatica). They will discuss symptoms, diagnostic approaches and potential treatments.

Step 4: Interactive Q&A and Peer Review (30 min) Students will present their findings and diagrams to peers for feedback. The instructor will facilitate a Q&A session to clarify doubts and reinforce key concepts related to the applied aspects of peripheral nerves and plexuses.
Practical Training 23.4 Applied Aspects of Upper motor Neurons
Total Learning Hours: 5:00 Hours Activity 1: Teacher Demonstration (60 Min) TheTeacher will illustrate the structure, function and pathways of upper motor neurons (UMNs) using detailed diagrams and models. They will also explain common clinical conditions related to UMN lesions, such as spasticity and hyperreflexia. Activity 2: Student Illustration (90 Min) Students will then draw diagrams to represent the UMN pathways, labeling key structures such as the motor cortex, corticospinal tract and brainstem. They will also identify the anatomical regions affected by UMN damage. Activity 3: Student Demonstration (90 Min) In small groups, students will simulate neurological assessments related to UMN lesions, including reflex testing (e.g., Babinski sign) and discuss the implications of findings for diagnosis and treatment planning. Activity 4: Q&A Session (60 Min) A discussion and Q&A session will follow, where students will share their observations, clarify doubts, and apply their knowledge to clinical case studies to deepen their understanding of the applied aspects of UMN function and disorders.
Practical Training 23.5 Applied aspect of lower motor neurons (LMNs).
Total Learning Hours: 5:00 Hours Activity 1: Teacher Demonstration:(60 Min)

The teacher will begin by illustrating the structure and function of lower motor neurons (LMNs), explaining their role in transmitting signals from the spinal cord to muscles. Key concepts, such as the neuromuscular junction, reflex arcs and motor neuron diseases (e.g., ALS), will be covered.

Activity 2: Student Illustration (90 Min)

Students will illustrate the anatomy of LMNs, including their pathway from the spinal cord to muscle groups. They will mark relevant structures such as the anterior horn of the spinal cord, nerve roots and target muscles.

Activity 3: Practical Application (90 Min)

Students will simulate clinical scenarios involving LMN dysfunction, such as assessing signs of weakness, muscle atrophy and reflex abnormalities in a patient. They will practice identifying symptoms associated with LMN disorders.

Activity 4: Q&A and Reflection (60 Min)

Students will engage in a Q&A session to discuss their findings and any challenges faced during the activity. The teacher will facilitate a discussion to clarify the clinical significance of LMN involvement in neurological conditions.

Experiential Learning Activity

Experiential-Learning Learning 23.1: Central Nerve and its applied aspects

Total Learning Hours: 5:00 Hours

Activity 1: Explore the Anatomy and Function of the Central Nervous System (CNS) (1 Hour)

The student will begin by studying the structure and function of the central nervous system, including the brain and spinal cord. They will learn about the key components of the CNS, such as the cerebrum, cerebellum, brainstem, spinal cord and understand their roles in processing sensory input, coordinating motor output and regulating autonomic functions. The student will explore how the CNS integrates information, controls bodily functions and supports cognition, emotion and memory.

Activity 2: Analyze Clinical Case Studies and Applied Aspects of CNS Disorders (1 Hour)

The student will analyze clinical case studies that highlight common CNS disorders, such as stroke, multiple sclerosis (MS), spinal cord injuries and neurodegenerative diseases. They will investigate how these conditions disrupt normal CNS functions, leading to symptoms like paralysis, cognitive impairments

and sensory loss. Students will discuss diagnostic techniques, such as neuroimaging and neurological examinations, to assess CNS dysfunction and formulate treatment approaches.

Activity 3: Apply Therapeutic Approaches and Discuss Future Advances (2 Hours)

In this step, students will discuss and critically evaluate various therapeutic approaches used in the treatment of CNS disorders, including pharmacological treatments, surgical interventions and rehabilitation strategies. They will explore current research advancements, such as stem cell therapy and neuroplasticity, that aim to improve recovery and rehabilitation for CNS patients. Students will engage in a Q&A session to address questions about the challenges in treating CNS disorders and discuss future possibilities in neuroscience.

Activity 4 : Q&A Session (1 Hour)

In this interactive session, students will participate in a Q&A to clarify any uncertainties regarding the anatomy, function, clinical cases and applied aspects of the CNS. The session will allow students to engage with their peers and the instructor, exchange insights and deepen their understanding of CNS disorders and treatment options.

Experiential-Learning Learning 23.2: Peripheral nerves and Nerve Plexuses

Total Learning Hours : 4:00 Hours

Activity 1: Study the Structure and Function of Peripheral Nerves and Plexuses (1 Hour)

The student will begin by studying the anatomy of the peripheral nervous system (PNS), including the types of peripheral nerves (sensory, motor, and mixed) and their roles in transmitting signals between the central nervous system (CNS) and the rest of the body. They will focus on the major nerve plexuses: the brachial, lumbar, sacral and cervical plexuses and understand their contributions to sensory and motor functions in specific regions of the body. The student will also learn how these plexuses form intricate networks that enable movement and sensation.

Activity 2: Analyze Clinical Cases and Pathologies Involving Peripheral Nerves and Plexuses (1 Hour)

In this step, the student will analyze clinical case studies involving damage or dysfunction in the peripheral nerves and nerve plexuses. Students will study conditions such as brachial plexus injuries, carpal tunnel syndrome, sciatica, and other neuropathies. They will learn how these conditions affect motor and

sensory functions, and discuss diagnostic approaches such as electromyography (EMG), nerve conduction studies, and imaging techniques. The student will also explore the clinical implications of peripheral nerve injuries and possible treatment options.

Activity 3: Discuss Treatment and Rehabilitation of Peripheral Nerve Disorders (1 Hour)

Students will explore therapeutic approaches used in the treatment of peripheral nerve disorders, including pharmacological interventions, physical therapy, surgical procedures and nerve regeneration techniques. They will also analyze emerging treatments, such as nerve grafts and bioelectronic devices,which aim to repair or regenerate damaged peripheral nerves. The student will engage in a Q&A session where they will present their findings, discuss therapeutic options and reflect on the challenges of managing nerve injuries.

Activity 4: Q&A Session: (1 Hour)

In this interactive session, students will have the opportunity to ask questions, clarify doubts, and deepen their understanding of the anatomical and clinical aspects of the peripheral nerves and nerve plexuses. They will discuss complex scenarios and treatment options with peers and the instructor to consolidate their knowledge.

Experiential-Learning Learning 23.3: Applied Aspects of Peripheral nerves and nerve plexuses

Total Learning Hours :4:00 Hours

Activity 1: Case-Based Analysis (60 Min)

Students will examine real or simulated clinical cases involving peripheral nerve injuries, nerve compression syndromes, or plexus disorders. They will analyze anatomical structures, pathways and functional impairments to determine the clinical presentation and consequences of these conditions.

Activity 2: Practical Application & Discussion (120 Min)

Students will collaborate in groups to map nerve distributions, identify affected regions in various clinical scenarios and propose potential diagnostic and treatment approaches. They will compare findings and discuss real-world applications of their knowledge in neurological assessments and rehabilitation strategies.

Activity 3: Q & A Session and Critical Review (60 Min)

Students will engage in a guided Q&A session where they present their analyses and receive instructor and peer feedback. They will discuss challenges in diagnosis and treatment, refining their understanding of the applied aspects of peripheral nerve anatomy and plexuses in clinical practice.

Experiential-Learning Learning 23.4: Applied aspect of Upper Motor Neuron
Total Learning Hours: 6:00 Hours Activity 1: Concept Review and Analysis (1.5 Hours) Students begin by revisiting theoretical knowledge of the upper motor neuron (UMN) structure, pathways and functions through focused study guides or multimedia content. They collaboratively analyze the role of UMNs in motor control, emphasizing key differences between UMNs and lower motor neurons and participate in structured discussions to consolidate their understanding. Activity 2: Clinical Correlation and Case Study (1.5 Hours) Students dive into detailed clinical case scenarios, such as stroke, spinal cord injuries, or neurodegenerative disorders affecting UMN pathways. They work in small groups to identify UMN lesion signs such as spasticity, hyperreflexia, or paralysis, comparing these with related lower motor neuron presentations to enhance clinical differentiation. Visual aids like MRI images or patient symptom charts are introduced to foster real-world diagnostic thinking. Activity 3: Q&A Session and Group Discussion (1 Hour) Students engage in a dynamic Q&A session, where facilitators guide them through nuanced case analyses, focusing on points of clinical uncertainty or debate. Group discussions expand into differential diagnoses, emphasizing how UMN-related knowledge informs clinical decision-making and treatment planning. Activity 4: Journal Club Activity (2 Hours) Students select and review recent research articles, clinical studies, or meta-analyses related to UMN disorders, forming diverse perspectives on the selected topics. Presentations are followed by peer-led discussions and critical appraisals, encouraging students to evaluate the methodological rigor, findings and relevance to modern clinical practice. Participants collaboratively brainstorm innovative research ideas based on knowledge gaps identified during the activity.
Experiential-Learning Learning 23.5: Applied aspect of Lower Motor Neuron (LMN) lesions.

Total Learning Hours: 7:00 Hours

Activity 1: Case-Based Discussion (Application of Knowledge) (2 Hours)

Students will be presented with a clinical case related to Lower Motor Neuron (LMN) lesions, such as a patient with flaccid paralysis, muscle atrophy, and hyporeflexia. They will work in groups to analyze the case, identify the affected neural structures, and explain the underlying neurophysiology.

Activity 2: Hands-On Neurological Examination (Skill Development) (2.5 Hours)

Students will practice neurological examination techniques (e.g., muscle tone assessment, deep tendon reflex testing, and nerve conduction studies) on simulated patients or peers. They will document their findings and interpret results based on LMN dysfunction.

Activity 3: Clinical Correlation & Problem-Solving (Critical Thinking & Integration) (2.5 Hours)

Students will be presented with multiple differential diagnosis scenarios where they must distinguish between LMN disorders such as Guillain-Barré Syndrome, Poliomyelitis, and Peripheral Neuropathy. They will work in teams to formulate a diagnosis and propose management strategies.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Diagnostic Imaging Quiz – 20 Marks** **Teacher will** Provide **cross-sectional images** (MRI/CT) showing lesions in the **central nervous system** or **peripheral nerve** involvement. Students need to: Identify the **location and type** of the lesion (e.g., upper motor neuron or lower motor neuron). Explain the **implications** of the lesion in terms of motor and sensory function (e.g., paralysis, reflex changes). **2. Concept Map – 8 Marks**	4

• Students create a **concept map** linking the **upper motor neurons**, **lower motor neurons**, **central nervous system**, **peripheral nervous system**, and **nerve plexuses**. **3. Practical Clinical Examination – 12 Marks** Students will demonstrate practical **neurological assessments** to detect signs of **upper motor neuron (UMN)** and **lower motor neuron (LMN)** dysfunction. For example, testing reflexes, muscle tone, and voluntary movement. **4. Case-Based Discussion – 10 Marks** **Teacher will** Provide a **clinical case study** with symptoms of **motor and sensory dysfunction**. For example, a patient presents with **weakness**, **loss of muscle tone**, **atrophy**, or **fasciculations**. 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 assessment. (25 Marks)	
Module 24 : مجموعہ ثریری(Majmo'ah-e- Sareeri) Thalamic complex ,نظام بطنی وخلاء تحت العنکبوت(Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) Ventricular system and Sub Arachnoid spaces.	
Module Learning Objectives (At the end of the module, the students should be able to) 1 Describe the thalamic complex and ventricular system of the brain. 2 Conduct the presentation, group discussion and clinical examination regarding the thalamic complex, ventricular system of the brain. 3 Identify the different components of the thalamic complex and ventricular system of the brain. and Clinical presentation of ventricles of Brain.	
Unit 1 سریرمؤخر(Sareer-e-Moakh'ar) Dorsal thalamus. سریرمقدم(Sareer-e-Muqaddam) Ventral thalamus. 24.1.1. سریرمؤخر(Sareer-e-Moakh'ar) Dorsal thalamus. 24.1.2. سریرمقدم(Sareer-e-Muqaddam) Ventral thalamus.	

References: 1,2,3,4,5,6,7,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO1,CO4	Describe the Dorsal thalamus.	3	Lecture	CC	Know	L&GD,BL,L&PPT ,L_VC
CO1,CO4, CO7	Demonstrate the Dorsal thalamus.	5	Practical24.1	PSY-GUD	Shows-how	D-M,CBL,PER,SIM,FC
CO1,CO4, CO7	Analyze the Ventral thalamus.	6	Experiential-Learning24.1	CAN	Does	RP,PL,PER,DIS,PBL
CO1,CO4	Describe the Ventral thalamus.	2	Lecture	CC	Know	SDL,L&PPT ,BL,L&GD,L_VC
CO1,CO4, CO7	Analyze the Dorsal thalamus.	7	Experiential-Learning24.2	CAN	Does	FC,CBL,IBL,SDL,PER
CO1,CO4, CO7	Demonstrate the Ventral thalamus.	5	Practical24.2	PSY-GUD	Shows-how	PL,DIS,D-M,CBL
Unit 2 نظام بطنی(Nizam-e-Batani)Ventricular system. خلاء تحت العنکبوت(Khil'a Tahat-e-Ankabutiyah) Sub Arachnoid spaces. 24.2.1. نظام بطنی (Nizam-e-Batani)Ventricular system. 24.2.2. خلاء تحت عنکبوتیہ(Khil'a Tahat-e-Ankabutiyah) Sub Arachnoid spaces. **References:** 1,2,3,4,5,6,7,8,10,11,16,21,24,25,27,30,31,35,42,53,54,58,62,64,75,77,79,101,105						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**

CO1,CO4, CO7	Describe the Ventricular system of the brain and its applied aspects.	3	Lecture	CC	Know	L&PPT ,BL,L&GD,L_VC
CO1,CO4, CO7	Demonstrate the Ventricular system of the brain and its applied aspects.	5	Practical24.3	PSY-GUD	Shows-how	D-M,PER,PL,DIS,CBL
CO1,CO4, CO7	Analyze the Ventricular system of the brain and its applied aspects.	7	Experiential-Learning24.3	CAN	Does	PER,DIS,JC,PL,CBL
CO1,CO4, CO7	Describe the Sub Arachnoid spaces of the brain and its applied aspects.	2	Lecture	CC	Know	L_VC,L&PPT ,L&GD
CO1,CO4, CO7	Demonstrate the Sub Arachnoid spaces of the brain and its applied aspects.	5	Practical24.4	PSY-GUD	Shows-how	D-M,PER,D,CBL
CO1,CO4, CO7	Analyze the Sub Arachnoid spaces of the brain and its applied aspects.	6	Experiential-Learning24.4	CAN	Does	FC,PER,CBL,IBL,PL

Practical Training Activity

Practical Training 24.1 Dorsal Thalamus.

Total Learning Hours: 5 Hours

Activity 1: Teacher Demonstration (60 Min)

Students will learn about the dorsal thalamus through an interactive demonstration using 3D models, virtual anatomy software, or holographic projections. The explanation will focus on thalamic nuclei, their connections and sensory relay functions, fostering foundational understanding.

Activity 2: Brain Dissection (60 Min)

Students will observe preserved brain specimens or prosected samples or through virtual dissection to locate the dorsal thalamus. They will identify major thalamic nuclei and discuss their roles in sensory processing. This hands-on activity strengthens anatomical identification skills and real-world application. Activity 3: Clinical Case-Based Discussion (90 Min) Students will analyze real or simulated clinical cases involving thalamic lesions, sensory deficits, or pain syndromes. They will correlate anatomical knowledge with MRI/CT findings and neurological symptoms, enhancing their ability to connect theory to clinical practice. Activity 4: 3D Model / Poster Creation (90 Min) Students will collaborate in groups to design 3D models (clay, printed, or digital) or create educational posters illustrating the dorsal thalamus's anatomy, nuclei and functions. They will present their models or posters to the class, focusing on clinical correlations and functional relevance.
Practical Training 24.2 Ventral Thalamus.
Total Learning Hours: 5 Hours Activity 1: Visual Demonstration Using Models or Virtual Tools (60 Min) The teacher will demonstrate the anatomical and functional aspects of the ventral thalamus using 3D anatomical models or virtual anatomy software. The teacher will highlight its location, subnuclei and their roles in sensory and motor integration, making use of annotations and interactive features. Students will observe the demonstration attentively, take detailed notes and ask questions to ensure clarity. They will then label diagrams or sketches provided by the teacher to consolidate their understanding. Activity 2: Guided Hands-on Dissection or Prosection (90 Min) The teacher will guide a hands-on activity where students examine brain specimens or a virtual prosection. The teacher will help students locate and identify the ventral thalamus and its connections to surrounding structures. Students will actively engage by handling or observing specimens under supervision and pinpointing the ventral thalamus. They will discuss with peers how its position and structure relate to its sensory and motor roles. Activity 3: Case-Based Learning with Role Play (90 Min)

Teacher will present a clinical case involving dysfunctions of the ventral thalamus, such as movement disorders or sensory processing issues. Real diagnostic tools like CT or MRI scans will be introduced as part of the discussion.

Students will assume roles such as neurologists, radiologists or patients. Each group will analyze the case collaboratively.

Activity 4: Collaborative Q&A and Peer Presentations (60 Min)

Teacher will facilitate a Q&A session, clarifying doubts and encouraging critical thinking about the ventral thalamus.The teacher will provide feedback during group presentations.

Students will form groups to prepare and present topics related to the ventral thalamus, such as its role in motor control and sensory processing or its clinical relevance. They will use diagrams, case data or multimedia resources to enhance their presentations.

Practical Training 24.3 Applied Aspects of the Ventricular System

Total Learning Hours : 5 Hours

Activity 1: Demonstration (60 Min)

The teacher will demonstrate the ventricular system of the brain using 3D anatomical models or virtual anatomy software. The teacher highlights the structure, CSF pathways and connections with surrounding regions.

Students will observe the demonstration and note key features.They will label diagrams provided during the session to consolidate understanding and ask questions for clarification.

Activity 2: Student Engagement (60 Min)

The teacher will guide a hands-on activity with brain specimens or virtual prosection, focusing on identifying the ventricular system's anatomical features and connections with cortical structures.

Students will engage by observing or handling specimens under supervision, locating key ventricular structures and discussing their functional significance and clinical implications in small groups.

Activity 3: Clinical Correlation Using Imaging (MRI/CT) (60 Min)

The teacher will demonstrate diagnostic imaging techniques, such as MRI and CT scans, to illustrate the ventricular system's anatomy and its involvement in disorders like hydrocephalus or ventriculitis.

Students will analyze the imaging provided and correlate anatomical observations with clinical presentations. They will work collaboratively to discuss potential diagnoses and treatment approaches based on the scans.

Activity 4: Q&A and Peer Teaching (60 Min)

The teacher will facilitate a Q&A session and provide guidance for peer teaching.

Students will prepare short presentations as part of peer teaching, explaining the anatomical and functional aspects of the ventricular system and its applied clinical relevance. They will use diagrams or case data to enhance their explanations.

Activity 5: Problem-Based Learning (PBL) (60 Min)

The teacher will introduce a clinical case scenario involving a ventricular system disorder, such as hydrocephalus. The case includes patient history, imaging data and symptoms.

Students will work in teams to solve the case by identifying the underlying anatomical and functional issues, proposing diagnostic steps and suggesting therapeutic approaches. Each group will present their findings and solutions to their peers.

Practical Training 24.4 Applied Aspects of Sub Arachnoid Spaces

Total Learning Hours : 5 Hours

Activity 1: Teacher Demonstration (3D Model/Virtual Simulation (60 Min)

Teacher will demonstrate the anatomical features of the subarachnoid space using 3D models or virtual anatomy software. Key structures such as cisterns, arachnoid villi and cerebrospinal fluid (CSF) pathways will be highlighted, with the use of labels and interactive features to ensure clarity.

Students will observe the demonstration, taking notes on the highlighted structures and their functions. They will ask questions for further clarification and identify the clinical significance of these anatomical features.

Activity 2: Hands-on Dissection / Prosection (90 Min)

The teacher will provide guided demonstrations of brain specimens, focusing on locating and identifying subarachnoid spaces and major cisterns. Facilitate discussions on the role of the subarachnoid space in CSF circulation and its involvement in clinical conditions like subarachnoid hemorrhage.

Students will observe and engage with the brain specimens, locating and identifying key structures under the teacher's guidance. They will participate in a discussion by relating anatomical observations to CSF circulation and associated clinical conditions.

Activity 3: Applied Aspect Analysis through Case Discussion (90 Min)

The teacher will introduce clinical cases involving subarachnoid hemorrhage, meningitis or hydrocephalus. Present diagnostic imaging such as CT or MRI scans and guide students in correlating anatomical knowledge with clinical findings.

Students will analyze provided case scenarios in small groups, identifying key diagnostic features and correlating them with their anatomical knowledge. They will participate in discussions to deepen understanding of the applied aspects of these conditions.

Activity 4: Q&A Session and Group Presentation (60 Min)

Teacher will facilitate a Q&A session to address any remaining doubts or gaps in understanding. Provide constructive feedback on group presentations and help connect clinical relevance to the concepts discussed.

Students will engage in the Q&A session, actively clarifying concepts and sharing insights. In small groups, they will prepare and present their findings, highlighting clinical relevance and complications related to subarachnoid spaces.

Experiential Learning Activity

Experiential-Learning Learning 24.1: Ventral Thalamus

Total Learning Hours : 6:00 Hours

Activity 1: Structural Exploration and Functional Analysis (90 Min)

Students will examine the anatomy of the ventral thalamus, focusing on its key nuclei and their roles in sensory and motor pathways, particularly in motor coordination and relay functions.

Students will use 3D anatomical models, histological slides, and neuroimaging scans to study the structures. They will collaborate in groups to discuss findings and label diagrams to reinforce their knowledge.

Activity 2: Clinical Case Analysis (90 Min)

Students will analyze case studies where dysfunction in the ventral thalamus is implicated in neurological disorders such as Parkinson's disease or stroke. They will discuss how these disorders impact movement and sensory processing.

Students will review imaging data, identify symptoms and correlate anatomical observations with clinical presentations. They will participate in collaborative discussions to deepen understanding and develop diagnostic reasoning.

Activity 3: Interactive Q&A and Collaborative Reflection (90 Min)

Students will participate in a Q&A session to clarify findings, address gaps in knowledge, and deepen their understanding of the ventral thalamus's applied aspects in clinical neurology.

Students will engage in open discussions, share questions with peers and reflect on feedback to refine their knowledge and confidence.

Activity 4: Applied Role Play and Problem-Based Learning (90 Min)

Students will engage in role play and problem-based learning to solve clinical scenarios involving ventral thalamus disorders. They will explore real-world applications of anatomical and clinical knowledge.

Students will take on roles like neurologists, radiologists, or patients to analyze and solve the presented case. Teams will collaborate to propose diagnostic steps and treatment approaches, presenting their solutions to the class.

Experiential-Learning Learning 24.2: Dorsal Thalamus

Total Learning Hours: 7:00 Hours

Activity 1: Exploration and Structural Analysis (2.5 Hours)

Students will study the anatomy, nuclei and functional organization of the dorsal thalamus using anatomical models, histological slides and neuroimaging scans (MRI/CT). They will identify key thalamic nuclei and their connections with cortical and subcortical structures. Students will prepare a concise presentation as part of a peer teaching exercise, where they will explain the identified structures, their roles and clinical relevance to their classmates, fostering collaborative learning and reinforcing knowledge.

Activity 2: Functional and Clinical Correlation (2.5 Hours)

Students will analyze case studies related to thalamic dysfunction, such as sensory disturbances, thalamic pain syndrome and motor impairments. They will discuss the role of the thalamus in sensory processing, cognition and motor coordination.

Activity 3: Q&A and Interactive Discussion (2 Hours)

Students will participate in a Q&A session to discuss applied aspects of the dorsal thalamus, debating its role in neurological disorders and therapeutic interventions. They will engage in critical discussions on recent advancements in thalamic research and neurorehabilitation.

Experiential-Learning Learning 24.3: Applied Aspects of Ventricular System

Total Learning Hours: 7:00 Hours

Activity 1: Exploration and Analysis (2 Hours)

Students will study the structure, function and circulation of cerebrospinal fluid (CSF) within the ventricular system through detailed examination of anatomical models, cross-sectional images and radiological scans (MRI/CT). They will focus on understanding the organization of ventricles, their spatial connections and how CSF flows within this system. Students will collaboratively analyze the observed features, documenting key insights on the anatomical pathways and functional significance of CSF circulation. They will prepare brief presentations to share their findings and interpretations with peers, fostering deeper comprehension and interactive learning.

Activity 2: Case-Based Application (2 Hours)

Students will analyze clinical cases related to ventricular system disorders, such as hydrocephalus, CSF obstruction and infections. They will discuss diagnostic approaches and imaging techniques used to assess these conditions.

Activity 3: Journal Club (2 Hours)

Students will review and present research articles or case studies related to the ventricular system's anatomy, CSF circulation and clinical applications. Students will critically analyze the findings, prepare concise presentations focusing on anatomical and clinical relevance and share their insights with peers to foster collaborative learning and deeper understanding.

Activity 4: Q&A and Critical Discussion (1 Hour)

Students will engage in a Q&A session, debating the implications of ventricular dysfunctions and proposing medical or surgical management strategies. They will refine their understanding by addressing real-world challenges in neurology and neurosurgery
Experiential-Learning Learning 24.4: Applied Aspects of Sub Arachnoid Spaces
Total Learning Hours: 6 Hours Activity 1: Case-Based Analysis (2 Hours) Students will examine clinical scenarios related to the subarachnoid space, such as cerebrospinal fluid (CSF) circulation disorders, hemorrhages or infections. They will analyze imaging studies (MRI/CT) to identify abnormalities. Activity 2: Application of Theoretical Knowledge (2 Hours) Students will correlate anatomical structures with clinical conditions, discussing the impact of subarachnoid hemorrhages, meningitis and hydrocephalus. They will propose diagnostic and therapeutic approaches based on their findings. Activity 3: Q&A and Critical Discussion (2 Hours) Students will participate in an interactive session, debating clinical cases and refining their understanding through faculty-led discussions. They will address key questions related to CSF dynamics, pathology and neurosurgical interventions
Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Total Hours of the Assessment: 4:00 Hours 1. Research Paper Presentation – 20 Marks	4

Students are assigned to research a recent scientific paper related to one of the topics (e.g., thalamic function, hydrocephalus, subarachnoid hemorrhage). They will present their findings to the class, summarizing the paper's objectives, methodology, findings, and clinical relevance. 2. Virtual Anatomy Tour and Quiz – 10 Marks Students participate in an interactive virtual anatomy tour that includes 3D models of the thalamus, ventricular system, and subarachnoid spaces. During the tour, students answer a set of interactive quiz questions based on anatomical landmarks and functions of these structures. 3. Peer Teaching and Discussion – 10 Marks Students work in small groups to teach a specific topic related to the thalamus, ventricular system, or subarachnoid spaces. They will create a teaching session (e.g., a presentation or interactive discussion) for their peers. 4. Clinical Problem-Solving Exercise – 10 Marks Provide students with a complex clinical problem that involves the dorsal/ventral thalamus, ventricular system, or subarachnoid space (e.g., a patient presenting with acute confusion, loss of consciousness, and headache potentially indicating a subarachnoid hemorrhage). 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 assessment. (25 Marks)	

Paper No : 4(تشریح سطحی،شعاعی،قانونی وجدید تشریحی تحقیقات)Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)

Semester No : 3

Module 25 : خطہ راس وعنق کی سطحی تحدید(Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region.

Module Learning Objectives

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

1 Describe: the key anatomical landmarks and structures of the head and neck region, including the bones, muscles, blood vessels, and nerves and explain their clinical significance.

2 Conduct: the Surface marking of Head region and Neck region

3 Identify: a detailed surface anatomy examination of the head and neck region, demonstrating proficiency in locating anatomical features using palpation.

Unit 1 خطہ راس کی سطحی تحدید(Khitta-e-Ra's ki satahi Tahdeed) Surface marking of Head region.

25.1.1. خطہ راس کی سطحی تحدید (Khitta-e-Ra's ki satahi Tahdeed) Surface marking of Head region.

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe dermatomes of the Head	1	Lecture	CC	Knows-how	L&PPT ,BL,DIS
CO1,CO4	Describe the surface anatomy of Superior Sagittal Sinus, Accessory, Vagus, Glassopharyngeal, Hypoglossal and Facial Nerve.	1	Lecture	CE	Knows-how	L&PPT ,BL,L_VC,D-M
CO1,CO4	Evaluate motor speech, sensory,auditory and visual areas	1	Lecture	CE	Knows-how	L_VC,DIS,L&GD

CO1,CO4	Describe the surface anatomy of Longitudinal Fissure, Lateral Sulcus (Sylvian Fissure) ,superior, Inferior Frontal Sulcus, Lateral Ventricle and Superior Temporal Sulcus.	1	Lecture	CE	Knows-how	DIS,L&GD,L&PPT
CO1,CO4	Evaluate the Bony Landmarks of the Head	1	Lecture	CE	Knows-how	L&PPT ,D-M,SIM
CO1,CO4, CO7	Assess a thorough assessment of cranial nerves related to facial movements and sensations and performs a simulated clinical examination of the head, integrating surface anatomical knowledge with patient assessment.	2	Practical25.1	PSY-GUD	Shows-how	PER,SIM,IBL,D-M,L_VC
CO1,CO4, CO7	Demonstrate key Anatomical landmarks, differentiate muscle attachment points and apply palpation techniques in functional movement of the head.	2	Practical25.2	PSY-GUD	Shows-how	L_VC,IBL,D-M,FC
CO1,CO4	Create a 3D model of the head, accurately representing surface anatomy and key landmarks including illustration of dermatome and design precise anatomical diagrams illustrating sutures and Fontanelles.	2	Practical25.3	PSY-ORG	Shows-how	D,PT,D-M,PrBL
CO1,CO4	Demonstrate the temporomandibular joint by feeling for the condylar process while the patient opens and closes their mouth and assess for any tenderness or abnormal movement.	2	Practical25.4	PSY-GUD	Shows-how	PBL,TBL,D-M
CO1,CO4	Palpate and identify the external auditory canal and its external opening (external acoustic meatus), understanding its role in ear-related examinations and its clinical significance in conditions like otitis externa.	2	Practical25.5	PSY-GUD	Shows-how	D-BED,L&PPT ,PT
CO1,CO4, CO7	Design a comprehensive clinical examination protocol using surface landmarks to evaluate the functional status of the cranial nerves.	3	Experiential-Learning25.1	PSY-ORG	Does	SDL,PAL,CBL,L&GD

CO1,CO4, CO7	Analyse the implications of injuries to surface landmarks for underlying neurovascular structures.	4	Experiential-Learning25.2	CAN	Does	BL,L&PPT ,CBL,PL
CO1,CO4	Assess skin and soft tissue structures, including the scalp and forehead, to identify abnormalities such as cysts, scars or lesions that may indicate dermatologic or systemic conditions.	3	Experiential-Learning25.3	CE	Does	JC,CBL,PAL,SDL,L&PPT
CO1,CO4	Formulate hypotheses about the origin of referred pain or sensory abnormalities based on surface anatomy of the head	3	Experiential-Learning25.4	CS	Does	SIM,JC,DIS,ML,IBL

Unit 2 خطہ عنق کی سطحی تحدید(Khitta-e- Unq ki satahi Tahdeed) Surface marking of Neck region.

25.2.1. خطہ عنق کی سطحی تحدید(Khitta-e- Unq ki satahi Tahdeed) Surface marking of Neck region.

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe the surface anatomy of Parotid Gland, Parotid Duct, Thyroid Gland and Submandibular Gland.	1	Lecture	CC	Knows-how	L_VC,D-M,L&PPT
CO1,CO4	Describe the surface anatomy of Frontal Sinus, Maxillary Sinus, Palatine Tonsil and Suprameatal Triangle.	1	Lecture	CC	Knows-how	L&PPT ,L&GD,D
CO1,CO4	Describe the surface anatomy of Facial, Common Carotid, External Carotid, Internal Carotid and Middle Meningeal Arteries.	1	Lecture	CE	Knows-how	L&PPT ,L&GD,DIS

CO1,CO4	Evaluate the surface anatomy of Subclavian Vessels, Vocal Cord, Facial ,External Jugular and Internal Jugular Veins.	1	Lecture	CE	Knows-how	L,L&GD,DIS
CO1,CO4	Describe the bony landmarks and Dermatomes of the Neck	1	Lecture	CE	Knows-how	D,L&PPT ,D-M
CO1,CO4, CO7	**Investigate the relationship between surface anatomy and pain referral patterns**, understanding how neck pain or discomfort may indicate underlying conditions affecting deeper structures.	4	Experiential-Learning25.5	CAN	Does	IBL,CBL,D,L&PPT
CO1,CO4, CO7	Analyse the surface anatomy of the neck across different populations, recognizing variations in age, gender or health status and their impact on clinical assessments.	5	Experiential-Learning25.6	CAN	Does	D,L&PPT ,PL
CO1,CO4	Document research studies to investigate the role of surface anatomy of the neck in diagnosing the diseases of the deeper organs.	4	Experiential-Learning25.7	AFT-VAL	Does	D,IBL,PAL,RP
CO1,CO4	Apply surface anatomy knowledge to accurately position a patient for clinical procedures such as tracheostomy, central venous catheterization or thyroid examination.	2	Practical25.6	PSY-GUD	Shows-how	SIM,D-M
CO1,CO4, CO7	Practice range of motion assessments of the neck by palpating muscular and bony structures during flexion, extension and rotation.	2	Practical25.7	CAP	Shows-how	D-M,D-BED,D
CO1,CO4, CO7	Perform systematic palpation to identify cervical lymph nodes and assess their clinical significance.	3	Practical25.8	PSY-GUD	Shows-how	SIM,TBL,D-M,CBL
CO1,CO4	Demonstrate the correct technique for locating and assessing major vascular structures such as the carotid artery and jugular vein.	3	Practical25.9	PSY-GUD	Shows-how	D-BED,D-M,CD,CBL,D

Practical Training Activity
Practical Training 25.1 Cranial Nerves and Surface Anatomy Integration
Total Learning Hours: 2 Hours **Activity 1: Demonstration – (30 Min)** Teacher will demonstrate cranial nerve assessment techniques, highlighting key surface anatomical landmarks related to facial movements and sensations. **Activity 2: Guided Practice – (30 Min)** Students will perform assessments on peers under supervision, identify relevant anatomical structures and nerve functions. **Activity 3: Independent Application – (30 Min)** Students will conduct a full simulated clinical examination; integrate surface anatomy with patient assessment skills. **Activity 4: Review & Discussion – (30 Min)** The session will conclude with a review of findings, peer feedback and discussion on clinical implications.
Practical Training 25.2 Anatomical Landmarks of the Head & Palpation
Total Learning Hours:2 Hours **Activity 1: Introduction to Anatomical Landmarks and Muscle Attachment Points (30 Min)** Teacher will give an overview of key anatomical landmarks of the head (frontal bone, temporal bone, zygomatic arch, mastoid process, occipital protuberance) and their functional significance. Then explain of how these landmarks relate to muscle attachment and function (e.g., jaw opening, head rotation, tilting). **Activity 2: Teacher Demonstration of Palpation and Functional Movement (30 Min)** Teacher will demonstrate accurate palpation techniques to identify bony landmarks (frontal bone, temporal bone, zygomatic arch, mastoid process, occipital protuberance).

Teacher will explain how to palpate the masseter, temporalis, and sternocleidomastoid muscles while describing their function during movements like jaw opening and head rotation.

Activity 3: Student Practice with Supervision (30 Min)

Students will practice palpating the anatomical landmarks and muscle attachment points under teacher supervision.

Teacher will provide individualized feedback and guides students to refine their techniques for better accuracy and understanding of muscle function during movement.

Activity 4: Reinforcement, Q&A, and Final Practice (30 Min)

Teacher will review the concepts through Q&A, addressing any questions or difficulties faced by students.

Final practice session where students independently will demonstrate palpation skills and anatomical knowledge, identify bony landmarks and muscle attachment points accurately.

Practical Training 25.3 3D Head Anatomy Model

Total Learning Hours: 2 Hours

Activity 1: Demonstration & Explanation– (30 Min)

The teacher will explain key surface anatomy landmarks of the head, including dermatomes, sutures and fontanelles, using visual aids and models.

Activity 2: 3D Model Construction– (30 Min)

Students collaboratively will construct a 3D model of the head, accurately incorporating surface landmarks, sutures and fontanelles.

Activity 3: Diagram Illustration– (30 Min)

Students will be divided into 2-5 groups and each group will create detailed anatomical diagrams highlighting dermatomes, sutures and fontanelles for reference and learning.

Activity 4: Presentation & Discussion– (30 Min)

Each group will present their models and diagrams, discussing their significance in clinical applications and developmental anatomy.

Practical Training 25.4 Tempero Mandibular Joint Palpation and Assessment

Total Learning Hours: 2:00 Hours **Activity** 1: **Teacher Demonstration (60 Min)** The teacher will demonstrate how to locate and palpate the temporomandibular joint (TMJ) by gently placing fingers in front of the ear and feeling for the condylar process while the patient opens and closes their mouth. The teacher will explain how to assess for tenderness, abnormal movements or any clicking sounds that may indicate dysfunction. **Activity** 2: **Student Practice (30 Min)** Students will practice locating and palpating the TMJ themselves, performing the assessment on a partner or mannequin, checking for tenderness, abnormal movement or irregularities in the joint's function while the patient moves their jaw. **Activity 3** :**Q & A Session (30 Min)** After the practice, students will engage in a Q & A session where they can ask questions about the TMJ assessment, discuss challenges they encountered during the practice and clarify any doubts about the procedure and clinical significance of findings.
Practical Training 25.5 Ear Canal Palpation
Total Learning Hours: 2:00 Hours **Activity** 1: Teacher Demonstrates (60 Min) The teacher will demonstrate how to palpate and identify the external auditory canal and its external opening (external acoustic meatus), explaining its clinical relevance and role in ear-related examinations, particularly in conditions like otitis externa. **Activity** 2: Students Practice (60 Min) Students will palpate the external auditory canal and its external opening on themselves or on peer, while noting any abnormalities or signs of infection and discuss the clinical significance of their findings.
Practical Training 25.6 Clinical Positioning Practice
Total Learning Hours: 2:00 Hours

Activity 1: Instructor Demonstration — (30 Min) The teacher will explain key surface anatomical landmarks relevant to tracheostomy, central venous catheterization and thyroid examination, demonstrating proper patient positioning. **Activity 2: Guided Student Practice – – (30 Min)** Students will practice identifying these landmarks on peers or mannequins, ensuring correct positioning for each procedure under supervision. **Activity 3: Independent Application — (30 Min)** Students will apply their knowledge to position a simulated patient for different procedures, refining their accuracy and technique. **Activity 4: Discussion & Feedback – (30 Min)** The session concludes with students presenting their observations, discussing challenges and receiving instructor feedback for improvement.
Practical Training 25.7 Neck Range of Motion (ROM) Palpation
Total Learning Hours: 2:00 Hours **Activity 1: Demonstration – (30 Min)** The teacher will explain and demonstrates proper palpation techniques to assess bony and muscular structures of the neck during different movements. **Activity 2: Guided Practice – (30 Min)** Students will practice palpating key landmarks while performing neck flexion, extension and rotation under supervision. **Activity 3: Application – (30 Min)** Students will apply their skills in simulated clinical scenarios, identifying movement restrictions or abnormalities. **Activity 4: Reflection & Discussion – (30 Min)** A debriefing session will allow the students to discuss findings, refine techniques and relate observations to clinical conditions.
Practical Training 25.8 Cervical Lymph Nodes
Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration– (60 Min)

The Teacher will demonstrate proper palpation techniques for identifying cervical lymph nodes, explaining their anatomical locations and clinical relevance. Students will learn to systematically palpate cervical lymph nodes, differentiate normal from abnormal findings, and apply this knowledge in clinical assessments through demonstration, guided practice, case-based application, and discussion.

Activity 2: Student Practice– (30 Min)

Students will practice palpation on peers under supervision, learning to differentiate normal and abnormal lymph nodes.

Activity 3: Clinical Application– (60 Min)

Students will apply their skills in case-based scenarios, assessing lymph node enlargement and its potential causes.

Activity 4: Discussion & Q&A– (30 Min)

The session will conclude with a discussion on findings, interpretation and clinical significance, reinforcing learning.

Practical Training 25.9 Palpation of Major Blood Vessels of Neck

Total Learning Hours: 3:00 Hours

Activity 1: Demonstration – (30 Min)

The Teacher will explain the anatomical location and clinical importance of the carotid artery and jugular vein, demonstrating proper palpation and auscultation techniques on a model or volunteer.

Activity 2: Student Practice – (60 Min)

Under supervision, students will practice locating the carotid artery and jugular vein on each other, applying proper palpation pressure and identifying pulse characteristics.

Activity 3: Clinical Application – (30 Min)

Students will assess vascular structures in different patient positions, noting variations in pulse strength and jugular venous distension under different physiological conditions.

Activity 4:Q&A and Feedback – (60 Min)

The session will conclude with a discussion on common clinical scenarios, troubleshooting palpation difficulties, and refining techniques based on teacher feedback.
Experiential Learning Activity
Experiential-Learning Learning 25.1: Cranial Nerve Examination Protocol
Total Learning Hours: 3:00Hours **Activity 1: Develop Examination Framework– (60 Min)** Student will outline a structured clinical examination protocol, identifying key surface landmarks relevant to cranial nerve assessment. **Activity 2: Apply and Test Protocols– (60 Min)** Using peer collaboration, student will perform the designed examination, assessing cranial nerve functions through palpation, sensory tests and motor evaluations. **Activity 3: Analyze Findings– (30 Min)** Student will interpret results, correlating observations with underlying anatomical structures and potential neurological implications. **Activity 4: Q&A and Refinement– (30 Min)** through discussion and feedback, student will refine their protocols, addressing challenges and ensuring accuracy in clinical application.
Experiential-Learning Learning 25.2: Neurovascular Injury Prediction
Total Learning Hours: 4:00 Hours **Activity 1: Identify Surface Landmarks– (60 Min)** Student will analyze key anatomical landmarks of the head and their relationship to underlying neurovascular structures. **Activity 2: Correlate with Injury Scenarios– (60 Min)** Using case studies or imaging, students will assess how trauma to specific landmarks (e.g., pterion, mastoid process) affects nearby nerves and blood vessels. **Activity 3: Predict Clinical Outcomes– (60 Min)**

Based on their analysis, students will predict potential complications such as nerve damage, vascular compromise, or functional impairments, linking surface anatomy to real-world clinical implications. **Activity 4: Q&A and Peer Discussion– (60 Min)** Student will engage in a discussion to justify their predictions, address misconceptions and refine their understanding through guided peer interaction and instructor feedback.
Experiential-Learning Learning 25.3: Scalp & Forehead Assessment
Total Learning Hours: 3:00 Hours **Activity** 1: Perform Guided Palpation (60 Min) Students will begin by palpating the scalp and forehead, using correct techniques to assess the skin and soft tissue structures, focusing on areas like the frontal region, temporal areas and vertex of the scalp. **Activity** 2: Identify Abnormalities (60 Min) After gaining knowledge of normal and abnormal skin features, students will identify and distinguish abnormalities such as cysts, scars or lesions during palpation, noting characteristics such as texture, size and location. **Activity** 3: Analyze Clinical Relevance (60 Min) Students will analyze their findings and relate identified abnormalities to potential dermatologic or systemic conditions, considering conditions like sebaceous cysts, dermatofibromas or indications of systemic diseases (e.g., lupus, cancer) and reflect on their diagnostic significance.
Experiential-Learning Learning 25.4: Referred Pain Hypothesis
Total Learning Hours: 3:00Hours **Activity 1: Analyze Surface Anatomy– (60 Min)** Student will examine key surface landmarks of the head, focusing on nerve pathways and their role in sensory perception and referred pain.

Activity 2: Correlate with Clinical Cases– **(60 Min)** Using patient scenarios, students will relate surface anatomy to sensory abnormalities such as trigeminal neuralgia or headaches caused by occipital nerve compression. **Activity 3: Formulate Hypotheses**– **(30 Min)** Based on anatomical and clinical correlations, students will hypothesize potential causes of referred pain or sensory disturbances, linking them to specific nerve distributions. **Activity 4: Q&A Session:** – **(30 Min)** Student will engage in discussions, ask questions, and clarify doubts about their hypotheses, refining their understanding through peer and instructor feedback.
Experiential-Learning Learning 25.5: Neck Pain Referral Mapping
Total Learning Hours: 4:00 Hours **Activity 1: Analyze the Surface Anatomy** –**(60 Min)** Students will review and identify key surface anatomical landmarks of the neck such as muscles, bones and vascular structures, and understand their role in supporting underlying structures. **Activity 2: Correlate with Pain Referral Patterns**–**(90 Min)** Students will explore how specific areas of pain or discomfort in the neck correspond to potential issues in deeper structures (e.g., muscles, nerves, blood vessels) and recognize common patterns in referred pain. **Activity 3: Apply Knowledge to Clinical Scenarios**–**(90 Min)** Students will assess case studies or clinical scenarios to predict possible underlying conditions causing neck pain, integrating their understanding of surface anatomy and pain referral patterns.
Experiential-Learning Learning 25.6: Neck Anatomy & Clinical Variations
Total Learning Hours: 5:00 Hours **Activity 1: Analyze and review**–**(90 Min)**

Students will analyze the surface anatomy of the neck, focusing on key landmarks and review how these landmarks may vary across different populations (age, gender, health status). **Activity 2: Compare and identify–(120 Min)** Students will compare these anatomical variations across different groups, identifying specific differences in structure and appearance of the neck that could affect clinical assessments. **Activity 3: Apply clinical reasoning–(90 Min)** Students will apply this understanding to clinical assessments, recognizing how variations in surface anatomy can influence diagnostic decisions, treatment approaches and overall patient care.
Experiential-Learning Learning 25.7: Neck Anatomy Research Proposal
Total Learning Hours: 4:00 Hours **Activity 1: Identify Research Gaps – (90 Min)** Students will review existing literature on the correlation between surface anatomy and deeper organ of the neck pathologies to identify unanswered questions. **Activity 2: Develop a Research Proposal –(90 Min)** Based on findings, students will design a study outlining objectives, methodology and potential clinical applications of surface anatomy of the neck in disease diagnosis. **Activity 3: Evaluate and Present – (60 Min)** Students will critically assess feasibility, ethical considerations and potential impact before presenting their research proposal for peer and instructor feedback.
Modular Assessment

Assessment	**Hour**

Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Practical Palpation & Identification Exercise – 15 Marks** Students will be asked to **palpate key anatomical landmarks** on a peer or model, including structures They will need to **identify the structures** and describe their clinical significance. **2. Case-Based Scenario Analysis – 10 Marks** Provide students with a **clinical scenario**. Students must **analyze the case**, identify the relevant surface anatomy, and explain the importance of specific structures in the clinical situation. **3. Imaging Interpretation & Correlation Exercise – 10 Marks** Students will be given **imaging studies** (such as X-rays or CT scans or MRI images) of the head and neck region. They must **identify key anatomical landmarks** visible in the images and explain how the surface anatomy correlates with the deeper structures seen in the imaging studies. **4. Interactive Oral Examination (Viva) – 10 Marks** During a **viva session**, students will be asked a series of **questions** related to the surface anatomy of the head and neck, such as: **5. Concept Map – 5 Marks** Students will create a **concept map** linking the various surface anatomical landmarks of the head and neck, such as muscles, arteries, veins, and nerves. or Any practical in converted form can be taken for assessment. (25 Marks) and	4

Any of the experiential as portfolio/ reflections / presentations can be taken as assessment. (25 Marks)	

Module 26 : تشریح شعاعی (Tashreeh-e- Shua'ei) Radiological Anatomy.

Module Learning Objectives

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

1. Describe the principles and techniques behind each imaging modality (X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide), including their uses in medical practice.

2. Conduct image analysis for X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide, accurately identifying anatomical structures in respective images.

3. Identify the normal anatomical structures as seen in X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide imaging, and understand how these modalities highlight these structures.

Unit 1 سادہ عکس ریزی (Sadah aks srezi) Simple x-rays procedures. تصویر بالموجات الشعاعیہ (Tasveer Bil Maujatis Sautiya) Ultrasonography. تصویر مقطعی حاسوبی (Tasweer maqta'ei Hasubi) Computed Tomography Scan. تصویر مقطعی حاسوبی مع التباین (Tasweer maqta'ei Hasubi ma'attabaun) Contrast Enhanced Computed Tomography Scan.

26.1.1. سادہ عکس ریزی (Sadah aks srezi) Simple x-rays procedures.

26.1.2. تصویر بالموجات الشعاعیہ (Tasveer Bil Maujatis Sautiya) Ultrasonography.

26.1.3. تصویر مقطعی حاسوبی (Tasweer maqta'ei Hasubi) Computed Tomography Scan.

26.1.4. تصویر مقطعی حاسوبی مع التباین (Tasweer maqta'ei Hasubi ma'attabaun) Contrast Enhanced Computed Tomography Scan.

References: 110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Describe the basic principles and interactions of X-rays with different tissues.	1	Lecture	CAP	Knows-how	L&PPT ,L_VC,L&GD
CO1,CO5	Identify normal anatomical structures on X-ray, USG, CT and CECT images. •	3	Practical26.1	CAN	Shows-how	PrBL,CBL,PBL,PT

CO1,CO5	Develop structured imaging reports by describing normal findings systematically across X-ray, USG, CT and CECT. •	5	Experiential-Learning26.1	CS	Does	BS,PL
CO1,CO5	Apply a structured approach (e.g., ABCs for X-ray, FAST protocol for USG, systematic review for CT) to interpret medical images effectively.	4	Experiential-Learning26.2	CAP	Does	PAL,DIS,PL
CO1,CO5	Analyse the strengths and limitations of X-ray, USG, CT, and CECT in assessing normal anatomy and differentiating tissues.	4	Experiential-Learning26.3	CE	Does	DIS,D-BED
CO1,CO5	Describe the principles of CT and CECT imaging, including image acquisition and reconstruction techniques.	2	Lecture	CE	Knows-how	L&PPT ,L&GD,L_VC
CO1,CO5	Describe the principles of Ultra Sonography and ultrasound physics, including sound wave propagation and echogenicity.	2	Lecture	CE	Knows-how	L_VC,L&PPT ,L&GD
CO1,CO5	Demonstrate the systematic approach to interpreting an X-ray including orientation, exposure and positioning and USG, including probe selection, orientation and scanning planes.	4	Practical26.2	PSY-GUD	Shows-how	D,CBL
CO1,CO5	Evaluate the principles of CT, including reviewing image orientation (axial, coronal and sagittal) and contrast phases and explain the systematic evaluation of CECT images, including arterial, venous and delayed phases.	3	Practical26.3	CE	Shows-how	DIS,D,PER

Unit 2 تصویر بالرنین المقناطیسی(Tasweer Bil Raneen Al Maqnateesi) Magnetic Resonance Imaging. تصویر شعاعی ثدیی(Tasweer-e-Shu'ai Sadyi) Mammography. تصویر شعاعی نواتی (Tasveer Shu'a'ei Navati) Radionuclide scanning.

26.2.1. تصویر بالرنین المقناطیسی(Tasweer Bil Raneen Al Maqnateesi) Magnetic Resonance Imaging.

26.2.2. تصویرشعاعی ثدیی(Tasweer-e-Shu'ai Sadyi) Mammography.

26.2.3. تصویرشعاعی نواتی(Tasveer Shu'a'ei Navati) Radionuclide scanning.

References: 116,125

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Apply a systematic approach to mammographic image evaluation, including craniocaudal (CC) and mediolateral oblique (MLO) views.	3	Practical26.4	CAP	Shows-how	D,PT,DIS
CO1,CO5	Describe the basic principles of radionuclide imaging, including the use of radiopharmaceuticals and gamma cameras.	1	Lecture	CE	Knows-how	L&GD,L_VC,L&PPT
CO1,CO5	Evaluate a structured approach to interpreting MRI, including selecting appropriate sequences (T1, T2, STIR, FLAIR, and DWI).	4	Practical26.5	CE	Shows-how	PT,DL,PBL
CO1,CO5	Develop structured imaging reports by describing normal findings in MRI, mammography and nuclear imaging.	5	Experiential-Learning26.4	CS	Does	JC,BL,DIS,PER
CO1,CO5	Participate in simulated case-based discussions to practice distinguishing normal imaging from early pathology.	4	Experiential-Learning26.5	AFT-SET	Does	PAL,JC,L&PPT ,DIS,BL
CO1,CO5	Interpret MRI, mammography and radionuclide imaging to understand their strengths and limitations for different clinical indications.	4	Experiential-Learning26.6	CAN	Does	CBL,BS,PAL
CO1,CO5	Identify a structured approach to interpreting nuclear medicine scans, including PET, SPECT and gamma camera imaging.	3	Practical26.6	CAN	Shows-how	PT,X-Ray,D,DIS

CO1,CO5	Describe the basic principles and techniques of mammographic imaging, including full-field digital mammography (FFDM) and digital breast tomosynthesis (DBT).	2	Lecture	CE	Knows-how	L&GD,L,L&PPT
CO1,CO5	Describe the strengths and limitations of mammography in detecting benign and malignant breast conditions.	1	Lecture	CE	Knows-how	L_VC,L&GD,L&PPT
CO1,CO5	Describe the basic principles of MRI, including the role of magnetic fields, radio frequency pulses and relaxation times (T1, T2).	1	Lecture	CE	Knows-how	L_VC,L&PPT ,L&GD

Practical Training Activity

Practical Training 26.1 Identification of Normal Anatomical Structures

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

Teacher will demonstrate the identification of normal anatomical structures on X-ray, USG, CT and CECT images, explaining the key features and landmarks for each modality.

Highlight normal variations and how they may appear differently in each imaging technique.

Activity 2: Student Practice (60 Min)

Students will practice identifying normal anatomical structures under guidance on sample X-ray, USG, CT and CECT images.

Teacher will provide real-time feedback as students point out anatomical landmarks in different imaging modalities.

Activity 3: Independent Student Performance (60 Min)

Students independently will identify normal anatomical structures across X-ray, USG, CT and CECT images.

Students will explain the significance of the identified structures in the context of each modality (e.g., how bone, soft tissue and air appear on X-ray vs. CT).

Activity 4: Discussion & Feedback (30 Min)

Discussion to share observations, challenges and interpretations of normal anatomical structures across different imaging techniques.

Teacher will provide feedback, reinforcing important points and clarifying any difficulties encountered during independent practice.

Practical Training 26.2 X-ray & USG Interpretation

Total Learning Hours: 4:00 Hours

Activity 1: Demonstration (60 Min)

The Teacher will explain and demonstrate a systematic approach to X-ray interpretation, covering orientation, exposure and positioning using sample images.

Demonstrate proper ultrasound (USG) probe selection, orientation and scanning planes on a model or phantom.

Activity 2: Discussion & Feedback (60 Min)

Group discussion to review challenges, observations and key takeaways from X-ray and USG interpretation.

Teacher will provide constructive feedback and clarifies doubts, reinforcing best practices.

Activity 3: Student Performance (60 Min)

Students will systematically interpret X-rays and explain their findings independently.

Students conduct an ultrasound scan, correctly selecting probes, adjusting scanning planes and identifying key structures.

Activity 4: Student Practice (60 Min)

Students will practice interpreting X-ray images under supervision, identifying correct orientation and exposure adjustments.

Students will perform basic USG scanning techniques, adjusting probe angles and recognizing normal anatomical landmarks.

Practical Training 26.3 CT Imaging Principles & CECT Evaluation
Total Learning Hours: 3:00 Hours **Activity** 1: Teacher Demonstration (60 Min) The Teacher will demonstrate the systematic approach to CT interpretation, including image orientation (axial, coronal, sagittal) using sample images. The Teacher will show how to assess contrast phases in CT and explain the arterial, venous and delayed phases in CECT images pointing out key landmarks. **Activity** 2: Guided Student Practice (30 Min) Students will practice interpreting CT images, identifying the correct orientation and recognizing contrast phases (e.g., arterial, venous, delayed). Students review CECT images under supervision, evaluating different phases and correlating findings with anatomical structures. **Activity** 3: Student Performance (60 Min) Students independently analyze CT and CECT images, applying the systematic approach to image orientation and correctly identifying each contrast phase. Students interpret CECT findings, accurately distinguishing between the arterial, venous and delayed phases. **Activity** 4: Discussion & Feedback :(30 Min) Group discussion to review findings, share challenges and discuss best practices for evaluating CT and CECT images. Teacher provides feedback on image interpretation, clarifying doubts and reinforcing essential concepts.
Practical Training 26.4 Mammographic Image Evaluation
Total Learning Hours: 3:00 Hours **Activity** 1: Introduction and Demonstration by Teacher (30 Min) The Teacher will introduce the systematic approach to evaluating mammographic images, focusing on the craniocaudal (CC) and mediolateral oblique (MLO) views. The Teacher will demonstrate key anatomical landmarks and explain the process of assessing positioning and image quality for each view. **Activity** 2: Guided Practice with Teacher Support (60 Min)

Students will practice evaluating mammographic images under the guidance of the Teacher, focusing on identifying normal structures and detecting positioning errors.

The Teacher will provide real-time feedback and clarification on techniques for recognizing proper positioning and image quality.

Activity 3: Independent Practice by Students (60 Min)

Students will independently analyze and evaluate mammographic images, ensuring accurate interpretation of normal anatomical structures and assessing image quality, positioning and potential artifacts.

Students will apply the systematic approach to evaluate both craniocaudal(CC) and mediolateral oblique(MLO) views with minimal guidance.

Activity 4: Reflection and Group Discussion (30 Min)

Students will participate in a group discussion to reflect on their findings, share experiences and address any challenges encountered during image evaluation.

The Teacher will provide constructive feedback, discussing common difficulties and reinforcing best practices for image assessment and positioning.

Practical Training 26.5 MRI Sequence Interpretation

Total Learning Hours: 4:00 Hours

Activity 1: Demonstration (60 Min)

The Teacher will explain and demonstrate the structured approach to MRI interpretation, including sequence selection (T1, T2, STIR, FLAIR, and DWI).

Show examples of how each sequence highlights different tissue characteristics and pathologies and guide students in understanding when to use each sequence for specific clinical scenarios.

Activity 2: Student Practice (60 Min)

Students will select the appropriate MRI sequences based on case scenarios under supervision; interpret different tissue types and pathologies (e.g., edema on STIR, tumors on FLAIR).

Teacher will provide real-time guidance on identifying the strengths and limitations of each MRI sequence.

Activity 3: Independent Student Performance (60 Min)

Students will independently interpret MRI images, selecting the correct sequences and explaining their choice based on anatomical and pathological indications.

Students will describe how different sequences (T1, T2, STIR, FLAIR, and DWI) demonstrate varying tissue properties and abnormalities.

Activity 4: Discussion & Feedback (60 Min)

Group discussion to review student findings, address challenges and clarify any difficulties encountered in interpreting MRI sequences.

Teacher will provide constructive feedback, reinforcing the application of appropriate sequences and improving interpretation skills.

Practical Training 26.6 Nuclear Medicine Scan Interpretation

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The Teacher will explain and demonstrate a structured approach to interpreting nuclear medicine scans, including PET, SPECT and gamma camera imaging.

The Teacher will demonstrate how to identify normal biodistribution patterns and highlight key features of each imaging modality (e.g., anatomical regions, physiological uptake).

Activity 2: Students Practice with Teacher Support (60 Min)

Students will practice interpreting nuclear medicine scans under the guidance of the Teacher, focusing on recognizing normal patterns in PET, SPECT and gamma camera images.

The Teacher will provide real-time feedback, helping students identify both normal and abnormal findings and reinforcing the differences between imaging modalities.

Activity 3: Independent Student Practice (60 Min)

Students will independently interpret PET, SPECT and gamma camera images, identifying normal physiological uptake and differentiating normal from abnormal patterns.

Students will apply the structured approach to scan evaluation, providing their interpretation based on anatomical and physiological relevance.

Activity 4: Discussion and Feedback (30 Min)

Group discussion to share findings, discusses challenges encountered and review different approaches for interpreting nuclear medicine scans.

The Teacher will provide constructive feedback, reinforcing key concepts and clarifying any misunderstandings regarding normal and abnormal patterns in PET, SPECT and gamma camera imaging.
Experiential Learning Activity
Experiential-Learning Learning 26.1: Structured Imaging Reporting Across Modalities
Total Learning Hours: 5:00 Hours **Activity** 1: Initial Independent Practice (120 Min) The student will independently review X-ray, USG, CT and CECT images and begin drafting structured imaging reports. The student will focus on systematically describing normal findings and key anatomical structures in each imaging modality, ensuring accurate and thorough observations. **Activity** 2: Self-Assessment and Revision (90 Min) The student will critically assess their own reports, ensuring they have followed a consistent format and correctly described all normal anatomical findings. The student will revise the reports as needed, refining their descriptions based on clarity, accuracy and completeness. **Activity** 3: Peer Review and Reflection (90 Min) The student will participate in peer review, exchanging reports with colleagues to gain different perspectives on the structure and content of their reports. Following the peer review, the student will reflect on feedback, make necessary improvements to their reports and consider how to enhance their future imaging evaluations and report writing.
Experiential-Learning Learning 26.2: Structured Medical Image Interpretation
Total Learning Hours: 4:00 Hours Activity 1: Initial Guided Application (90 Min) Student will apply the learned structured approaches (e.g., ABCs for X-ray, FAST protocol for USG and systematic review for CT) under the supervision of the Teacher.

The Teacher will provide support and feedback while students apply these methods to real or simulated medical images, ensuring correct application of the structured approaches.

Activity 2: Independent Practice (90 Min)

Students will independently analyze medical images (X-ray, USG, CT) using the respective structured approaches.

They will identify key findings (e.g., bone fractures, fluid collections, organ abnormalities) and document their interpretations based on the protocols.

Activity 3: Reflection and Group Discussion (60 Min)

After independent practice, students will engage in group discussion to review their findings and reflect on challenges faced during the interpretation process.

The Teacher will provide feedback, reinforcing the importance of the structured approaches and discussing any common issues or mistakes encountered.

Experiential-Learning Learning 26.3: Imaging Modalities Strengths & Limitations

Total Learning Hours: 4:00 Hours

Activity 1: Evaluation and Analysis (90 Min)

The student will independently review a set of X-ray, USG, CT and CECT images, focusing on assessing normal anatomy and identifying how each imaging modality differentiates various tissues.

The student will document the strengths and limitations of each modality in terms of image clarity, tissue differentiation and visualization of specific anatomical structures.

Activity 2: Synthesis and Comparison (90 Min)

The student will synthesize their findings by creating a comparative analysis of the strengths and limitations of X-ray, USG, CT and CECT. This will include factors like resolution, tissue contrast, cost-effectiveness and clinical relevance for assessing normal anatomy.

The student will organize their analysis in a clear, structured format, identifying which imaging modality is most effective for different anatomical regions and clinical scenarios.

Activity 3: Peer Discussion and Reflection (60 Min)

The student will engage in a peer discussion to share their comparative analysis, debating the advantages and disadvantages of each imaging technique based on real-world cases. The student will reflect on the feedback received from peers and incorporate insights to further refine their understanding of each imaging modality's application and limitations in clinical practice.
Experiential-Learning Learning 26.4: Structured Imaging Reporting
Total Learning Hours: 5:00 Hours Activity 1: Initial Report Drafting and Practice (120 Min) The student will independently review MRI, mammography and nuclear imaging scans, focusing on identifying normal findings in each modality. The student will create initial structured imaging reports, systematically describing the normal anatomy and key features visible in the images, using the appropriate medical terminology for each imaging technique. Activity 2: Self-Assessment and Refinement (90 Min) The student will critically assess their reports for clarity, accuracy and structure, ensuring that all normal anatomical features are correctly described and organized according to the standard reporting format. The student will revise the reports based on self-reflection, improving their descriptions where necessary and ensuring that they adhere to the established guidelines for each imaging modality. Activity 3: Peer Review and Feedback (90 Min) The student will participate in a peer review session where reports are shared with classmates for constructive feedback. The student will incorporate peer feedback, refining their reports further.
Experiential-Learning Learning 26.5: Imaging Case Discussions
Total Learning Hours: 4:00 Hours Activity 1: Initial Case Review and Group Discussion (60 Min)

The student will review simulated case scenarios with a mix of normal and early pathology images across different modalities (e.g., X-ray, MRI, CT).

The student will discuss the images in a group, identifying key features of normal anatomy and the subtle early signs of pathology such as small tumors, early fractures or tissue changes.

Activity 2: Independent Analysis and Interpretation (90 Min)

The student will independently analyze the images from each case, attempting to distinguish between normal variations and potential early pathologies.

The student will document their findings, noting how early signs of disease or injury may present and which imaging modalities are most sensitive to these early changes.

Activity 3: Peer Feedback and Reflection (90 Min)

The student will present their analysis to the group, explaining their rationale for distinguishing normal findings from early pathology.

The group will provide peer feedback, discussing different interpretations and approaches to recognizing subtle pathologies. The student will reflect on feedback to enhance their diagnostic skills and understanding of early disease presentation.

Experiential-Learning Learning 26.6: Imaging Modalities Comparison

Total Learning Hours: 4:00 Hours

Activity1: Independent Analysis of Imaging Techniques (90 Min)

The student will independently review a set of MRI, mammography and radionuclide imaging scans, focusing on clinical indications for each modality (e.g., breast cancer detection, bone scans, neurological imaging).

The student will evaluate the strengths (e.g., sensitivity, tissue differentiation, specificity) and limitations (e.g., cost, patient accessibility, resolution) of each imaging technique in the context of these clinical indications.

Activity 2: Comparative Synthesis and Documentation (90 Min)

The student will create a comparative analysis, summarizing how each imaging modality excels or falls short for specific clinical scenarios (e.g., MRI for soft tissue, mammography for early breast cancer detection, radionuclide imaging for functional imaging).

The student will document their findings, focusing on factors like resolution, diagnostic accuracy, safety and cost-effectiveness for each modality.

Activity 3: Peer Discussion and Reflection (60 Min) The student will engage in a peer discussion to share their comparative analysis, discussing how the strengths and limitations of each modality affect clinical decision-making in different scenarios. The student will reflect on feedback from peers and the Teacher, revising their analysis as needed and gaining a deeper understanding of when and why to choose specific imaging techniques for various clinical indications.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Image Comparison Exercise – 15 Marks** Students are provided with **pairs of images** They must **compare the images** and provide a **written explanation of the differences**, identifying the normal anatomical structures in the image and noting any pathology (if present). **2. Practical Demonstration of Imaging Techniques – 10 Marks** In a **practical demonstration**, students will explain the **procedure for obtaining a specific type of image** (e.g., X-ray or MRI or USG). They will outline the **technical steps, patient preparation, and safety considerations** for performing the imaging, followed by a discussion of the images typically produced. **3. Clinical Case Review Presentation – 10 Marks** Students will be given **clinical case scenarios** with associated **medical images** from one or more imaging modalities.	4

They must **present their analysis** of the case, identifying key normal anatomical structures and explaining why the imaging modality is appropriate for this case. **4. Diagnostic Imaging Quiz (Interactive) – 5 Marks** An **interactive, timed quiz** (could be multiple-choice or true/false) **5. Interactive Group Discussion – 10 Marks (20%)** In a **group discussion**, students will be presented with **a challenging clinical scenario** and its associated imaging studies. They will discuss the normal findings seen in the images, explain their significance, and contribute to the identification of any potential clinical diagnoses. 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 assessment. (25 Marks)	
Semester No : 4	
Module 27 : تصویروں کی تعبیر (Tasveeron Ki Ta'abeer) Interpretation of Radiographs.	
Module Learning Objectives (At the end of the module, the students should be able to) 1 Describe: the fundamental principles and technical aspects behind the interpretation of X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide imaging. 2 Conduct: a thorough analysis of X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide images, accurately identifying normal anatomical structures and pathological abnormalities. 3 Identify: the normal anatomical structures and common pathological findings in X-ray, USG, CT, CECT, Mammography, MRI, and Radionuclide imaging.	

Unit 1 سادہ عکس ریزی تصویروں کی تعبیر(Sadah aks srezi Tasveeron Ki Ta'abeer) plain x-rays. تصویر بالموجات الصوتیہ کی تعبیر(Tasveer Bil Maujatis Sautiyah Ki Ta'abeer) Ultrasonography. تصویر مقطعی حاسوبی کی تعبیر(Tasweer maqta'ei Hasubi Ki Ta'abeer) Interpretation of Computed Tomography Scan.

27.1.1. سادہ عکس ریزی تصویروں کی تعبیر(Sadah aks srezi Tasveeron Ki Ta'abeer) plain x-rays.

27.1.2. تصویر بالموجات الصوتیہ کی تعبیر(Tasveer Bil Maujatis Sautiyah Ki Ta'abeer) Ultrasonography.

27.1.3. تصویر مقطعی حاسوبی کی تعبیر (Tasweer maqta'ei Hasubi Ki Ta'abeer) Interpretation of Computed Tomography Scan.

References: 110,111,112,113,114,115,117,118,119,120,121,122,123,124,126

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Develop Case Scenarios Based on X-ray, CT and USG Findings for Peer Teaching.	5	Experiential-Learning27.1	PSY-ORG	Does	PL,DIS,TBL
CO1,CO5	Analyse Differential Diagnoses Based on X-ray, CT and USG Imaging Characteristics	4	Experiential-Learning27.2	CS	Does	L&GD,DIS,D,PAL
CO1,CO5	Compare the Effectiveness of X-ray vs. USG in Diagnosing Specific Conditions.	4	Practical27.1	PSY-GUD	Shows-how	FC,DIS,D
CO1,CO5	Interpret a Clinical Report Integrating X-ray, CT and USG Images with Clinical Findings.	4	Practical27.2	PSY-GUD	Shows-how	FC,X-Ray,D,DIS
CO1,CO5	Document Research Studies on the Role of X-ray, CT and USG in Diagnosing or Treating Specific Diseases.	4	Experiential-Learning27.3	AFT-VAL	Does	BL,W,PAL,D,L&PPT
CO1,CO5	Integrate Normal Anatomical Structures with Pathological Finding	2	Practical27.3	PSY-GUD	Shows-how	FC,PBL,DL,DIS

CO1,CO5	Describe the indications and limitations of X-ray imaging in diagnosing various conditions, particularly for skeletal, thoracic and abdominal evaluations.	2	Lecture	CE	Knows-how	L,EDU,L&PPT ,L_VC,X-Ray
CO1,CO5	Describe the indications for ultrasound in diagnosing abdominal, obstetrics and musculoskeletal conditions and explain its advantages over other imaging techniques.	2	Lecture	CE	Knows-how	L,L_VC,L&PPT
CO1,CO5	Describe the indications for CT imaging in clinical practice, with a focus on trauma, neuroimaging and detailed abdominal and chest evaluations.	1	Lecture	CE	Knows-how	L&PPT ,L_VC,L&GD

Unit 2 تصویر مقطعی حاسوبی مع التباین کی تعبیر(Tasweer maqta'ei Hasubi ma'attabaun Ki Ta'abeer) Interpretation of Contrast Enhanced Computed Tomography Scan. تصویر بالرنین المقناطیسی کی تعبیر(Tasweer Bil Raneen Al Maqnateesi Ki Ta'abeer) Interpretation of Magnetic Resonance Imaging. تصویر شعاعی نواتی کی تعبیر(Tasveer Shua'aei al- Nawavi Ki Ta'abeer) Interpretation of Radionuclide scanning.

27.2.1. تصویر مقطعی حاسوبی مع التباین کی تعبیر(Tasweer maqta'ei Hasubi ma'attabaun Ki Ta'abeer) Interpretation of Contrast Enhanced Computed Tomography Scan.

27.2.2. تصویر بالرنین المقناطیسی کی تعبیر (Tasweer Bil Raneen Al Maqnateesi Ki Ta'abeer) Interpretation of Magnetic Resonance Imaging.

27.2.3. تصویر شعاعی نواتی کی تعبیر(Tasveer Shua'aei al- Nawavi Ki Ta'abeer) Interpretation of Radionuclide scanning.

References: 116,125

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Evaluate Recent Advancements in CECT, MRI and Radionuclide Imaging	4	Experiential-Learning27.4	CAN	Does	X-Ray,FC,BL,L&PPT ,D
CO1,CO5	Identify Safety Guidelines and Protocols for CECT, MRI and radionuclides Imaging Techniques.	4	Practical27.4	PSY-GUD	Shows-how	DL,FC,PT,DIS

CO1,CO5	Construct Comprehensive Radiology Reports for CECT, MRI and Radionuclide Imaging.	4	Experiential-Learning27.5	PSY-ORG	Does	BS,PAL,FC
CO1,CO5	Develop an Evidence-Based Imaging Strategy for Disease Diagnosis using CT, CECT, MRI and radionuclide imaging	5	Experiential-Learning27.6	CS	Does	PAL,BL,PrBL
CO1,CO5	Evaluate Sensitivity, Specificity and Diagnostic Accuracy of CECT, MRI and Radionuclide Imaging.	3	Practical27.5	CE	Shows-how	BS,DIS,PT
CO1,CO5	Describe the various clinical indications for CECT, such as evaluating tumors, vascular abnormalities, infections and trauma.	2	Lecture	CC	Knows-how	L_VC,FC,L&PPT
CO1,CO5	Identify Strengths and Limitations of CECT, MRI and Radionuclide Imaging	3	Practical27.6	CAN	Shows-how	D,L&PPT ,DIS
CO1,CO5	Describe the clinical indications for MRI in diagnosing conditions related to the brain, spinal cord, musculoskeletal system and soft tissues.	2	Lecture	CC	Knows-how	L&GD,L&PPT ,L_VC
CO1,CO5	Describe the clinical applications of PET and SPECT in oncology (e.g., tumor detection, staging), cardiology (e.g., myocardial perfusion) and neurology (e.g., brain function assessment).	1	Lecture	CC	Knows-how	L&GD,L_VC,L&PPT
Practical Training Activity						
Practical Training 27.1 X-ray vs. USG Effectiveness Comparison						
Total Learning Hours: 4 Hours **Activity 1: Teacher Demonstration (60 Min)**						

The Teacher will demonstrate how X-ray, CT and ultrasound (USG) are used to diagnose specific conditions, highlighting the strengths and limitations of each imaging modality.

The Teacher will present clinical cases where both X-ray and USG are used to diagnose the same condition, explaining how each technique contributes to accurate diagnosis.

Activity 2: Guided Group Analysis (60 Min)

Students will work in small groups, analyzing case studies with both X-ray, CT and USG images for the same conditions.

The Teacher will guide the groups in evaluating the effectiveness of each modality by discussing the clarity of images, diagnostic accuracy and the practical applications of both techniques in a clinical context.

Activity 3: Independent Comparison and Reporting (60 Min)

Students will independently analyze a new set of clinical cases, using both X-ray, CT and USG images.

They will compare the strengths and limitations of each imaging modality, documenting their findings in a detailed report. Students will justify their choices of imaging technique for each case, explaining the reasons behind their selection.

Activity 4: Group Discussion &Teacher Feedback (60 Min)

Students will present their individual analyses in small groups, discussing their findings and comparing the results.

The Teacher will provide feedback on the students' assessments, addressing any misconceptions, clarifying concepts and guiding them in refining their diagnostic skills.

Practical Training 27.2 Integrated Clinical Imaging Report

Total Learning Hours: 4 Hours

Activity 1: Teacher Demonstration (60 Min)

The Teacher will demonstrate how to construct a clinical report by integrating the interpretation of X-ray, CT and USG images with clinical findings.

The demonstration will include a sample case, showing how to analyze both types of images, correlate them with clinical symptoms and organize the findings into a clear and concise report.

Activity 2: Guided Practice (60 Min)

Students will work in pairs or small groups to analyze a case study provided by the Teacher, which includes both X-ray, CT and USG images along with clinical details.

The Teacher will guide the students in interpreting the images, correlating them with clinical symptoms and drafting a preliminary clinical report.

Activity 3: Independent Report Construction (60 Min)

Students will independently analyze a new case, reviewing the X-ray, CT and USG images alongside clinical findings.

They will construct a detailed clinical report, integrating the image interpretation with clinical details and justifying their conclusions.

Activity 4: Peer Review and Teacher Feedback (60 Min)

Students will exchange their reports with a peer for review, discussing their findings and the structure of the report.

The Teacher will provide feedback on the clarity, accuracy and thoroughness of the reports, helping students refine their skills in integrating imaging with clinical information.

Practical Training 27.3 Anatomy-Pathology Integration

Total Learning Hours: 2 Hours

Activity 1: Teacher Demonstration and Guided Practice (60 Min)

The teacher will demonstrate how to identify normal anatomy and pathological findings in X-ray, USG and CT images, explaining the differences and how pathology alters the image. Students will practice identifying these changes under the Teacher's guidance.

Activity 2: Independent Analysis and Group Discussionn (60 Min)

Students will independently analyze a set of X-ray, USG and CT images, identifying both normal anatomical structures and pathological findings. They will present their findings in class, followed by group discussion and Teacher feedback to clarify concepts and reinforce learning.

The session will conclude with a Q&A session and reflection on challenges faced during integration.

Practical Training 27.4 Imaging Safety Protocols

Total Learning Hours: 4 Hours

Activity 1: Teacher Demonstration (60 Min)

The Teacher will demonstrate safety guidelines and protocols for various imaging techniques.

Topics will include radiation safety for CECT (e.g., dose reduction techniques, protective measures), safety considerations for MRI (e.g., patient contraindications, safety with implants or metallic objects) and handling precautions for radionuclides (e.g., storage, disposal and patient care).

The Teacher will also provide case studies highlighting potential risks and safety breaches in imaging settings.

Activity 2: Group Research on Specific Protocols (60 Min)

Students will be divided into small groups, each assigned to research and discuss the safety protocols specific to one imaging modality: CT/CECT, MRI or radionuclides.

Each group will explore safety measures, contraindications and risk prevention strategies relevant to their assigned imaging modality.

Step 3: Protocol Creation (45 Min)

Students will create a detailed checklist or safety protocol document for their assigned modality, including the steps to mitigate risks and ensure patient and staff safety.

They will include information on patient screening, safety measures for imaging equipment and emergency protocols for unexpected events related to each modality.

Activity 4: Presentation and Peer Review (45 Min)

Each group will present their safety protocol findings to the class, focusing on the unique aspects of their assigned imaging modality.

Students will engage in a peer review session, providing feedback and asking questions on each group's protocol, while the Teacher facilitates discussion and clarifies any misconceptions.

Activity 5: Teacher Feedback and Reflection (30 Min)

The Teacher will offer feedback on the group presentations, highlighting key points, addressing gaps and reinforcing best practices for safety in clinical imaging.

Students will reflect on the importance of these protocols and how they can apply this knowledge in real-world clinical settings

Practical Training 27.5 Diagnostic Accuracy of CECT, MRI & Radionuclide Imaging

Total Learning Hours: 3Hours

Activity 1: Teacher Demonstration (30 Min)

The Teacher will demonstrate how to evaluate the sensitivity, specificity and diagnostic accuracy of different imaging modalities (e.g., CECT, MRI, Radionuclide) in various clinical settings.

The Teacher will explain the concepts of sensitivity, specificity and diagnostic accuracy, providing examples of how these metrics are calculated and interpreted in clinical practice.

Activity 2: Guided Analysis of Clinical Cases (60 Min)

Students will be provided with clinical case studies that include different imaging modalities.

In groups, students will analyze the cases, evaluating the sensitivity, specificity and diagnostic accuracy of the imaging techniques used. They will apply theoretical knowledge to calculate or estimate these metrics using the provided data.

Activity 3: Independent Evaluation (60 Min)

Students will independently assess a new clinical case involving multiple imaging techniques.

They will calculate and analyze the sensitivity, specificity and diagnostic accuracy of each modality, considering the clinical relevance and limitations of the images in the case.

Activity 4: Group Discussion and Teacher Feedback (30 Min)

Students will present their findings to the class, discussing the strengths and weaknesses of the imaging techniques used in each case.

The Teacher will provide feedback on their evaluations, offering additional insights into how these metrics influence clinical decision-making and the choice of imaging modality.

Practical Training 27.6 CECT, MRI & Radionuclide Imaging Comparison

Total Learning Hours: 3Hours

Activity 1: Teacher Demonstration (45 Min)

The Teacher will introduce the principles, strengths and limitations of CT, CECT, MRI and radionuclide imaging.

Real-world examples will be provided to illustrate how different imaging modalities are used in diagnosing various medical conditions.

Activity 2: Group-Based Case Analysis (45 Min)

Students will be divided into groups, each assigned a specific medical condition (e.g., tumor detection, organ imaging, vascular studies).

Each group will analyze which imaging modalities are most suitable for their assigned condition and justify their choices.

Activity 3: Independent Comparison and Evaluation (45 Min)

Students will individually compare the strengths and limitations of each imaging technique based on resolution, contrast, safety and diagnostic value.

They will prepare a brief summary outlining their findings.

Activity 4: Presentation and Peer Discussion (45 Min)

Groups will present their findings, comparing how different modalities perform for various conditions.

The class will engage in peer discussions and the Teacher will provide feedback and additional insights to reinforce key learning points.

Experiential Learning Activity

Experiential-Learning Learning 27.1: Imaging Case Scenarios for Peer Teaching

Total Learning Hours: 5 Hours

Activity 1: Review and Identify Key Concepts (60 Min)

Students will review a range of X-ray, CT and USG images, identifying key conditions and clinical features.

They will select specific conditions or scenarios that effectively highlight the practical application of X-ray, CT and USG findings for teaching purposes.

Activity2: Design Case Scenarios (120 Min)

Students will design detailed case scenarios based on the selected X-ray, CT and USG findings.

They will include clinical symptoms, diagnostic images and questions to encourage peer discussion and learning. Students will focus on creating engaging, informative scenarios that promote critical thinking.

Step 3: Peer Teaching Session (60 Min)

Students will present their case scenarios to their peers, guiding them through the analysis of the X-ray, CT and USG findings.

They will facilitate group discussions, encouraging peers to diagnose the condition and discuss possible treatment options.

Activity 4: Feedback and Reflection (60 Minutes)

After the peer teaching session, students will reflect on the effectiveness of their case scenario in teaching and learning.

The Teacher and peers will provide feedback, highlighting strengths and suggesting improvements for future scenarios.

Experiential-Learning Learning 27.2: Imaging-Based Differential Diagnosis

Total Learning Hours: 4 Hours

Activity 1: Review of Imaging Characteristics (45 Min)

Students will review X-ray, CT and USG images, identifying key imaging characteristics such as shape, size, location and texture of abnormalities.

The Teacher will guide the students in understanding how these characteristics correlate with different clinical conditions.

Activity 2: Case Analysis and Identification of Potential Diagnosis (60 Min)

Students will be given a set of X-ray, CT and USG images depicting various clinical conditions.

They will analyze the images, identifying potential diagnosis based on the observed characteristics and begin formulating a list of differential diagnosis.

Activity 3: Formulation of Differential Diagnosis (90 Min)

Students will independently formulate a differential diagnosis for each case, using their knowledge of imaging features to narrow down possible conditions.

They will document their reasoning and justify their choices based on imaging characteristics.

Activity 4: Group Discussion and Teacher Feedback (45 Min)

Students will present their differential diagnoses to the group, discussing their reasoning behind each choice.

The Teacher and peers will provide feedback, offering insights and suggesting alternative diagnosis or additional factors to consider.

Experiential-Learning Learning 27.3: Research on X-ray, CT & USG in Disease Diagnosis

Total Learning Hours: 4 Hours

Activity 1: Literature Review and Research Gap Identification (60 Min)

Students will review existing research on the use of X-ray, CT and USG in diagnosing or treating diseases.

They will identify gaps in the literature and choose a specific disease or clinical condition to focus on, determining where further research is needed.

Activity 2: Defining Research Question and Objectives (45 Min)

Based on the identified research gap, students will develop a clear research question and define the objectives of their study.

They will decide on how X-ray, CT and USG can be used to explore these objectives, considering the clinical significance and potential impact of their research.

Activity 3: Designing the Research Methodology (45 Min)

Students will design the methodology for their research study, including selecting the study type (observational, experimental, etc.), choosing control groups (if applicable) and determining data collection methods.

They will also plan how to integrate X-ray, CT and USG into their study, including criteria for imaging selection, diagnostic evaluation and treatment monitoring.

Activity 4: Developing the Research Proposal (60 Min)

Students will write a detailed research proposal that outlines their research question, objectives, methodology and expected outcomes.

They will include a justification for using X-ray, CT and USG in the study as well as a plan for analyzing and interpreting the data.

Activity 5: Presenting Proposals and Receiving Feedback (30 Min)

Students will present their research proposals to the class, explaining their study design, research questions and methodology.

Peers and the Teacher will provide constructive feedback, discussing strengths, weaknesses and potential improvements in the design and implementation of their studies.

Experiential-Learning Learning 27.4: Advancements in CECT, MRI & Radionuclide Imaging

Total Learning Hours: 4 Hours

Activity1: Research and Literature Review (90 Min)

Students will explore recent advancements in CECT, MRI and radionuclide imaging, including AI-assisted interpretation, low-dose CECT and hybrid imaging (PET-CECT, PET-MRI).

They will analyze research articles, clinical case studies and technological developments to understand their impact on diagnostics and patient care.

Activity 2: Comparative Analysis and Group Discussion (90 Min) In groups, students will compare traditional imaging methods with recent advancements, evaluating their benefits, limitations and clinical relevance. Each group will discuss potential challenges in implementation, ethical concerns and future trends. **Activity 3: Presentation and Expert Feedback (60 Min)** Groups will present their findings, highlighting key advancements and their implications for medical imaging. The Teacher will provide feedback, address questions and guide students in critically assessing technological progress in radiology.
Experiential-Learning Learning 27.5: Radiology Report Construction
Total Learning Hours: 4 Hours **Activity 1: Review of Reporting Guidelines (60 Min)** Students will study standardized radiology reporting formats for CECT, MRI and radionuclide imaging. Key components such as structure, terminology, clinical correlations and recommendations will be discussed. **Activity 2: Interpretation of Imaging Cases (60 Min)** Students will analyze provided radiological images, identifying key findings and clinical implications. They will assess pathology, anatomical variations and incidental findings relevant to patient management. **Activity 3: Report Construction and Justification (60 Min)** Based on their image interpretation, students will draft structured radiology reports. Reports will include a clear description of findings, clinical significance and recommendations for further action or follow-up. **Activity 4: Presentation and Peer Review (60 Min)** Students will present their reports for peer review, discussing their diagnostic reasoning and recommendations. Feedback from peers and the Teacher will help refine reporting accuracy, clarity and clinical relevance.
Experiential-Learning Learning 27.6: Evidence-Based Imaging Strategy for Diagnosis

Total Learning Hours: 5 Hours

Activity1: Research and Literature Review (60 Min)

Students will review clinical guidelines and research articles on the use of CECT, MRI and radionuclide imaging for diagnosing specific diseases.

They will identify key factors influencing imaging choices, such as sensitivity, specificity, cost and patient safety.

Activity 2: Designing an Imaging Strategy (90 Min)

Based on their research, students will develop an evidence-based imaging strategy for a chosen disease.

They will outline the sequence of imaging modalities, justification for their selection and how each contributes to accurate diagnosis.

Activity 3: Case-Based Application and Critical Evaluation (90 Min)

Students will apply their imaging strategy to a clinical case, assessing its effectiveness and limitations.

They will compare alternative approaches and refine their strategy based on patient factors and diagnostic challenges.

Activity 4: Presentation and Peer Review (60 Min)

Students will present their strategies to the class, explaining their rationale and clinical relevance.

Peer discussion and Teacher feedback will help refine their approach and reinforce evidence-based decision-making in medical imaging.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. Total Hours of the Assessment: 4:00 Hours **1. Radiology Report Writing – 20 Marks** Students are given an X-ray, CT, MRI, or USG image.	4

They must write a structured radiology report.

2. Image Annotation Task – 10 Marks

Students are provided with radiological images with unlabeled structures.

They must mark and annotate important anatomical landmarks and pathological findings.

3.Oral Viva / Panel Discussion – 10 Marks

One-on-one or group discussion with examiners.

4. Group-Based Case Presentation – 10 Marks

Students work in small groups to analyze a radiology case study.

They present their findings, interpretations, and possible diagnoses to the class.

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 assessment. (25 Marks)

Module 28 : خطہ صدر و بطن کی سطحی تحدید (Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region.

Module Learning Objectives

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

1 Describe the key anatomical landmarks and structures of the thorax and abdomen and their relationship to the surface anatomy.

2 Conduct a thorough examination of the thorax and abdomen using palpation techniques to identify key surface landmarks and related structures.

3 Identify and locate the surface landmarks of the thorax and abdomen through palpation, demonstrating proper technique and accuracy.

Unit 1 خطہ صدر کی سطحی تحدید (Khitta-e-Sadr ki satahi Tahdeed) Surface marking of Thorax.

28.1.1. خطہ صدر کی سطحی تحدید (Khitta-e-Sadr ki satahi Tahdeed) Surface marking of Thorax.

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Demonstrate different surface anatomical landmarks of the thorax and relate them to underlying vasculature and musculature.	3	Experiential-Learning28.1	PSY-SET	Does	D-M,L&GD,PAL,DIS
CO1,CO5	Illustrate the surface anatomy of the thorax with detailed labeling of landmarks and their clinical relevance.	3	Practical28.1	PSY-ORG	Shows-how	D-M,FC,PT,X-Ray,DIS
CO1,CO5	Analyze the relationship between surface anatomical features and internal organ positioning in the thorax and assess how well the surface anatomy of the thorax reflects internal pathology, such as in cases of trauma or disease.	4	Practical28.2	CAN	Shows-how	D,FC,DIS,PT
CO1,CO5	Critique the accuracy of various imaging modalities (e.g., X-ray, ultrasound) in reflecting the surface anatomy of the thorax.	3	Experiential-Learning28.2	CAN	Does	PAL,FC,BS,PER
CO1,CO5	Judge the effectiveness of palpation techniques in identifying key surface landmarks of the thorax during physical exams.	4	Experiential-Learning28.3	CE	Does	CBL,FC,PAL,DIS
CO1,CO4	Identify the bony landmarks related to thorax and location of the Apex Beat, Borders, Orifices and Auscultatory Area of the Heart using surface anatomy.	1	Lecture	CAN	Knows-how	L&PPT ,L_VC,L
CO1,CO4	Describe the surface anatomy of the Esophagus, Trachea, Lungs, Root of Lungs, Pleura, Ascending Aorta, Arch of Aorta and Descending Aorta	2	Lecture	CAP	Knows-how	L_VC,L&GD,L&PPT ,D-M
CO1,CO5	Identify the surface anatomical landmarks in relation to the common entry points for surgical procedures like Chest Tube Insertion, thoracocentesis and pericardiocentesis.	3	Experiential-Learning28.4	CAN	Does	D-M,L_VC,CBL

CO1,CO5	Evaluate the clinical significance of the surface anatomy landmarks of the thorax in patient diagnosis.	3	Practical28.3	CE	Shows-how	CD,PT,DIS,FC,D
CO1,CO4	Describe the surface anatomy of the Brachiocephalic, Left Common Carotid and Left Subclavian Artery, Internal Thoracic Artery, Right Brachiocephalic Vein, Left Brachiocephalic Vein, Superior Vena cava, Thoracic Duct, Intercostal Spaces and Dermatomes of the Thorax.	2	Lecture	CC	Knows-how	L_VC,L,L&PPT

Unit 2 خطہ بطن کی سطحی تحدید (Khitta-e- Batan ki satahi Tahdeed) Surface marking of Abdomen region

28.2.1. خطہ بطن کی سطحی تحدید (Khitta-e- Batan ki satahi Tahdeed) Surface marking of Abdomen region.

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Identify and correlate specific abdominal surface anatomy landmarks with referred pain patterns and common abdominal complaints to improve differential diagnosis skills.	3	Experiential-Learning28.5	CAN	Does	DIS,JC,FC,BS,L&PPT
CO1,CO5	Analyse surface anatomical landmarks to common abdominal imaging techniques (X-ray, ultrasound, CT), understanding how imaging results correspond to anatomical positioning.	3	Experiential-Learning28.6	CE	Does	BL,W,X-Ray,FC,TBL
CO1,CO5	Demonstrate appropriate hand positioning and palpation techniques for identifying anatomical structures of abdomrn	2	Practical28.4	PSY-GUD	Shows-how	D-BED,X-Ray,RLE
CO1,CO5	Design a practical guide for clinicians to effectively use surface anatomical landmarks during abdominal examination.	3	Practical28.5	PSY-ORG	Shows-how	D-BED,PT,DIS

CO1,CO4	Determine the location of the Umbilicus, Regions of Anterior Abdominal Wall, Inguinal Canal and Stomach.	1	Lecture	CAP	Knows-how	L&PPT ,L_VC,L
CO1,CO4	Describe the bony landmarks related to abdomen and surface anatomy of Gastric Triangle, Duodenum, Ileocolic Orifice, Vermiform Appendix, Mc Burney's Point, Sigmoid Point, Cecum, Ascending Colon, Transverse Colon, Descending Colon and Sigmoid Mesocolon.	1	Lecture	CE	Knows-how	CBL,L&PPT ,L_VC,D-BED
CO1,CO4	Describe the surface anatomy of Liver, Gall Bladder, Portal Vein, Common Bile Duct ,Pancreas, Spleen, Kidney & Renal Angle, Supra Renal Gland and Ureters.	2	Lecture	CE	Knows-how	SIM,CBL,D-BED,L_VC
CO1,CO4	Describe the surface anatomy of Inferior Vena Cava, Abdominal Aorta,Common iliac Artery, Coeliac Trunk, Superior Mesentric Artery, Renal Artery, Inferior Mesentric Artery, Inferior Epigastric Artery and Dermatomes of the Abdomen.	1	Lecture	CE	Knows-how	CD,D-BED,L&PPT ,CBL
CO1,CO7	Identify key abdominal surface landmarks (e.g., umbilicus, iliac crest, costal margin) during physical exams to assess the relationship between surface anatomy and internal structures.	2	Practical28.6	CC	Shows-how	LRI,D-BED,L_VC,CD
CO1,CO7	Construct a clinical case study requiring the identification and application of surface anatomical landmarks for diagnosing abdominal pain.	3	Practical28.7	PSY-ORG	Shows-how	D-BED,FC,L_VC,CD

CO1,CO7	Demonstrate the use of surface anatomy to assist in performing clinical procedures like abdominal paracentesis, catheter placement or abdominal surgery.	3	Experiential-Learning28.7	CAN	Does	CBL,LRI,L_VC
CO1,CO7	Identify the method for enhancing palpation skills for surface anatomical landmarks through the use of 3D or virtual reality technology.	4	Experiential-Learning28.8	AFT-VAL	Does	TUT,DIS,PAL

Practical Training Activity

Practical Training 28.1 Thoracic Surface Landmarks Map

Total Learning Hours: 3 Hours

Activity 1: Teacher Demonstration (45 Min)

The teacher will demonstrate key thoracic surface landmarks using anatomical models and radiological images.

Clinical relevance to internal structures and procedures (e.g., auscultation points, needle insertion sites) will be highlighted.

Activity 2: Hands-On Surface Anatomy Mapping (45 Min)

Students will identify and mark thoracic surface landmarks on peers or anatomical models.

They will compare these landmarks with imaging to understand their relationship with underlying structures.

Activity 3: Case-Based Application (45 Min)

Students will analyze clinical cases where surface anatomy is crucial (e.g., chest tube placement, pericardiocentesis).

They will discuss how variations in anatomy affect clinical procedures and diagnosis.

Activity 4: Group Discussion, Q&A and Teacher Feedback (45 Min)

Students will present their thoracic maps and case analyses.

A Q&A session will address challenges, reinforcing the importance of accurate surface anatomy mapping in clinical practice.

Practical Training 28.2 Surface Anatomy & Thoracic Internal Pathology

Total Learning Hours: 4 Hours

Activity 1: Teacher Demonstration (60 Min)

The Teacher will demonstrate key thoracic surface landmarks and their correlation with internal structures using anatomical models and imaging (X-ray, CT, MRI).

Case examples of trauma or disease (e.g., pneumothorax, pleural effusion) will be presented to illustrate how surface anatomy reflects internal pathology.

Activity 2: Hands-On Surface Anatomy Mapping (60 Min)

Students will identify and mark thoracic surface landmarks on peers or anatomical models.

They will compare these landmarks with radiological images to assess their accuracy in locating internal organs.

Activity 3: Case-Based Pathology Assessment (60 Min)

Students will analyze imaging from patients with thoracic trauma or disease.

They will assess how well surface anatomy predicts internal pathology and discuss limitations in clinical assessment.

Activity 4: Group Discussion and Teacher Feedback (60 Min)

Students will present findings, debating cases where surface anatomy aligns or misrepresents internal pathology.

The Teacher will provide insights on clinical applications and the importance of integrating imaging with physical examination.

The session will conclude with a Q&A where students can clarify concepts, discuss challenges and explore clinical applications with the Teacher's guidance.

Practical Training 28.3 Clinical Significance of Thoracic Surface Anatomy

Total Learning Hours: 3 Hours

Activity 1: Teacher Demonstration (45 Min)

The Teacher will demonstrate key thoracic surface landmarks, explaining their clinical significance in diagnosing conditions like pneumothorax, pleural effusion and rib fractures.

Radiological images and clinical case examples will be used to highlight how surface landmarks correlate with internal structures.

Activity 2: Hands-On Identification and Application (45 Min)

Students will identify and mark thoracic surface landmarks on peers or anatomical models.

They will apply their knowledge to clinical scenarios, discussing how these landmarks aid in diagnosis and procedural interventions (e.g., chest tube insertion).

Activity 3: Case Study Analysis (45 Min)

Students will analyze real clinical case studies where surface anatomy is critical (e.g., trauma, respiratory distress).

They will correlate the surface landmarks with patient symptoms and imaging findings to assess the clinical relevance.

Activity 4: Group Discussion, Q&A and Teacher Feedback (45 Min)

Students will present their analyses, discussing the clinical significance of each landmark.

A Q&A session will follow allowing students to clarify doubts and receive feedback to reinforce their understanding.

Practical Training 28.4 Hand Positioning & Palpation Techniques

Total Learning Hours: 2:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The Teacher will demonstrate proper hand positioning and palpation techniques for identifying key anatomical structures of the abdomen. Emphasis will be placed on applying the right amount of pressure, using the pads of the fingers and avoiding excessive force during palpation.

Activity 2: Students Guided Practice (30 Min)

Students will observe and then practice hand positioning and palpation techniques under supervision, focusing on key anatomical structures. They will begin with simple landmarks and progress to more complex areas while ensuring proper technique.

Activity 3: Independent Practice (30 Min)

Students will perform palpation exercises independently on abdomen, identifying anatomical structures on a model or cadaver. They will record their findings and reflect on their accuracy.

Activity 4: Feedback and Reflection (30 Min)

After the practice, students will receive constructive feedback on their technique. A discussion will follow to address any challenges or questions encountered during the palpation process, encouraging self-reflection and improvement.

Practical Training 28.5 Practical Guide for Abdominal Examination Using Surface Anatomy
Total Learning Hours: 3:00 Hours Activity 1: Teacher Demonstration (30 Min) The Teacher will demonstrate key abdominal surface landmarks using anatomical models and imaging. Clinical relevance to examinations (e.g., palpation, percussion, auscultation) and diagnostic procedures will be explained. Activity 2: Hands-On Identification and Mapping (60 Min) Students will practice locating and marking abdominal surface landmarks on peers or models. They will correlate these landmarks with internal organs and their diagnostic significance. Activity 3: Guide Development and Case Application (60 Min) Students will collaborate to design a clinician-friendly guide outlining key surface landmarks, their functions and clinical applications. They will apply their guide to case studies, demonstrating its use in real diagnostic scenarios. Activity 4: Presentation, Q&A and Teacher Feedback (30 Min) Students will present their practical guides and discuss their clinical applications. A Q&A session will address challenges and reinforce the importance of surface anatomy in abdominal examinations.
Practical Training 28.6 Abdominal surface landmarks (e.g., umbilicus, iliac crest, and costal margin etc)
Total Learning Hours: 2:00 Hours Activity 1: Teacher Demonstration (30 Min) The teacher will demonstrate how to locate and identify key abdominal surface landmarks such as the umbilicus, iliac crest and costal margin, on a model or volunteer. The teacher will explain the clinical significance of each landmark and how they correlate with underlying internal structures (e.g., organs, muscles and vascular structures).

Activity 2: Guided Practice (30 Min)

Students will work in pairs or small groups, using anatomical models or each other, to practice locating and identifying these key abdominal landmarks.

The Teacher will provide guidance and feedback, ensuring students understand how to palpate and assess the surface anatomy accurately.

Activity 3: Independent Practice (30 Min)

Students will individually perform abdominal examinations on models or peers, identifying and marking key abdominal landmarks.

Students will use their knowledge to relate these landmarks to underlying anatomical structures and assess how they assist in understanding clinical conditions.

Activity 4: Reflection and Q&A (30 Min)

Students will reflect on their experience and discuss any challenges they encountered during the practice session.

A Q&A session will be held where the Teacher answers questions and reinforces the importance of surface anatomy in clinical practice.

Practical Training 28.7 Surface anatomical landmarks on a patient presenting with abdominal pain.

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The Teacher will demonstrate key abdominal surface landmarks using anatomical models and imaging.

Clinical relevance to common conditions (e.g., appendicitis, cholecystitis, bowel obstruction) will be highlighted.

Activity 2: Hands-On Surface Anatomy Identification (60 Min)

Students will practice locating and marking abdominal surface landmarks on peers or models.

They will compare these landmarks with radiological images to understand their relationship with underlying organs.

Activity 3: Case Study Development and Diagnosis (60 Min)

Students will create and analyze clinical case scenarios based on surface anatomy findings.

They will assess symptoms, correlate with anatomical structures and propose possible diagnoses.

Activity 4: Group Discussion, Q&A and Teacher Feedback (30 Min)

Students will present their case studies and diagnostic reasoning.

A Q&A session will address challenges, reinforcing the role of surface anatomy in diagnosing abdominal conditions.
Experiential Learning Activity
Experiential-Learning Learning 28.1: Thoracic Surface Landmarks & Underlying Structures
Total Learning Hours: 3:00 Hours Activity 1: Review and Identification (60 min) Students will review theoretical knowledge of thoracic surface anatomy including key landmarks such as the clavicle, ribs, sternum and intercostal spaces. The Teacher will demonstrate the location of these landmarks on anatomical models and radiological images. Activity 2: Hands-On Identification and Correlation (60 Min) Students will identify and mark surface anatomical landmarks on anatomical models or peers. They will correlate these landmarks with underlying structures like the major blood vessels (e.g., aorta, subclavian artery) and muscles (e.g., intercostals, diaphragm) using imaging studies. Activity 3: Group Discussion and Feedback (60 Min) Students will present their findings, discussing the relationship between surface landmarks and underlying vasculature and musculature. The Teacher will provide feedback, reinforcing the clinical relevance of this correlation in medical examinations and procedures
Experiential-Learning Learning 28.2: Accuracy of Imaging Modalities in Thoracic Surface Anatomy
Total Learning Hours: 3:00 Hours Activity 1: Review of Imaging Modalities (60 Min) Students will review theoretical knowledge of different imaging modalities (X-ray, ultrasound, CT, MRI) and their ability to represent thoracic surface anatomy. The Teacher will explain the strengths and limitations of each imaging technique in visualizing surface landmarks. Activity 2: Hands-On Image Analysis (60 Min)

Students will analyze various radiological images (X-ray, ultrasound, CT, MRI) of the thorax, comparing them to anatomical models or surface anatomy landmarks. They will assess the accuracy of each modality in reflecting thoracic surface features such as ribs, clavicles and sternum. Activity 3: Group Critique and Feedback (60 Min) Students will present their findings and critique the effectiveness of each imaging modality in representing surface anatomy. The Teacher will provide feedback, guiding students in improving their critical analysis of imaging techniques.
Experiential-Learning Learning 28.3: Effectiveness of Thoracic Palpation Techniques
Total Learning Hours: 4:00 Hours Activity 1: Review and Preparation (60 Min) Students will review theoretical knowledge about key thoracic surface landmarks and palpation techniques. They will prepare by practicing correct hand placement and palpation methods on anatomical models or peers. Activity 2: Hands-On Palpation Practice (90 Min) Students will perform palpation on peers or anatomical models to identify thoracic surface landmarks. They will assess the accuracy and effectiveness of their technique in locating key structures such as ribs, sternum and clavicles. Activity 3: Evaluation and Feedback (90 Min) Students will reflect on their palpation experience, evaluating their success in identifying landmarks. The Teacher will provide feedback on technique and students will discuss challenges and improvements in small groups.
Experiential-Learning Learning 28.4: Surgical Entry Points & Surface Anatomy
Total Learning Hours: 3:00 Hours Activity 1: Review and Analyze (60 Min) Students will review the theoretical aspects of surface anatomy related to chest tube insertion, thoracocentesis and pericardiocentesis.

They will study diagrams, videos or models to identify key anatomical landmarks like intercostal spaces, the xiphoid process and mid-axillary lines.

Activity 2: Hands-on Practice and Exploration (60 Min)

Students will perform hands-on activities using anatomical models or virtual simulations to locate the surface landmarks relevant to each procedure.

They will practice identifying appropriate entry points for chest tube insertion, thoracocentesis and pericardiocentesis based on surface anatomy.

Activity 3: Group Discussion and Feedback (60 Min)

In groups, students will present their findings and discuss the significance of accurate surface landmark identification for the safety and effectiveness of each procedure.

The Teacher will provide feedback and answer questions to reinforce understanding with a focus on clinical application.

Experiential-Learning Learning 28.5: Abdominal Anatomy & Referred Pain Correlation

Total Learning Hours: 3:00 Hours

Activity 1: Review and Analyze (60 Min)

Students will review theoretical concepts related to abdominal surface anatomy and referred pain patterns associated with common abdominal conditions (e.g., appendicitis, cholecystitis, peptic ulcers).

They will analyze case studies or diagrams to understand how specific abdominal landmarks correspond to pain referral areas and common complaints.

Activity 2: Hands-on Practice (60 Min)

Students will participate in guided exercises to palpate and identify key abdominal landmarks on patients or models, while correlating these landmarks with common referred pain patterns.

They will then practice using surface anatomy to link these pain patterns to potential underlying abdominal conditions.

Activity 3: Case Study Application and Discussion (60 Min)

Students will be given clinical case scenarios and asked to use abdominal surface anatomy and referred pain patterns to suggest differential diagnoses.

A group discussion will follow, where students present their findings and receive feedback from Teachers, enhancing their diagnostic reasoning and clinical skills.

Experiential-Learning Learning 28.6: Surface Anatomy & Abdominal Imaging Correlation

Total Learning Hours: 3:00 Hours

Activity 1: Review and Analyze (60 Min)

Students will review the theoretical principles of abdominal surface anatomy and familiarize themselves with common imaging techniques (X-ray, ultrasound, CT).

They will analyze how specific surface landmarks correspond to anatomical structures visible in imaging results.

Activity 2: Hands-on Application (60 Min)

Using sample imaging results (X-ray, ultrasound, CT scans), students will practice identifying anatomical structures and correlating them with surface landmarks, discussing how positioning affects image quality and interpretation.

Activity 3: Discussion and Reflection (60 Min)

In groups, students will present their findings and discuss the relationship between surface anatomy and imaging techniques in clinical cases.

The Teacher will guide a reflective discussion on how understanding surface landmarks improves the accuracy of imaging interpretation.

Experiential-Learning Learning 28.7: Surface Anatomy in Clinical Procedures

Total Learning Hours: 3:00 Hours

Activity 1: Review and Learn (60 min)

Students will review the theoretical aspects of surface anatomy related to abdominal structures, focusing on landmarks relevant to procedures like abdominal paracentesis, catheter placement and abdominal surgery.

They will study diagrams, videos and case studies to understand how surface anatomy guides the location of key organs and vessels.

Activity 2: Hands-on Practice (60 Min)

Using models or simulations, students will practice identifying and palpating key abdominal landmarks (e.g., iliac crest, umbilicus, costal margin) to aid in the safe performance of clinical procedures.

They will practice positioning for abdominal paracentesis, catheter placement or surgical incisions based on surface anatomy.

Activity 3: Demonstration and Application (60 Min)

Students will demonstrate their ability to apply surface anatomy by performing mock procedures (paracentesis, catheter insertion or simulated abdominal surgery) on models, with feedback from Teachers to ensure accuracy and safety. A Q&A session will follow, allowing students to discuss challenges and receive clarification on techniques and landmarks used in real clinical settings.
Experiential-Learning Learning 28.8: 3D/VR-Based Palpation Skill Enhancement
Total Learning Hours: 4:00 Hours Activity 1: Research and Conceptualization (60 Min) Students will review current methods for teaching palpation skills and explore the potential of 3D or virtual reality technology in enhancing these skills. The Teacher will provide examples of existing virtual reality applications in medical training. Activity 2: Method Development and Design (90 Min) Students will design an innovative method or concept that integrates 3D or virtual reality technology to improve palpation of surface anatomical landmarks. They will outline key features, user interactions and potential benefits in their proposed method. Activity 3: Presentation and Feedback (90 Min) Students will present their proposed method, highlighting how it enhances palpation skills and the expected impact on learning outcomes. The Teacher and peers will provide feedback, offering suggestions for refinement and practical application.
Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours**	4

1.Clinical Skill Demonstration – 20 Marks Students demonstrate **palpation of key landmarks** Perform a **basic clinical examination** Use surface markings to outline the **heart or lungs, or liver on a peer or model**. **2.Anatomy Mapping & Labeling Task – 15 Marks** Students are given a **blank body diagram** and must label key surface landmarks, auscultation points, or organ locations. Identify **referred pain areas** for thoracic/abdominal conditions. **3.Forensic & Radiological Correlation Exercise – 10 Marks** Compare a **radiograph, ultrasound, or CT scan** with surface anatomy features. Identify **how external anatomical landmarks relate to internal structures**. Discuss the forensic relevance of surface anatomy **4.Oral Viva / Peer Teaching – 5 Marks** Each student explains a **specific anatomical region** to peers. Or, participate in a **structured viva** with examiners asking questions on anatomical relationships. 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 assessment. (25 Marks)	
Semester No : 5	
Module 29 : طرف اعلیٰ وطرف اسفل کی سطحی تحدید(Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs.	
Module Learning Objectives (At the end of the module, the students should be able to)	

1 Describe the key anatomical landmarks and structures of the upper and lower limbs, including bones, joints, muscles, tendons, and neurovascular pathways.

2 Conduct a detailed palpation of the upper and lower limbs to identify key surface landmarks such as bony prominences, joint lines, and muscle bellies

3 Identify the clinical relevance of these surface anatomical features in the context of physical examination, diagnosis, and surgical procedures.

Unit 1 طرف اعلیٰ کی سطحی تحدید (Taraf-e-Aa'la ki satahi Tahdeed) Surface marking of upper limbs.

29.1.1. طرف اعلیٰ کی سطحی تحدید (Taraf-e-Aa'la ki satahi Tahdeed) Surface marking of upper limbs.

References: 106,107,108,109,110

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Demonstrate how to palpate the arterial pulse of the upper limb and apply it in clinical assessments.	2	Practical29.1	PSY-MEC	Shows-how	PT,D-BED,D
CO1,CO4	Apply knowledge of surface landmarks to locate important bony landmarks and muscles of the upper limb during a physical exam	2	Practical29.2	CAP	Shows-how	DIS,D
CO1,CO4	Develop a clinical protocol that integrates surface anatomy to improve the accuracy of upper limb nerve blocks.	3	Practical29.3	CAP	Shows-how	DIS,D-M,FC,D
CO1,CO4	Demonstrate mastery in combining palpation of the upper limb with neurological tests for related functional assessments.	4	Experiential-Learning29.1	PSY-SET	Does	CD,BS,PAL,L_VC
CO1,CO4	Apply surface anatomy knowledge in all clinical encounters involving upper limb injuries.	5	Experiential-Learning29.2	CAP	Does	DIS,DL,CBL,PER,BL
CO1,CO4	Construct a 3D model of the upper limb highlighting critical surface landmarks for use in accurate positioning of superficial veins for venesection	3	Practical29.4	PSY-ORG	Shows-how	DL,PT,DIS,D-M

	procedures, intramuscular, intravenous injections and overall educational simulations.					
CO1,CO4	Demonstrate how to palpate the arterial pulse of the upper limb and apply it in clinical assessments.	4	Experiential-Learning29.3	PSY-MEC	Does	CBL,D-BED,L&PPT ,RLE,L_VC
CO1,CO4	Examine the Bony landmarks and surface anatomy of Superficial, Deep Palmar Arch, Flexor, Extensor Retinaculum and Dermatomes of the Upper Limb	2	Lecture	CS	Knows-how	L_VC,L&GD,L&PPT ,L
CO1,CO4	Appraise the surface anatomy of the Cephalic, Basilic , Median Cubital Vein and Axillary, Median, Radial and Ulnar Nerves	2	Lecture	CE	Knows-how	L,L&PPT ,L&GD,L_VC
CO1,CO4	Evaluate the surface anatomy of the Axillary, Brachial Radial and Ulnar Arteries.	1	Lecture	CE	Knows-how	L&PPT ,L,L_VC,L&GD
Unit 2 طرف اسفل کی سطحی تحدید(Taraf-e-Asfal ki satahi Tahdeed) Surface marking of lower limbs 29.2.1. طرف اسفل کی سطحی تحدید(Taraf-e-Asfal ki satahi Tahdeed) Surface marking of lower limbs. **References:** 106,107,108,109,110						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO1,CO4	Analyze the mechanics of common sports movements (e.g., squatting, jumping, running) and relate them to muscle activation.	5	Experiential-Learning29.4	CAN	Does	FC,ML,PL,FV,BL

CO1,CO4	Create and apply body painting to visually map key structures like dermatomes, muscle groups, and vascular pathways.	4	Experiential-Learning29.5	CC	Does	DIS,D-BED,PAL,BL,TUT
CO1,CO4	Identify key bony landmarks and soft tissue structures of the lower limb through surface palpation.	3	Practical29.5	CAN	Shows-how	D-M,CBL,BL,D-BED
CO1,CO4	Identify & correlate surface anatomy with underlying muscles, vessels, and nerves.	4	Practical29.6	CAN	Shows-how	SIM,DIS,D,JC
CO1,CO4	Demonstrate clinical examination techniques relevant to lower limb surface anatomy.	3	Practical29.7	PSY-SET	Shows-how	PT,D-M,D,CD,DIS
CO1,CO4	**Interpret real-life case scenarios** (e.g., patient with foot drop, sciatica) by correlating symptoms with surface anatomical landmarks.	4	Experiential-Learning29.6	CS	Does	CBL,PAL,D-BED
CO1,CO4	**Describe the** Dermatomes of the Lower Limb, Flexor, Superior Extensor, Inferior Extensor, and Superior Peroneal and Inferior Peroneal Retinaculum.	1	Lecture	CE	Knows-how	L&PPT ,L&GD,L_VC,L
CO1,CO4	Describe the surface anatomy of the Femoral, Great Saphenous, Short Saphenous Veins, Perforators and Femoral, Sciatic, Tibial, Common Peroneal, Superficial Peroneal, Deep Peroneal, Median Plantar, and Lateral Plantar Nerves.	2	Lecture	CE	Knows-how	L&GD,L&PPT ,L,L_VC

CO1,CO4	Describe the surface anatomy of the Femoral, Inferior Gluteal, Superior Gluteal, Anterior Tibial, Popliteal, Posterior Tibial Dorsalis Pedis, Median Plantar Artery, and Lateral Plantar Arteries	2	Lecture	CE	Knows-how	L,L&GD,L&PPT ,L_VC

Practical Training Activity

Practical Training 29.1 **Palpating Arterial Pulses of the Upper Limb**

Total Learning Hours: 2:00Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate the technique for palpating key arterial pulses in the upper limb (e.g., radial, brachial, and ulnar pulses) on anatomical models or volunteers.

The teacher will explain the clinical significance of each pulse and its role in assessing circulation and cardiovascular health.

Activity 2: Guided Practice (30 Min)

Students will work in pairs or small groups to practice palpating the upper limb pulses on their peers or anatomical models.

The Teacher will provide guidance, ensure correct technique, and reinforce the importance of pulse assessment in clinical settings.

Activity 3: Independent Practice (30 Min)

Students will individually palpate the arterial pulses of the upper limb on their peers, applying the technique and assessing the strength, regularity, and symmetry of the pulses.

Students will practice incorporating pulse palpation into overall clinical assessments, such as circulatory status and cardiovascular evaluation.

Activity 4: Reflection and Q&A (30 minutes)

Students will reflect on their practice and discuss any challenges faced during pulse palpation.

A Q&A session will follow, where the Teacher clarifies any doubts and reinforces the importance of accurate pulse assessment in clinical practice.

Practical Training 29.2 Mapping Muscles & Bones of the Upper Limb

Total Learning Hours: 2:00Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate the process of locating key bony landmarks (e.g., clavicle, scapula, humerus, radius, ulna) and muscles (e.g., deltoid, biceps brachii, triceps) of the upper limb during a physical exam.

The teacher will explain the clinical significance of each landmark and muscle and their role in the assessment of upper limb function.

Activity 2: Guided Practice (30 Min)

Students will work in pairs or small groups, using anatomical models or each other, to practice identifying bony landmarks and muscles on the upper limb.

The Teacher will guide the students through palpation techniques, providing feedback and reinforcing the importance of surface anatomy in clinical assessment.

Activity 3: Independent Practice (30 Min)

Students will individually perform a physical exam on their peers or models, locating and identifying key bony landmarks and muscles of the upper limb.

Students will practice relating these landmarks to normal and abnormal clinical findings, such as joint mobility, muscle strength, and signs of injury.

Activity 4: Reflection and Q&A (30 Min)

Students will reflect on their practice and discuss any challenges faced during the exam.

A Q&A session will follow, where the Teacher clarifies concepts and answers questions, reinforcing the clinical relevance of surface anatomy in physical exams.

Practical Training 29.3 Anatomy-Based Accuracy in Nerve Blocks

Total Learning Hours: 3:00Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate the anatomical landmarks relevant to upper limb nerve blocks, such as the brachial plexus, and show how surface anatomy aids in precise needle placement for various nerve blocks (e.g., axillary, supraclavicular, and interscalene blocks).

The teacher will explain how to integrate surface anatomy with clinical protocols to enhance the accuracy and safety of nerve blocks.

Activity 2: Protocol Development (60 Min)

Students, in small groups, will be tasked with developing a clinical protocol that incorporates surface anatomical landmarks for specific upper limb nerve blocks.

Each group will design their protocol, considering factors such as patient positioning, identification of anatomical landmarks, needle insertion angles, and potential complications.

Activity 3: Protocol Presentation and Feedback (60 Min)

Groups will present their clinical protocols to the class, explaining how they incorporated surface anatomy into the procedure to improve accuracy.

The Teacher and peers will provide constructive feedback on each protocol, with a focus on enhancing clinical application and safety.

Activity 4: Refinement and Finalization (30 Min)

Based on feedback, students will refine their protocols and finalize them.

The Teacher will provide additional guidance and help students integrate any changes or improvements to ensure the protocol's clinical effectiveness.

Practical Training 29.4 Upper Limb Surface Modeling

Total Learning Hours: 3:00Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate how to construct a 3D model of the upper limb using materials such as clay, foam, or 3D modeling software.

The teacher will highlight the key surface landmarks critical for venesection, intramuscular injections, and intravenous injections, explaining their clinical significance in various procedures.

Activity 2: Group Practice (60 Min)

Students will be divided into groups and guided in constructing their own 3D models of the upper limb, incorporating the critical surface landmarks like the brachial, radial, and ulnar veins, as well as muscle groups and bony prominences.

The Teacher will circulate, providing feedback and ensuring accuracy in model construction and anatomical landmark placement.

Activity 3: Independent Practice (60 Min)

Each student will independently construct a 3D model or modify their group model, applying their knowledge of anatomical landmarks for venesection and injections.

Students will identify and mark the relevant veins and structures on their models, ensuring the correct positioning for simulated procedures.

Activity 4: Reflection and Q&A (30 Min) Students will present their 3D models to the class, explaining their choices of landmarks and their relevance to clinical procedures. A Q&A session will follow, where the Teacher addresses any challenges or questions, reinforcing the importance of accurate anatomical knowledge for successful clinical procedures.
Practical Training 29.5 Mapping Bony Landmarks & Soft Tissues
Total Learning Hours: 4:00 Activity 1: **Demonstration**: (60 Min) The Teacher will provide an overview of the importance of surface anatomy in clinical assessments, focusing on key bony landmarks and soft tissue structures of the lower limb. The Teacher will demonstrate how to palpate important structures such as the iliac crest, patella, tibial tuberosity, quadriceps, hamstrings, and other relevant soft tissues. Activity 2: **Practical Observation**: (60 Min) Students will closely observe the Teacher's palpation techniques. During this step, the Teacher will also explain the clinical significance of each structure and how identifying these landmarks can aid in diagnosing musculoskeletal or neurological conditions. Activity 3: **Student Practice**: (60 Min) Students will practice palpating the identified landmarks on themselves or a partner, applying the techniques demonstrated by the Teacher. They will receive individual feedback and corrections to ensure proper technique and accuracy in identifying both bony and soft tissue structures. Activity 4: **Interactive Reflection and Feedback**: (60 Min) In this final step, students will participate in a group discussion or Q&A session. They will reflect on their palpation experience and receive additional guidance. The Teacher will also clarify any questions related to clinical applications, helping students understand the relevance of these landmarks in real-world assessments.
Practical Training 29.6 Anatomical Correlations: Surface to Depth

Total Learning Hours: 3:00

Activity 1: **Teacher Presentation**: (30 Min)

The Teacher will provide a detailed demonstration of palpating critical surface anatomical landmarks of the lower limb, explaining their significance in relation to underlying muscles, vessels, and nerves. Key areas like the femoral artery, tibial nerve, and hamstring muscles will be highlighted, with a focus on their clinical importance.

Activity 2: **Guided Observation**: (60 Min)

Students will observe the Teacher's techniques and gain an understanding of how surface anatomy relates to deeper anatomical structures. The Teacher will explain how identifying these landmarks are crucial in clinical practice for accurate assessment and diagnosis.

Activity 3: **Hands-On Practice**: (60 Min)

will engage in hands-on practice, palpating the key muscles, blood vessels, and nerves of the lower limb. With guidance from the Teacher, they will identify and correlate these structures using surface anatomy, focusing on proper technique and anatomical accuracy.

Activity 4: **Interactive Discussion**: (30 Min)

A Q&A session will be held to encourage students to discuss their findings, clarify any doubts, and explore clinical applications of their new knowledge. This will help them understand the role of surface anatomy in diagnosing conditions and how it contributes to effective clinical examinations.

Practical Training 29.7 Lower Limb Exam Techniques

Total Learning Hours: 3:00

Activity 1: T**eacher Demonstration**: (30 Min)

The teacher will begin by demonstrating clinical examination techniques related to the surface anatomy of the lower limb, including palpation of key bony landmarks, muscles, and vascular structures. The teacher will emphasize the correct technique for assessing muscle tone, joint mobility, and vascularity, explaining their clinical relevance.

Activity 2: **Student Practice**: (60 Min)

Students will practice these examination techniques under supervision, palpating key anatomical structures like the femoral pulse, tibial tuberosity, and patella. They will also assess joint movements such as flexion and extension, while applying knowledge of muscle and joint function.

Activity 3: **Analysis and Application**: (60 Min)

Students will apply their findings from the palpation and joint assessments to diagnose potential conditions like muscle imbalances, nerve compression, or vascular abnormalities. Students will also recognize how variations in surface anatomy may affect clinical findings.

Activity 4: **Q&A and Reflection**: (30 Min)

After the practical activity, a Q&A session will be held to address any challenges students faced and to ensure clear understanding of clinical examination techniques. Students will be encouraged to discuss the relevance of their findings in clinical settings and share experiences.

Experiential Learning Activity

Experiential-Learning Learning 29.1: Mastering Palpation & Neurological Tests

Total Learning Hours: 4:00Hours

Activity 1: Conduct Palpation and Neurological Tests (60 Min)

Students will independently practice palpating key structures of the upper limb (e.g., pulses, muscles, joints) while performing neurological tests (e.g., reflexes, sensation, motor function) on themselves or peers.

They will combine both palpation and neurological testing to assess the overall function of the upper limb and identify any abnormalities.

Activity 2: Complete Functional Assessment (90 Min)

Students will perform a comprehensive upper limb functional assessment, documenting their findings from both palpation and neurological tests.

Based on their assessments, they will formulate a potential diagnosis or highlight areas requiring further clinical investigation.

Activity 3: Reflection and Peer Feedback (90 Min)

Students will reflect on their combined palpation and neurological assessments, discussing their process and results.

In peer groups, they will exchange feedback on techniques and findings, offering suggestions for improvement and sharing insights to enhance their understanding of functional assessments.

Experiential-Learning Learning 29.2: Surface-Based Insights for Upper Limb Injuries
Total Learning Hours: 5:00Hours **Acivity 1: Assess Upper Limb Injuries Using Surface Anatomy (90 Min)** Students will independently examine upper limb injuries, identifying surface anatomical landmarks (e.g., bones, joints, muscles) to assess injury severity, location, and impact on underlying structures. **Acivity 2: Perform Clinical Evaluations and Document Findings (120 Min)** Students will apply their surface anatomy knowledge to conduct detailed clinical evaluations, focusing on the relationship between visible injuries and internal structures. They will document their findings, including possible diagnoses and next steps for treatment or referral. **Acivity 3: Discuss Case Scenarios and Review (90 Min)** Students will discuss various upper limb injury case scenarios in small groups, comparing their assessment approaches and evaluating the clinical implications of their surface anatomy findings. Peer feedback and self-reflection will help refine their ability to apply surface anatomy in clinical practice.
Experiential-Learning Learning 29.3: **Palpating the Arterial Pulse of the Upper Limb**
Total Learning Hours: 4:00Hours Activity **1: Palpate Arterial Pulses (60 Min)** Students will practice palpating the arterial pulses of the upper limb (e.g., radial, brachial, ulnar) on themselves or peers, focusing on accurate location, technique, and palpation strength. Activity **2: Integrate Pulse Findings into Clinical Assessments (90 Min)** Students will apply their findings from pulse palpation to assess circulatory health, identifying abnormalities such as weak or absent pulses, and correlate them with clinical conditions (e.g., arterial occlusion, peripheral artery disease). Activity **3: Reflect and Document Clinical Implications (90 Min)**

Students will reflect on their assessment techniques and document their findings, discussing the clinical significance of pulse palpation in diagnosing cardiovascular and vascular conditions. They will also review potential treatment strategies or further diagnostic steps based on their assessments.

Experiential-Learning Learning 29.4: Mechanics of Movement in Athletics

Total Learning Hours: 5:00

Activity 1: **Identify Key Muscles Involved**: (120 Min)

Students will first identify the primary muscles involved in common sports movements, such as squatting, jumping, and running. They will relate these muscles to their function during each movement, understanding how muscle activation changes with different phases of the motion.

Activity 2: **Observe and Analyze Movements**: (90 Min)

Students will observe demonstrations of these sports movements and analyze the mechanics involved. They will use their theoretical knowledge of muscle function to identify which muscles are activated and how they contribute to the efficiency and effectiveness of each movement.

Activity 3: **Apply and Assess in Practice**: (90 Min)

Students will perform the movements themselves while actively engaging the muscles involved. They will assess their own muscle activation through feedback, both from the Teacher and through self-reflection, refining their technique to ensure proper muscle engagement for optimal performance and injury prevention.

Experiential-Learning Learning 29.5:

Body Mapping Through Art

Total Learning Hours: 4:00

Activity 1: **Design and plan the body painting**: (60 Min)

Students will identify key anatomical structures like dermatomes, muscle groups, and vascular pathways, and plan how to represent them visually on the body using colors and markers.

Activity 2: **Apply body painting**: (120 Min)

Students will apply the body paint to their own or a peer's body, accurately marking the identified anatomical structures and ensuring proper placement for each group.

Activity 3: **Evaluate and discuss the painted model**: (60 Min)

Students will analyze the body painting, comparing it with anatomical references to ensure accuracy, and discuss how the visual map can aid in clinical assessments and understanding of human anatomy.

Experiential-Learning Learning 29.6: Case-Based Surface Anatomy Interpretation

Total Learning Hours: 4:00

Activity 1: **Analyze Symptoms**: (90 Min)

Review and analyze a real-life case scenario, such as a patient with foot drop or sciatica, focusing on the specific symptoms presented.

Activity 2: **Correlate Symptoms with Anatomy**: (90 Min)

Identify and correlate the symptoms with the relevant surface anatomical landmarks, such as nerve pathways and muscle groups involved.

Activity 3: **Formulate Diagnosis**: (60 Min)

Based on the analysis, hypothesize a diagnosis and propose a plan for further clinical investigation or management, integrating surface anatomy knowledge.

Modular Assessment

Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours**	4

1.Surface Anatomy Identification & Practical Assessment – 20 Marks Live demonstration: Students will be asked to identify and palpate specific bony landmarks, muscles, joints, or neurovascular structures on a peer or model. **Functional assessment**: Students demonstrate and describe joint movements (e.g., elbow flexion, knee extension) and associated muscles. **2. Clinical Case-Based Analysis – 15 Marks** Students will be presented with a case involving **limb dysfunction, nerve injury, or vascular impairment**. They must describe the affected anatomical structures, possible causes, and clinical implications. **3. Objective Structured Practical Examination (OSPE) – 10 Marks** Short station-based practical tasks such as: Identifying key **surface landmarks** using palpation. Demonstrating **muscle testing techniques**. Marking **vascular structures** on a diagram or model. **4. Reflective Report on Experiential Learning – 5 Marks** A short written reflection (250 words) on a **practical session, clinical case discussion, or imaging correlation** 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 assessment. (25 Marks)	
Module 30 : تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy.	
Module Learning Objectives (At the end of the module, the students should be able to)	

1 Describe the key principles of forensic anatomy, focusing on the identification of human bones and their role in determining sex, age, and height for medico-legal purposes.

2 conduct Conduct a hands-on examination of skeletal remains or models to identify and analyze anatomical features and estimate demographic characteristics (e.g., sex, age, height).

3 Identify the anatomical markers used to determine the sex, age, and height of human remains from skeletal remains.

Unit 1 تشریح قانونی (Tashreeh -e-Qanooni) Forensic Anatomy. بدنی عظام کی شناخت انکی نعش کے ذریعے کرنا (Badni Eza'm ki Shinakht unki Na'sh ke Zariye karna) Identification of human bones from their remains.

30.1.1. تشریح قانونی (Tashreeh -e-Qanooni) Forensic Anatomy.

30.1.2. بدنی عظام کی شناخت انکی نعاش کے ذریعے کرنا (Badni Eza'm ki Shinakht unki Na'sh ke Zariye karna) Identification of human bones from their remains.

References: 127,128,129,130,131

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Describe key concepts in forensic anatomy, including forensic osteology, odontology, and soft tissue analysis.	2	Lecture	CAP	Knows-how	L&GD,L,L&PPT ,L_VC
CO1,CO5	Describe the role of Forensic Anatomy in the Criminal Legal Procedures.	1	Lecture	CC	Knows-how	L&PPT ,L,L&GD,L_VC
CO1,CO5, CO7	Identify and differentiate between antemortem, perimortem, and postmortem bone trauma.	4	Practical30.1	CAN	Shows-how	CD,BL,L_VC,DIS,SIM
CO1,CO5, CO7	Apply forensic techniques to estimate the time since death based on bone decomposition and preservation.	4	Experiential-Learning30.1	CAP	Does	BL,IBL,FC
CO1,CO5, CO7	Differentiate burned, fragmented, or commingled skeletal remains for forensic identification.	3	Practical30.2	CAN	Shows-how	BS,DIS,PT,FC

CO1,CO5, CO7	Document forensic reports based on anatomical observations and evidence interpretation	5	Experiential-Learning30.2	AFT-RES	Does	JC,BS,FC,DIS,PAL
CO1,CO5	Describe the identification of human bones from their remains.	2	Lecture	CAP	Knows-how	L,L&PPT ,L_VC,L&GD
CO1,CO5, CO7	Discuss real-world forensic cases where skeletal remains played a critical role in solving crimes or identifying missing persons.	4	Experiential-Learning30.3	CC	Does	FC,BL,PAL,DIS,CBL
CO1,CO5, CO7	Differentiate between human and non-human bones based on morphological characteristics	3	Practical30.3	CAN	Shows-how	CD,D,FC,DIS,PT

Unit 2 تشریح کو طبی وقانونی نظریہ میں استعمال کرتے ہوئے جنس، عمر، قد کا تعین کرنا۔ (Tahreeh ko Tibbi wa Qanooni Nazariye me Iste'mal karte hue Jins, Umar wa Qa'd ka Ta'yyun karna)

Determination of sex, age, and height. for medico legal application of Anatomy.

30.2.1. تشریح کو طبی وقانونی نظریہ میں استعمال کرتے ہوئے جنس، عمر، قد کا تعین کرنا۔ (Tahreeh ko Tibbi wa Qanooni Nazariye me Iste'mal karte hue Jins, Umar wa Qa'd ka Ta'yyun karna)

Determination of sex, age, and height. for medico legal application of Anatomy.

References: 127,128,129,130,131,132,133,134,135

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Discuss the significance of age, sex, and height estimation in medicolegal and forensic investigations.	2	Lecture	CC	Knows-how	L&PPT ,L_VC,L&GD,L
CO1,CO5, CO7	Demonstrate the process of determining age and sex from a given set of skeletal remains, highlighting key anatomical features that aid in identification for Medico legal purposes.	3	Practical30.4	PSY-SET	Shows-how	D,BL,JC,CD,FC

CO1,CO5, CO7	Assess cranial features and pelvic morphology for sex determination in forensic cases.	5	Experiential-Learning30.4	CAN	Does	BL,DIS,PAL,JC,SDL
CO1,CO5	Describe sex determination techniques in medicolegal investigations, particularly in cases involving unidentified bodies and gender-related crimes.	2	Lecture	CC	Knows-how	L,L_VC,L&GD,L&PPT
CO1,CO5, CO7	Compare sexual dimorphism in skeletal remains by studying morphological differences between male and female pelvises, skulls, and long bones.	4	Practical30.5	CAN	Shows-how	D-M,DIS,L&GD,L&PPT ,TBL
CO1,CO5	Evaluate international and national forensic guidelines for age, sex, and height estimation in legal cases.	1	Lecture	CE	Know	L&PPT ,L,L&GD,L_VC
CO1,CO5, CO7	Demonstrate the process of determining age and sex from a given set of skeletal remains, highlighting key anatomical features that aid in identification.	4	Experiential-Learning30.5	AFT-RES	Does	CD,PAL,IBL,BL,FC
CO1,CO5, CO7	Investigate how postmortem changes and environmental conditions can affect the accuracy of sex, age, and height determinations in Medico legal cases.	3	Practical30.6	CAP	Shows-how	CD,FC,D,L_VC
CO1,CO5, CO7	Analyze the influence of postmortem changes and environmental factors on the accuracy of sex, age, and height estimations in forensic cases.	4	Experiential-Learning30.6	CAN	Does	DIS,PL,CD,L_VC,PAL
Practical Training Activity						
Practical Training 30.1 Markers of Antemortem, Perimortem & Postmortem Trauma						

Total Learning Hours: 4:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will demonstrate how to identify and differentiate between antemortem, perimortem, and postmortem bone trauma by showing various bone samples and explaining key characteristics of each type of trauma.

Activity 2: Student Practice (60 Min)

Students will examine provided bone samples and classify the trauma based on the characteristics demonstrated, focusing on identifying signs such as healing (antemortem), fracture patterns (perimortem), and discoloration (postmortem).

Activity 3: Group Discussion (60 Min)

Students will engage in a group discussion to compare their findings and share reasoning behind their classifications, helping to solidify their understanding of the trauma types.

Activity 4: Q&A Session (60 Min)

The teacher will facilitate a Q&A session to address any uncertainties, clarify specific features, and deepen understanding of trauma types in forensic analysis.

Practical Training 30.2 Skeletal Remains: Forensic Differentiation

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate how to identify and differentiate burned, fragmented, or commingled skeletal remains by showcasing examples of each type, highlighting key features such as fracture patterns, burn marks, and signs of commingling.

Activity 2: Student Practice (60 Min)

Students will be provided with skeletal remains that are burned, fragmented, or commingled. They will apply the demonstrated techniques to classify and differentiate the remains based on visual and tactile examination, focusing on characteristics like color changes from burning or breakage patterns.

Activity 3: Group Discussion and Analysis (60 Min)

After individual practice, students will discuss their findings in small groups, comparing their observations to reinforce correct identification techniques and further understanding of forensic identification processes.

Activity 4: Q&A Session (30 Min)

A Q&A session will follow the practice and group discussion, where students can clarify doubts, ask questions about complex cases, and engage in discussions to deepen their understanding of forensic skeletal analysis.

Practical Training 30.3 Human vs. Non-Human: Skeletal Insights

Total Learning Hours: 3:00 Hours

Activity 1: Demonstration (30 Min)

The teacher will demonstrate how to differentiate human bones from non-human bones by examining key morphological characteristics such as bone size, shape, and structure.

Activity 2: Student Practice (60 Min)

Students will practice identifying and differentiating human and non-human bones using a variety of skeletal samples, paying attention to specific features like bone density, joint structure, and surface texture.

Activity 3: Independent Assessment (60 Min)

Students will independently assess various bone samples, documenting their findings and justifying their identification of human versus non-human bones based on the observed characteristics.

Activity 4: Q&A Session (30 Min)

The teacher will facilitate a Q&A session, addressing any questions or challenges the students encountered during their identification process, ensuring clarity and reinforcing learning. Students will practice differentiating human bones from non-human bones by examining key morphological features, such as size, shape, and structure. They will apply this knowledge through hands-on analysis of skeletal samples, followed by a Q&A session to reinforce understanding.

Practical Training 30.4 Anatomy of Age & Sex Determination

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The teacher will demonstrate how to identify key anatomical features from skeletal remains, including the pelvis, skull, and long bones, to determine age and sex for medico-legal purposes, explaining the significance of each feature.

Activity 2: Guided Practice (60 Min)

Students will practice identifying these anatomical features on skeletal remains or replicas, using the demonstration as a reference to assess age and sex.

Activity 3: Independent Practice (60 Min)

Students will apply the techniques learned to additional skeletal remains or replicas, attempting to determine the age and sex independently while ensuring accuracy.

Activity 4: Q&A and Discussion (30 Min)

The teacher will facilitate a Q&A session, addressing any challenges or questions students encountered during the activity and providing additional insights into the application of these techniques in medico-legal cases.

Practical Training 30.5 Skeletal Clues: Male vs. Female

Total Learning Hours: 4:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will introduce the concept of sexual dimorphism and demonstrate how to identify morphological differences between male and female pelvises, skulls, and long bones. The teacher will highlight key features such as the pelvic inlet, sacrum, and skull characteristics.

Activity 2: Guided Practice (60 Min)

Students will observe the teacher's demonstration and then, under guidance, practice identifying the sexual dimorphism features on provided skeletal remains. They will compare pelvises, skulls, and long bones for male and female traits.

Activity 3: Independent Practice (60 Min)

Students will work independently to assess additional skeletal remains, using the knowledge gained to identify and document sexual dimorphism in the bones. They will analyze specific features and make accurate determinations.

Activity 4: Q&A Session (60 Min)

The activity will conclude with a Q&A session, where students can ask questions, clarify doubts, and discuss any challenges they faced while comparing skeletal remains. The teacher will provide further insights into refining their skills and knowledge.

Practical Training 30.6 Forensic Estimation Challenges

Total Learning Hours: 3:00 Hours

Activity1: Demonstration (30 Min)

The teacher will introduce postmortem changes and environmental factors that affect the accuracy of determining sex, age, and height. They will demonstrate how decomposition, environmental conditions (e.g., temperature, humidity), and other factors can alter skeletal remains, using real case examples.

Activity 2: Student Observation (30 Min)

Students will observe the teacher's demonstration of how to assess skeletal remains for age, sex, and height, considering the impact of postmortem changes and environmental influences.

Activity 3: Student Practice (60 Min)

Students will investigate a set of skeletal remains, applying their knowledge of anatomical landmarks and forensic techniques while considering the effects of postmortem changes and environmental factors on the accuracy of the findings.

Activity 4: Q&A and Discussion (60 Min)

The teacher will lead a Q&A session to discuss students' observations and findings, exploring challenges in estimating sex, age, and height in medico legal cases. Students will reflect on their experiences and ask questions regarding real-world forensic cases.

Students will investigate how postmortem changes and environmental conditions impact the accuracy of determining sex, age, and height from skeletal remains in medico legal cases, through teacher demonstration, guided practice, and a Q&A discussion.

Experiential Learning Activity

Experiential-Learning Learning 30.1: Estimating Time: Bone Preservation Insights
Total Learning Hours: 4:00 Hours Activity 1: **Review Theory** (60 Min) Students will study the principles behind estimating the time of death, including the factors affecting bone decomposition and preservation. Activity **2: Examine Decomposed Bone Samples** (60 Min) Students will apply their knowledge by examining bone samples, noting characteristics such as color, texture, and presence of insect activity, and assess the extent of decomposition. Activity 3: **Analyze Findings** (60 Min) Based on their examination, students will use established forensic techniques to estimate the time since death by comparing their observations with known decomposition timelines. Activity 4: **Discussion & Q&A** (60 Min) Students will present their findings to the class, and engage in a discussion about the challenges, ethical considerations, and variables that can affect the accuracy of postmortem interval estimation.
Experiential-Learning Learning 30.2: Forensic Report Essentials
Total Learning Hours: 5:00 Hours **Activity 1: Analyze Forensic Evidence** (60 Min) Students will review a set of skeletal remains or anatomical evidence, focusing on key observations such as bone structure, fractures, and markings relevant to the case. **Activity 2: Interpret Evidence** (90 Min) Using their knowledge, students will interpret the findings, drawing conclusions about factors like age, sex, cause of death, or trauma based on anatomical analysis. Step 1: **Activity 3: Prepare Forensic Report** (90 Min)

Students will compile their observations and interpretations into a structured forensic report, detailing the evidence, methods, and conclusions in a clear and concise manner. **Activity 4: Review and Reflect** (60 Min) Students will present their reports to peers or instructors for feedback and engage in a Q&A session to refine their report-writing skills and critical thinking in forensic analysis.
Experiential-Learning Learning 30.3: Skeletal Clues in Forensics
Total Learning Hours: 4:00 Hours Activity 1: Review Case Studies (60 Min) Students will review real-world forensic cases where skeletal remains were critical in solving crimes or identifying missing persons. They will analyze the methodology used and the role of skeletal evidence in the investigation. Activity 2: Identify Key Forensic Techniques (60 Min) Students will identify and discuss the forensic techniques employed in these cases, such as skeletal analysis, age, sex, and ancestry determination, and how they contributed to solving the cases. Activity 3: Group Discussion and Analysis (60 Min) In groups, students will present a case study, explaining the forensic techniques used and evaluating their effectiveness in the case. They will discuss the challenges faced during the investigation and how they were overcome. Activity 4:Q&A Session (60 Min) Students will engage in a Q&A session to clarify concepts, discuss the implications of skeletal evidence in forensic science, and reflect on how similar methods could be applied in hypothetical future cases.
Experiential-Learning Learning 30.4: Cranial & Pelvic Insights in Forensics
Total Learning Hours: 5:00 Hours

Activity 1: Exploration (60 Min)

Students will independently examine cranial features (such as brow ridge, mastoid process, and external occipital protuberance) and pelvic morphology (including pelvic inlet shape, sacrum curvature, and pelvic arch) to identify characteristics that help determine sex.

Activity 2: Data Recording (90 Min)

Students will document their observations and record the anatomical features they identify for sex determination.

Activity 3: Peer Review: (90 Min)

Students will compare their findings with peers, discussing the accuracy of their assessments and any challenges they faced during the evaluation process.

Activity 4: Q&A Session (60 Min)

A question-and-answer session will allow students to clarify any doubts and engage in further discussion to refine their understanding of sex determination through cranial and pelvic features.

Experiential-Learning Learning 30.5: Sex and Age Determination from Skeletal Remains

Total Learning Hours: 4:00 Hours

Activity 1: Analysis of Skeletal Remains (60 Min)

Students will begin by analyzing a set of skeletal remains, identifying key anatomical features such as the pelvis, skull, and long bones, which are crucial for determining age and sex. They will apply theoretical knowledge on skeletal markers.

Activity 2: Demonstration and Practice (90 Min)

The instructor will demonstrate how to identify and measure these key features for accurate age and sex determination. Then, students will practice these techniques using the provided skeletal remains, refining their skills through hands-on application.

Activity 3: Discussion and Evaluation (90 Min)

Following the hands-on practice, a Q&A session will be conducted. Students will discuss their findings, compare them with known reference data, and engage in discussions about the potential limitations and challenges in determining age and sex from skeletal remains.

Experiential-Learning Learning 30.6: Postmortem Influences on Estimations	
Total Learning Hours: 4:00 Hours **Activity 1: Examine and analyze postmortem changes (60 Min)** Students will explore how factors such as decomposition and environmental conditions (e.g., temperature, humidity) influence skeletal remains and can impact the accuracy of sex, age, and height estimations in forensic cases. **Activity 2: Conduct comparative studies (90 Min)** Students will investigate case studies or simulated forensic cases where environmental variables or postmortem changes affected the skeletal remains, comparing results from different scenarios and documenting variations in determinations of sex, age, and height. **Activity 3: Apply critical thinking and problem-solving skills (90 Min)** Students will discuss and debate the limitations and challenges of forensic estimation methods when influenced by external conditions, and propose strategies to improve the accuracy of these assessments in real-world forensic investigations.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Forensic Case Analysis – 20 Marks** Students will be presented with a forensic case scenario involving human skeletal remains. They will be required to determine sex, age, height, and possible cause of skeletal changes based on given markers.	4

2.Skeletal Identification & Practical Assessment – 15 Marks Hands-on identification of skeletal elements (or images of bones if physical specimens are unavailable). Application of key anatomical landmarks to determine sex, age, or stature. **3.Objective Structured Practical Examination (OSPE) – 10 Marks** Short station-based assessments (e.g., measuring long bones for stature estimation, identifying skull features for sex determination, assessing skeletal maturity). **4.Reflective Report on Experiential Learning – 5 Marks** Students will write a **short reflection** (250 words) on a forensic case study, a skeletal analysis activity, or a forensic reconstruction exercise. 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 assessment. (25 Marks)	
Semester No : 6	
Module 31 : تشریح میں جدید تحقیقات (Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy	
Module Learning Objectives (At the end of the module, the students should be able to) 1 Describe the fundamental principles and techniques of various imaging modalities, including Intravenous Urography (IVU), Angiography, Fluoroscopy, Barium Studies, Cholecystography, and Hysterosalpingography. 2 conduct the preparation and administration of contrast media for IVU, Angiography, and Barium studies, ensuring correct dosage, technique, and safety measures.	

3 Identify the indications for each imaging technique and how they contribute to diagnosing specific conditions in different organs and systems (e.g., renal, cardiovascular, gastrointestinal, reproductive).

Unit 1 تشریح میں جدید تحقیقات جس میں ساخت و اَفعال کے باہمی تعلقات کو سمجھنے میں مدد ملتی ہے اور سریریاتی مسئلوں کو حل کرنے میں استعمال ہوتے ہیں (Tashreeh Men Jadeed Tahqeeqaat Jisse Saakht-o-af'al ke bahmi ta'luqaat ko Samajhney Mem Ma'dad Milti Hai Aur Sareeryati mas'lo ko hal karney mai iste'mal hotey hai) Recent advances in Anatomy which facilitate comprehension of structure function correlations and applications in clinical problem solving. تصویراوعیہ (Tasveer-e-Auiyyah) Angiography.

31.1.1. تشریح میں جدید تحقیقات جس میں ساخت و اَفعال کے باہمی تعلقات کو سمجھنے میں مدد ملتی ہے اور سریریاتی مسئلوں کو حل کرنے میں استعمال ہوتے ہیں (Tashreeh Men Jadeed Tahqeeqaat Jisse Saakht-o-af'al ke bahmi ta'luqaat ko Samajhney Mem Ma'dad Milti Hai Aur Sareeryati mas'lo ko hal karney mai iste'mal hotey hai) Recent advances in Anatomy which facilitate comprehension of structure function correlations and applications in clinical problem solving.

31.1.2. تصویراوعیہ (Tasveer-e-Auiyyah) Angiography.

References: 132,133,134,139,140

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Interpret the conventional IVU images with CT urography (CTU) and MR urography (MRU) through a case-based approach to determine the most suitable imaging modality for different clinical scenarios.	4	Experiential-Learning31.1	CAN	Does	BL,DL,CBL,DIS,L&PPT
CO1,CO5, CO7	Interpret real patient case studies involving angiography, IVU, and fluoroscopy, formulating diagnostic impressions and proposing imaging-based treatment approaches.	5	Experiential-Learning31.2	CAN	Does	C_L,D,CBL,D-BED,L&PPT
CO1,CO5	Apply artificial intelligence (AI) and machine learning in anatomical studies.	1	Lecture	CC	Knows-how	L&PPT ,BL,L_VC,L&GD,SY

CO1,CO5, CO7	Discuss how AI and machine learning are revolutionizing anatomical imaging, angiographic diagnostics, and fluoroscopic image processing, leading to improved precision and efficiency.	3	Practical31.1	CC	Shows-how	L&PPT ,SY,D
CO1,CO5	Define angiography and its role in vascular imaging and Compare angiography with non-invasive vascular imaging techniques like Doppler ultrasound, CT angiography, and MR angiography.	2	Lecture	CC	Knows-how	L&PPT ,BL,L_VC,L&GD
CO1,CO5, CO7	Evaluate the impact of digital subtraction angiography (DSA), CT angiography (CTA), and MR angiography (MRA) on vascular imaging and their advantages over conventional anatomical studies.	3	Practical31.2	CE	Shows-how	PL,PT,PAL
CO1,CO5, CO7	Analyze the role of recent anatomical imaging advancements, including 3D reconstruction, virtual dissection, and functional imaging, in enhancing diagnostic accuracy in angiography, IVU, and fluoroscopy.	4	Practical31.3	CAN	Knows-how	CBL,D
CO1,CO5, CO7	Compare & present traditional angiography with non-invasive CTA and MRA, discussing the advantages and limitations of each modality.	4	Experiential-Learning31.3	CAN	Does	DIS,JC,PER
CO1,CO5	Describe the anatomy of the urinary system as visualized in IVU and evaluate the advantages and limitations of IVU in modern radiology.	2	Lecture	CE	Knows-how	L&GD,L&PPT ,L_VC

Unit 2 تصویر تلون فلوری اور اس کے مختلف اقسام واشارات (Tasveer-e-Talawwun Flori wa Iske Mukhtalif Aqsa'm wa Isharaat) fluoroscopy its different types and indications. اشعاع مع بیریم (ish'aa'a ma'a barium) Barium studies. تصویر مرارہ شعاعی (Tasweer mrarah shua'ei) Cholecystography. تصویر شعاعی رحمی قاذفی (Tasweer-e- shua'ei qazifi) Hystero-salpingography.

31.2.1. تصویر تلون فلوری واس کے مختلف اقسام واشارات (Tasveer-e-Talawwun Flori wa Iske Mukhtalif Aqsa'm wa Isharaat) fluoroscopy its different types and indications.

31.2.2. اشعاع مع بیریم (ish'aa'a ma'a barium) Barium studies.

31.2.3. تصویر مرارہ شعاعی (Tasweer mrarah shua'ei) Cholecystography.

31.2.4. تصویر شعاعی رحمی قاذفی (Tasweer-e- shua'ei rahmi-qazifi) Hystero-salpingography.

References: 141,142,143,144,145

3A	3B	3C	3D	3E	3F	3G
CO1,CO5, CO7	Assess Sensitivity, Specificity, and Limitations of Barium Swallow, Cholecystography, and Salpingography.	4	Practical31.4	CE	Shows-how	L&PPT
CO1,CO5, CO7	Evaluate the Accuracy and Safety of Contrast Agents vs. Other Imaging Modalities for GIT & Gallbladder Evaluation.	3	Practical31.5	CK	Shows-how	L&PPT ,C_L
CO1,CO5	Describe fluoroscopy, types and indications.	1	Lecture	CC	Knows-how	BL,L&GD,L_VC,L&PPT
CO1,CO5	Describe different types of barium studies and their clinical applications.	2	Lecture	CK	Knows-how	L_VC,L&GD,BL,L&PPT
CO1,CO5	Demonstrate the appropriate selection, preparation, and administration of contrast media for each procedure, considering patient safety and contraindications.	5	Experiential-Learning31.4	AFT-SET	Does	D,DIS,L&PPT

CO1,CO5	Describe hysterosalpingography (HSG) and its role in reproductive medicine.	1	Lecture	CC	Knows-how	BL,L_VC,L&GD,L&PPT
CO1,CO5	Discuss cholecystography and its historical role in gallbladder imaging.	1	Lecture	CC	Knows-how	L_VC,BL,L&GD,L&PPT
CO1,CO5, CO7	Analyse Patient Discomfort in Salpingography, Cholecystography, and Barium Studies: A Study on Pain Reduction Strategies and Sedation Alternatives.	4	Experiential-Learning31.5	AFT-RES	Does	D,D-M,DL,JC
CO1,CO5, CO7	Design a Patient Information Pamphlet for Salpingography, Cholecystography, and Barium Studies.	4	Experiential-Learning31.6	AFT-SET	Does	PAL,JC,PBL
CO1,CO5, CO7	Analyze Contrast Agents in GIT, Uterine Tube, and Gallbladder Imaging.	3	Practical31.6	CAN	Shows-how	D,PER

Practical Training Activity

Practical Training 31.1 Smart Imaging: The AI Advantage

Total Learning Hours: 3:00 Hours

Activity 1: Teacher Demonstration (30 Min)

The Teacher will present an overview of AI and machine learning applications in anatomical imaging, angiography, and fluoroscopy.

Demonstrate AI-based image processing techniques, showcasing real-time enhancements, automated segmentation, and diagnostic assistance.

Activity 2: Guided Student Practice (60 Min)

Students will explore AI-powered imaging software, learning how to interpret AI-assisted angiographic and fluoroscopic images.

Perform side-by-side comparisons of traditional vs. AI-enhanced diagnostic images to assess accuracy and efficiency. **Activity 3: Independent Hands-on Application (60 Min)** Students will use simulated datasets to apply AI-based tools for anatomical structure identification and anomaly detection. Practice adjusting AI parameters to optimize image clarity and enhance diagnostic precision. **Activity 4: Analysis and Discussion (30 Min)** Students analyze AI-generated diagnostic reports and compare them with human interpretations. Engage in a Q&A session discussing the benefits, limitations, and ethical considerations of AI in medical imaging
Practical Training 31.2 Advancing Angiography: DSA, CTA & MRA
Total Learning Hours: 3:00 Hours Activity 1: Introduction & Demonstration (30 Min) The teacher explains the principles of DSA, CTA, and MRA, demonstrating their applications in vascular imaging and comparing them with conventional methods. Activity 2: Hands-on Image Analysis (60 Min) Students examine case studies featuring DSA, CTA, and MRA scans, identifying vascular structures and assessing image clarity, contrast, and diagnostic advantages. Activity 3: Comparative Evaluation (60 Min) Students analyze key differences between the techniques, discussing their benefits in clinical settings, including reduced invasiveness, enhanced visualization, and diagnostic accuracy. Activity 4: Discussion & Q&A (30 Min) A guided discussion follows where students critically evaluate when to use each modality, addressing real-world applications, limitations, and advancements in vascular imaging.
Practical Training 31.3 Angiography, IVU, and Fluoroscopy

Total Learning Hours: 4:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The teacher will provide an overview of recent advancements in anatomical imaging, such as 3D reconstruction, virtual dissection, and functional imaging, explaining how they are used in angiography, IVU, and fluoroscopy to improve diagnostic accuracy.

Activity 2: Student Exploration (60 Min)

Students will explore different case studies where these imaging advancements have been applied in angiography, IVU, and fluoroscopy, identifying how the technologies enhance diagnostic precision.

Activity 3: Hands-on Practice (60 Min)

Students will use simulation software or available tools to practice interpreting 3D reconstructions, virtual dissections, and functional imaging, applying them to real or simulated patient data to enhance their understanding of diagnostic applications.

Activity 4: Q&A Session (60 Min)

After completing the activity, students will engage in a Q&A session, discussing challenges, advantages, and real-world implications of these imaging techniques in improving diagnostic accuracy in clinical practice.

Practical Training 31.4 **Imaging Insights: Barium, Cholecystography & Salpingography**

Total Learning Hours: 4:00 Hours

Activity 1: Teacher Demonstration (60 Min)

The Teacher will explain the principles, indications, and limitations of barium swallow, cholecystography, and salpingography.

Demonstrate of image interpretation techniques and discussion on sensitivity and specificity for detecting normal and abnormal anatomical structures.

Activity 2: Case-Based Image Analysis (60 Min)

Students will analyze provided radiographic images from barium swallow, cholecystography, and salpingography.

They will assess the diagnostic accuracy of each modality in detecting abnormalities and differentiate normal vs. pathological findings.

Activity 3: Independent Evaluation and Report Writing (60 Min)

Students will independently evaluate a set of imaging cases, calculate sensitivity and specificity where applicable, and identify limitations.They will draft a short report summarizing their findings and diagnostic considerations.

Activity 4: Group Discussion and Teacher Feedback (60 Min)

Students will present their evaluations, compare findings, and discuss clinical decision-making based on imaging results.

The Teacher will provide feedback, clarify key concepts, and highlight best practices in using these imaging modalities.

Practical Training 31.5 Contrast Agents vs. Other Imaging Modalities for GIT & Gallbladder Evaluation

Total Learning Hours: 3:00 Hours

Step 1: Teacher Demonstration (30 Min)

The Teacher will explain the use of oral and intravenous contrast agents in GIT and gallbladder imaging, highlighting their mechanisms, benefits, risks, and contraindications.

A comparative overview of contrast-enhanced imaging (CT, MRI, fluoroscopy) versus non-contrast modalities like ultrasonography will be provided.

Step 2: Case-Based Image Analysis (60 Min)

Students will examine radiological images from contrast-based studies and ultrasonography to assess diagnostic accuracy.

They will compare findings, identifying cases where contrast-enhanced imaging is superior or where non-contrast imaging is sufficient.

Step 3: Independent Evaluation and Risk Assessment (60 Min)

Students will assess the risks and benefits of contrast agents in given clinical scenarios, considering factors like allergies, renal function, and radiation exposure.

They will draft a comparative analysis summarizing accuracy, safety, and clinical applicability.

Step 4: Group Discussion and Teacher Feedback (30 Min)

Students will present their evaluations, debating the advantages and risks of contrast use versus ultrasonography or other imaging modalities.

The Teacher will provide feedback, reinforcing best practices in selecting appropriate imaging techniques.

Practical Training 31.6 Contrast Agents in GIT, Uterine Tube, and Gallbladder Imaging.

Total Learning Hours: 3:00 Hours **Activity1: Teacher Demonstration (30 Min)** The Teacher will explain how contrast agents enhance visualization of different segments of the GIT, uterine tube, and gallbladder. Live or recorded demonstrations of contrast-enhanced imaging techniques (e.g., barium studies, hysterosalpingography, and cholecystography) will be presented, highlighting their diagnostic significance. **Activity 2: Image Analysis and Interpretation (60 Min)** Students will review radiographic images showing normal and pathological findings in contrast-enhanced studies. They will identify key anatomical landmarks and assess how contrast agents aid in diagnosing abnormalities. **Activity 3: Case-Based Application (60 Min)** Students will analyze real or simulated patient cases, correlating clinical symptoms with contrast-enhanced imaging findings. They will discuss the role of contrast in differentiating normal vs. pathological conditions. **Activity 4: Group Discussion and Teacher Feedback (30 Min)** Students will present their findings, debating the advantages and limitations of contrast-enhanced imaging in different clinical scenarios. The Teacher will provide feedback, emphasizing best practices for interpretation and diagnosis.
Experiential Learning Activity
Experiential-Learning Learning 31.1: IVU vs. CTU vs. MRU: A Case-Based Analysis
Total Learning Hours: 4:00 Hours **Activity 1: Review of theoretical concepts (60 Min)** Students will first be briefed on the differences between conventional IVU, CT urography (CTU), and MR urography (MRU), focusing on their principles, advantages, and limitations in clinical use. **Activity 2: Case-based analysis (60 Min)**

Students will analyze a series of real-world patient cases where both conventional IVU and advanced imaging techniques (CTU and MRU) are used, identifying the clinical scenarios for which each modality is most appropriate.

Activity 3: Comparison and contrast (60 Min)

Students will actively compare the diagnostic capabilities of conventional IVU, CTU, and MRU in the context of the cases, evaluating the strengths and weaknesses of each technique in terms of diagnostic accuracy, patient safety, and clinical outcomes.

Activity 4: Clinical decision-making (60 Min)

Based on their analysis, students will propose the most suitable imaging modality for each case scenario, justifying their decisions with evidence from the case studies and their theoretical knowledge of the imaging techniques

Experiential-Learning Learning 31.2: Case-Based Imaging Analysis

Total Learning Hours: 5:00 Hours

Activity 1: (60 Min)

Student will review theoretical concepts and the procedural knowledge of angiography, IVU, and fluoroscopy, understanding their applications, strengths, and limitations in clinical diagnosis.

Activity 2: (60 Min)

Student will analyze real patient case studies, identifying key diagnostic features from angiographic, IVU, and fluoroscopic images and formulating possible clinical impressions based on the imaging findings.

Activity 3: (90 Min)

Student will assess various diagnostic approaches and propose appropriate imaging-based treatment strategies, taking into account the patient's condition, imaging results, and relevant medical history.

Activity 4: (90 Min)

Student will discuss their diagnostic impressions and treatment proposals in a group or class setting, justifying their decisions based on evidence from the case studies and theoretical knowledge.

Experiential-Learning Learning 31.3: Comparative Analysis of Traditional Angiography, CTA, and MRA: Advantages and Limitations
Total Learning Hours: 4:00 Hours Activity 1: Analyze the modalities (60 Min) **Student will review** the theoretical concepts and technical aspects of traditional angiography, CTA, and MRA, focusing on their principles, procedures, and clinical uses in vascular imaging. Activity 2: Compare and contrast (90 Min) **Student will compare** and contrast the advantages and limitations of each modality by assessing factors such as accuracy, safety, invasiveness, patient comfort, and diagnostic efficiency, using practical examples and case studies. Activity 3: Apply knowledge (90 Min) **Student will apply** their knowledge by analyzing real-world clinical scenarios and recommending the most suitable imaging modality, considering factors like patient condition, required resolution, and procedure risks.
Experiential-Learning Learning 31.4: Contrast Essentials: Safety & Selection
Total Learning Hours: 5:00 Hours **Activity 1**: Selection of Contrast Media (90 Min) Students will assess the patient's medical history and the specific imaging procedure to determine the appropriate contrast media, considering factors like allergies, kidney function, and the type of imaging required (e.g., CT, MRI, angiography). **Activity 2**: Preparation: (90 Min) Students will prepare the contrast media by ensuring proper dilution (if applicable), checking the expiration date, and verifying the volume required for the procedure, all while adhering to aseptic techniques. **Activity 3**: Administration (60 Min) Students will practice the safe administration of contrast media, following correct protocols for intravenous, intra-arterial, or oral delivery, ensuring proper technique, and monitoring the patient for any signs of adverse reactions.

Activity 4: Post-Administration Monitoring and Documentation (60 Min) Students will monitor the patient for any potential reactions, documenting the procedure accurately, including the type and amount of contrast media used, patient response, and any adverse events or complications.
Experiential-Learning Learning 31.5: Salpingography, Cholecystography and Barium Studies.
Total Learning Hours: 4:00 Hours **Activity 1: Literature Review and Understanding (60 Min)** Quickly review existing research on patient discomfort during salpingography, cholecystography, and barium studies. Focus on identifying common pain points and current sedation protocols. **Activity 2: Design Research Study (90 Min)** Develop a quick, practical study design to assess patient discomfort. This could be a brief survey or interview format, with questions centered on pain levels, anxiety, and satisfaction with current sedation protocols. **Activity 3: Propose Improvements (90 Min)** Analyze the findings based on theoretical knowledge, and then propose practical recommendations to minimize patient discomfort. This could include alternative sedation methods or procedural modifications.
Experiential-Learning Learning 31.6: **Salpingography, Cholecystography, and Barium Studies**
Total Learning Hours: 4:00 Hours **Activity 1: Research and Content Development (60 Min)** Students will research the procedures of salpingography, cholecystography, and barium studies, focusing on their risks, benefits, and procedural steps. They will gather relevant information, aiming to explain each procedure in simple, layman's terms, ensuring the language is patient-friendly. **Activity 2: Pamphlet Design and Creation (90 Min)** Students will design a visually appealing pamphlet that incorporates essential information such as procedure description, preparation steps, risks, and benefits.

They will ensure that the content is clear, concise, and uses simple language with illustrations where necessary to aid understanding.

Activity 3: Peer Review and Final Refinement (90 Min)

Students will present their pamphlets to peers for feedback, evaluating the clarity and accessibility of the information.

Based on peer input and Teacher feedback, students will refine and finalize the pamphlets, ensuring the content is accurate, easy to understand, and informative.

Modular Assessment

Assessment	Hour
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Case-Based Problem Solving – 20 Marks** Provide students with a real-life patient scenario involving IVU, angiography, or fluoroscopy. They must analyze the case, select the appropriate imaging technique, justify their choice, and interpret the expected findings. **2. Radiographic Image Interpretation – 15 Marks** Students will be presented with 2–3 radiographic images (e.g., IVU, angiography, fluoroscopy) and will describe key features, identify abnormalities, and provide possible diagnoses. **3. Objective Structured Clinical Examination (OSCE) – 10 Marks** A short station-based assessment where students may be asked to: Demonstrate patient positioning for a fluoroscopy or IVU procedure. Explain the steps of contrast media administration. Discuss safety precautions related to radiation exposure.	4

4.Reflective Writing on Clinical Observation – 5 Marks

Students will reflect on a real or simulated clinical imaging procedure they observed, discussing key takeaways, challenges, and the role of the radiologic technologist.

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 assessment. (25 Marks)

Module 32 : قانون تشریح و تشریح اخلاقیات (Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics

Module Learning Objectives

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

1Describe Describe the ethical, legal, and anatomical principles involved in organ donation, focusing on the processes, criteria, and legal requirements governing the procurement of organs.

2 conduct a clinical scenario analysis to address ethical challenges in organ donation, including evaluating situations where donor consent is ambiguous, and how to handle them.

3 Identify Identify the key anatomical structures involved in organ donation and demonstrate accurate understanding of the surgical techniques involved in harvesting organs from deceased donors.

Unit 1 تبرع بالاعضاء (Tabarr'u bil A'aza) organ donation.

32.1.1. تبرع بالاعضاء (Tabarr'u bil A'aza) organ donation.

32.1.2. حالیہ حاصل شدہ اعضاء کی متعلق تبرع بالاعضاء کے اصول (Haliya Hasil Shuda Aa'za ke Muta'lliq Tabarr'u bil A'aza ke Usool) Principles of organ donation from recently procured.

References: 155,156,157,158,159,160,161

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

CO1,CO2, CO7	Describe key terms related to organ donation, including brain death, circulatory death and transplantation.	1	Lecture	CC	Knows-how	L_VC,L&GD,BL,L&PPT
CO1,CO2, CO7	Describe the Principles of organ donation from recently procured.	2	Lecture	CC	Knows-how	BL,L_VC,L&GD
CO1,CO5	Apply ethical principles in decision-making regarding organ procurement from recently deceased donors.	4	Experiential-Learning32.1	CAP	Does	L&GD
CO1,CO5	Discuss the ethical and legal issues involved in the allocation of organs, focusing on priority criteria, fairness, and the role of the law.	5	Experiential-Learning32.2	AFT-RES	Does	L&PPT
CO1,CO5, CO7	Perform accurate organ preservation techniques.	5	Practical32.1	PSY-GUD	Shows-how	DIS,D-M,DL
CO1,CO5, CO7	Demonstrate appropriate donor evaluation technique	5	Practical32.2	PSY-SET	Shows-how	BL,D,CBL
CO1,CO7	Examine the ethical considerations surrounding embalming and the preservation of human bodies for anatomical study, public display, or historical purposes.	4	Experiential-Learning32.3	CAN	Does	JC,DIS
CO1,CO2, CO7	Evaluate the principles and ethical considerations of organ donation.	2	Lecture	CE	Knows-how	L&PPT ,L&GD

Unit 2 تشریحی اخلاقیات (Tashreehi Akhlaqiyaat) Ethics of Anatomy. قانون تشریح (Qanoon-e-Tashreeh) Anatomy Law.

32.2.1. تشریحی اخلاقیات (Tashreehi Akhlaqiyaat) Ethics of Anatomy.

32.2.2. قانون تشریح (Qanoon-e-Tashreeh) Anatomy Law.

References: 155,156,157,158,159,160,161						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO1,CO6,CO7	Describe the medical ethics and anatomical ethics in the Unani system of medicine.	1	Lecture	CC	Knows-how	L&GD,L&PPT,BL,L_VC
CO1,CO5,CO7	Demonstrate proper handling, preservation, and respectful treatment of human anatomical specimens following legal and ethical guidelines.	5	Practical32.3	PSY-GUD	Shows-how	DL,DIS,D,C_L
CO1,CO5,CO7	Examine and compare anatomy laws from different countries to understand how cultural, legal, and ethical standards influence anatomy education and research.	4	Experiential-Learning32.4	CAN	Does	D-BED,D-M,DL
CO1,CO6,CO7	Describe key ethical principles related to the study and teaching of anatomy.	2	Lecture	CC	Knows-how	L&GD,BL,L&PPT,L_VC
CO1,CO5,CO7	Demonstrate appropriate ethical behaviors in handling human remains.	5	Practical32.4	PSY-SET	Shows-how	
CO1,CO5,CO7	Discuss ethical concerns in anatomical research, particularly around cadaveric dissections and the use of human tissue.	4	Experiential-Learning32.5	AFT-RES	Does	
CO1,CO6,CO7	Describe the Anatomical laws and the legal frameworks governing human body donation for anatomical studies.	2	Lecture	CC	Knows-how	L&PPT ,L_VC
CO1,CO7	Participate in a mock trial involving a hypothetical legal case concerning the unlawful use of human remains for anatomical research or education.	5	Experiential-Learning32.6	PSY-SET	Does	L_VC,FC

Practical Training Activity
Practical Training 32.1 Mastering Organ Preservation
Total Learning Hours: 5:00 Hours Activity 1: **Teacher Demonstration (60 Min)** The teacher will demonstrate the proper organ preservation techniques, explaining the key steps such as using preservation solutions, maintaining the right temperature, and handling the organs with care. The teacher will discuss how to preserve organ viability for transplantation by emphasizing aseptic technique and cold storage. Activity 2: **Student Observation (90 Min)** Students will observe the teacher's demonstration closely, taking notes on the preservation process and understanding the rationale behind each step. The teacher will also explain how preservation techniques ensure the organ remains viable and suitable for transplantation. Activity 3: **Student Practice (90 Min)** Students will then practice the preservation techniques under supervision. They will flush the organs with preservation solutions, ensure they are properly stored in cold conditions, and follow aseptic procedures to handle the organs with care. Activity 4: **Reflection and Q&A (60 Min)** After the practice session, students will reflect on their experience, discussing challenges and key takeaways. The teacher will answer any questions and guide students through troubleshooting and improving their techniques, ensuring they understand the importance of precision in organ preservation.
Practical Training 32.2 Ethical Donor Assessment
Total Learning Hours: 5:00 Hours **Activity 1: Teacher Demonstration (60 Min)**

The teacher will demonstrate the process of donor evaluation, emphasizing the importance of assessing the suitability of an organ donor. This will include monitoring vital signs, performing necessary lab tests, and visually and physically assessing the condition of organs for transplantation. The teacher will also highlight the key factors influencing organ viability and transplant success.

Activity 2: Student Practice (90 Min)

Students will practice performing clinical evaluations under the teacher's supervision. This includes monitoring vital signs (e.g., blood pressure, heart rate, oxygen saturation), reviewing lab test results, and assessing organs such as the heart, liver, and kidneys for signs of suitability for transplantation.

Activity 3: Reflection and Discussion (90 Min)

Students will reflect on their practice and discuss the challenges and clinical decision-making involved in donor evaluation. The teacher will guide students in identifying potential red flags in donor suitability and the importance of accurate assessments for successful organ transplants.

Activity 4: Q&A Session (60 Min)

A Q&A session will follow, allowing students to ask questions and clarify any doubts regarding the evaluation process, including ethical considerations, limitations, and complications that may arise during donor assessment.

Practical Training 32.3 Ethical Treatment in Anatomy Labs

Total Learning Hours: 5:00 Hours

Activity 1: Introduction & Demonstration (60 Min)

The Teacher will explain the legal and ethical principles governing human anatomical specimens.

Demonstrate proper handling, preservation techniques, and respectful treatment.

Activity 2: Supervised Hands-on Practice (90 Min)

Students, under Teacher guidance, will practice handling and preserving specimens.

Emphasis on following ethical guidelines, labeling, and storage protocols.

Activity3: Independent Skill Application (90 Min)

Students will work individually to apply handling and preservation techniques.

Perform tasks such as proper documentation, storage, and specimen maintenance.

Activity 4: Case Study Discussion & Reflection (60 Min)

Group discussion on ethical dilemmas in anatomy labs.

Students will analyze real-world cases and propose solutions to reinforce ethical decision-making.

Practical Training 32.4 Ethics in Handling Human Remains

Total Learning Hours: 5: Hours

Activity 1: **Demonstration (90 Min)**

The Teacher will demonstrate the ethical guidelines and proper procedures for handling human remains, emphasizing respect for dignity, privacy, and adherence to legal and institutional protocols.

Activity 2: **Explanation and Discussion (90 Min)**

The Teacher will explain the ethical and cultural considerations involved in handling human remains, discussing potential dilemmas and ethical challenges.

Activity 3: **Student's Role (60 Min)**

Students will Observe and take notes on proper techniques and practice handling human remains under supervision, applying the demonstrated techniques while ensuring compliance with ethical standards, safety protocols, and respect for the deceased.

Activity 4: **Q&A Session (60 Min)**

After the practice session, students will engage in a Q&A session with the Teacher, discussing any questions or concerns regarding the ethical handling of human remains, reinforcing understanding and clarification.

Experiential Learning Activity

Experiential-Learning Learning 32.1: Organ Procurement

Total Learning Hours: 4:00 Hours

Activity 1: **Case Analysis and Ethical Frameworks** (60 Min)

Students will review real-world and hypothetical cases involving organ procurement, analyzing ethical dilemmas related to consent, timing of retrieval, and medical necessity. They will apply ethical principles such as autonomy, beneficence, and justice to evaluate different perspectives.

Activity **2: Simulated Ethical Decision-Making** (60 Min)

Through role-playing exercises, students will take on the roles of healthcare providers, legal experts, and family members to navigate complex decision-making scenarios. They will debate conflicting interests and justify their decisions based on ethical guidelines and legal considerations.

Activity **3: Reflection and Policy Discussion** (60 Min)

Students will critically assess how ethical principles are applied in practice, discussing challenges in balancing donor and recipient rights. They will propose potential improvements in organ procurement policies while reflecting on real-world implications.

Activity **4: Q&A and Expert Insights** (60 Min)

A guided discussion with an expert panel will allow students to ask questions and explore emerging issues in organ donation ethics.

Experiential-Learning Learning 32.2: Laws and Lives: Organ Allocation

Total Learning Hours: 5:00 Hours

Activity 1: Examine Ethical and Legal Frameworks (60 Min)

Students will explore global and national organ allocation policies, analyzing ethical theories and legal precedents that shape organ distribution systems.

Activity 2: Compare Allocation Criteria (90 Min)

Through case studies, students will assess different organ allocation criteria such as medical urgency, waiting time, donor-recipient compatibility, and social factors, debating their ethical and legal implications.

Activity 3: Simulate Ethical Decision-Making (90 Min)

Students will engage in role-playing activities where they act as policymakers, clinicians, or patients, making real-time decisions on organ allocation while considering ethical dilemmas and resource limitations

Activity 4: Q&A and Critical Reflection (60 Min)

A guided discussion will allow students to challenge allocation models, propose reforms, and reflect on how ethical considerations influence legal policies, healthcare equity, and public trust in organ donation systems.
Experiential-Learning Learning 32.3: Ethics of Embalming
Total Learning Hours: 4:00 Hours Activity 1: **Research and Understand Ethical Principles** (90 Min) Students will review the ethical guidelines and principles surrounding the use of embalming and body preservation for anatomical study, public display, and historical purposes. They will explore varying cultural and legal perspectives on these practices. Activity 2: **Analyze Real-World Case Studies** (90 Min) Students will examine case studies where embalming and body preservation were applied, analyzing the ethical dilemmas and controversies involved. They will critically assess the balance between scientific/educational benefits and ethical concerns. Activity 3: **Engage in Discussion and Debate** (60 Min) Students will participate in group discussions or debates, articulating their perspectives on the ethical issues surrounding embalming, drawing conclusions based on their research, and proposing ethical guidelines for handling human remains in various contexts.
Experiential-Learning Learning 32.4: Anatomy Laws Across Borders
Total Learning Hours: 4:00 Hours **Activity 1: Research & Analysis** (90 Min) Students will explore anatomy laws from different countries, examining legal frameworks, cultural perspectives, and ethical considerations that shape anatomy education and research. **Activity 2: Comparative Discussion** (90 Min) They will compare key differences in regulations, highlighting how these variations impact medical education, research practices, and the respectful use of human remains.

Activity 3: Application & Reflection (60 Min) Students will present case studies or propose policy recommendations to improve ethical and legal standards, followed by a Q&A session to discuss global best practices and challenges.
Experiential-Learning Learning 32.5: The Ethics of Dissection
Total Learning Hours: 4:00 Hours Activity 1: Analyze Ethical Principles (60 Min) Students will review and analyze ethical guidelines related to anatomical research, focusing on cadaveric dissection and the use of human tissue. They will explore historical cases, legal frameworks, and ethical considerations in medical education and research. Activity 2: Evaluate Real-World Scenarios (60 Min) Students will apply their knowledge to case studies involving ethical dilemmas in anatomical research. They will assess issues such as informed consent, donor anonymity, and the respectful handling of human remains, formulating reasoned ethical arguments. Activity 3: Propose Ethical Solutions (60 Min) Based on their analysis, students will develop recommendations or best practices for ethically conducting anatomical research. They may present their findings through discussions, written reflections, or debates, ensuring an applied understanding of ethical concerns in this field.
Experiential-Learning Learning 32.6: Trial of Ethics
Total Learning Hours: 5:00 Hours Activity 1: **Case Analysis & Preparation** (90 Min) Students will review legal and ethical guidelines concerning the use of human remains in anatomical research, analyze the mock case details, and prepare arguments for prosecution or defense. Activity **2: Mock Trial Participation** (90 Min)

Acting as legal representatives, expert witnesses, or jurors, students will present evidence, question witnesses, and debate the ethical and legal aspects of the case. Activity**3: Reflection & Discussion** (60 Min) Students will analyze the trial outcome, compare perspectives, and discuss key ethical and legal takeaways in relation to real-world anatomical research and education. Activity **4: Q&A Session** (60 Min) An open forum where students ask questions, clarify legal concepts, and engage in critical discussions about ethical dilemmas in anatomy education and research.	
Modular Assessment	
Assessment	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep a 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. **Total Hours of the Assessment: 4:00 Hours** **1. Multiple-Choice Questions (MCQs) – 15 Marks** 15 MCQs (1 mark each) covering key topics such as consent, donor selection, organ procurement, and legal regulations. **2. Short Answer Questions – 10 Marks** 2-3 short answer questions (3-5 marks each) requiring brief explanations or listing key points. **3.Case-Based Analysis – 15 Marks** A case study on an ethical or legal dilemma in organ donation, requiring students to analyze the situation, discusses ethical concerns, and proposes appropriate solutions. **4.Practical/Scenario-Based Discussion – 10 Marks**	4

A brief oral or written reflection on an organ donation scenario, such as ethical issues in brain death determination or legal aspects of living versus deceased donation. 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 assessment. (25 Marks)	

Table 4 : Practical Training Activity

(*Refer table 3 of similar activity number)

Practical No*	Practical name	Hours
1.1	General Embryology	5
1.2	Fertilization and Implantation.	5
1.3	The placenta	5
1.4	Early Embryonic Development.	5
2.1	General Systemic embryology.	5
2.2	Development of organ systems.	5
2.3	Congenital abnormalities with teratogenesis.	5
2.4	Congenital Anomalies	5
3.1	Cell Biology.	5
3.2	Cellular organelles.	5
3.3	Cellular structures.	5
3.4	Stem Cells and Cryobanking.	5
4.1	The nucleus.	5
4.2	Chromatin and protein synthesis.	5
4.3	Cellular activity.	5
4.4	Microscopic organization of the cell.	5
5.1	Human Chromosomes.	5
5.2	Cytogenetics..	5
5.3	Basics of molecular genetics.	5

5.4	Histochemimcal and Immunohistochemical Techniques.	5
6.1	Single gene pattern inheritance.	5
6.2	Sex chromosomal pattern and intermediate pattern of inheritance.	5
6.3	Alleles,Non-Mendelian inheritance and Mitochondrial inheritance.	5
6.4	Genome Imprinting and Parental Disomy.	5
7.1	Multifactorial pattern of inheritance	5
7.2	Teratology and Gene structure	5
7.3	Molecular Screening and Cancer Genetics.	5
7.4	Haematological malignancies and Pharmacogenetics.	5
8.1	Reproductive Genetics and Infertility.	5
8.2	Comprehensive Genetic Applications	5
8.3	Ethics of Genetics and Gene therapy	5
8.4	Defense Dynamics and Immune System	5
9.1	Arthrology of head region.	3
9.2	The head region.	5
9.3	Myology of head region.	4
9.4	Gross and applied anatomy of head region.	4
9.5	Anatomy of brain.	4
10.1	Osteology of neck region.	4
10.2	Arthrology of neck region.	3
10.3	Myology of neck region.	3
10.4	Splanchology of neck region.	3
10.5	Gross and applied anatomy of neck region.	4

10.6	Spinal Cord.	3
11.1	Osteology of upper limb	5
11.2	Arthrology of upper limb	5
11.3	Myology of upper limbs.	5
11.4	Anatomy of upper limbs.	5
12.1	Osteology of lower limbs.	5
12.2	Arthrology of lower limbs.	5
12.3	Myology of lower limbs.	5
12.4	Gross and applied anatomy of lower limbs.	5
13.1	Osteology of thorax.	4
13.2	Arthrology of thorax.	3
13.3	Splanchnology of thorax.	4
13.4	Myology of thorax.	5
13.5	Gross anatomy, surgical and clinical anatomy of thorax.	4
14.1	Osteology of lumbar spine.	3
14.2	Arthrology of lumbar spine.	3
14.3	Myology of abdominal wall.	4
14.4	Anatomy of inguinal region	3
14.5	Splanchnology of abdomen.	4
14.6	Gross, surgical and clinical anatomy of abdomen.	3
15.1	Osteology of Pelvis and perineum.	3
15.2	Arthrology of Pelvis and perineum.	2
15.3	Myology of Pelvis and perineum.	4

15.4	Anatomy of male and female, internal and external genitalia.	3
15.5	Splanchology of Pelvis and perineum.	5
15.6	Gross,surgical and clinical anatomy of Pelvis and perineum.	3
16.1	General Anatomy of Human Body	5
16.2	Applied Anatomy for Unani Procedures and its treatment/Management.	4
16.3	Embalming Procedures	4
16.4	Museum preparation for the display of anatomical structures.	2
16.5	Embalming of Cadaver.	2
16.6	Preservation of Cadaver and specimen	3
17.1	Neurons and Classification of Neurons	5
17.2	Synapses, Neurotransmitters and Neuroglia.	5
17.3	Enteric nervous system.	3
17.4	Autonomic Nervous System.	3
17.5	Somatic Nervous System	4
18.1	Development of Central Nervous System	5
18.2	Development of the Peripheral Nervous System	5
18.3	Development of the Autonomic Nervous System	5
18.4	Development of the Enteric Nervous System	5
19.1	Olfactory Pathways.	5
19.2	Optic Pathways.	5
19.3	Cochleovestibular Pathways	5
19.4	Gustatory Pathway.	5
20.1	The Sensory Pathway	5

20.2	The Motor Pathway	5
20.3	The HPA Axis and Hypothalamic-Sympathetic Pathway	5
20.4	The Brainstem-parasympathetic pathway and Spinal-sympathetic reflex.	5
21.1	Hypothalamo-Hypophyseal System.	5
21.2	Limbic System.	5
21.3	Basal Nuclei	5
21.4	Reticular System.	5
22.1	Cross Sectional Anatomy of the Brain	5
22.2	Cross Sectional Anatomy of the Spinal Cord.	5
22.3	Applied Aspects of the Peripheral Nervous System	5
22.4	Applied Aspects of the Central Nervous System.	5
23.1	Applied Aspects of Central Nerves.	4
23.2	Peripheral nerves and nerve plexuses	3
23.3	Applied Aspects of Peripheral Nerves and Nerve Plexuses	3
23.4	Applied Aspects of Upper motor Neurons	5
23.5	Applied aspect of lower motor neurons (LMNs).	5
24.1	Dorsal Thalamus.	5
24.2	Ventral Thalamus.	5
24.3	Applied Aspects of the Ventricular System	5
24.4	Applied Aspects of Sub Arachnoid Spaces	5
25.1	Cranial Nerves and Surface Anatomy Integration	2
25.2	Anatomical Landmarks of the Head & Palpation	2
25.3	3D	2

25.4	Tempero Mandibular Joint Palpation and Assessment	2
25.5	Ear Canal Palpation	2
25.6	Clinical Positioning Practice	2
25.7	Neck Range of Motion (ROM) Palpation	2
25.8	Cervical Lymph Nodes	3
25.9	Palpation of Major Blood Vessels of Neck	3
26.1	Identification of Normal Anatomical Structures	3
26.2	X-ray & USG Interpretation	4
26.3	CT Imaging Principles & CECT Evaluation	3
26.4	Mammographic Image Evaluation	3
26.5	MRI Sequence Interpretation	4
26.6	Nuclear Medicine Scan Interpretation	3
27.1	X-ray vs. USG Effectiveness Comparison	4
27.2	Integrated Clinical Imaging Report	4
27.3	Anatomy-Pathology Integration	2
27.4	Imaging Safety Protocols	4
27.5	Diagnostic Accuracy of CECT, MRI & Radionuclide Imaging	3
27.6	CECT, MRI & Radionuclide Imaging Comparison	3
28.1	Thoracic Surface Landmarks Map	3
28.2	Surface Anatomy & Thoracic Internal Pathology	4
28.3	Clinical Significance of Thoracic Surface Anatomy	3
28.4	Hand Positioning & Palpation Techniques	2
28.5	Practical Guide for Abdominal Examination Using Surface Anatomy	3

28.6	Abdominal surface landmarks (e.g., umbilicus, iliac crest, and costal margin etc)	2
28.7	Surface anatomical landmarks on a patient presenting with abdominal pain.	3
29.1	Palpating Arterial Pulses of the Upper Limb	2
29.2	Mapping Muscles & Bones of the Upper Limb	2
29.3	Anatomy-Based Accuracy in Nerve Blocks	3
29.4	Upper Limb Surface Modeling	3
29.5	Mapping Bony Landmarks & Soft Tissues	3
29.6	Anatomical Correlations: Surface to Depth	4
29.7	Lower Limb Exam Techniques	3
30.1	Markers of Antemortem, Perimortem & Postmortem Trauma	4
30.2	Skeletal Remains: Forensic Differentiation	3
30.3	Human vs. Non-Human: Skeletal Insights	3
30.4	Anatomy of Age & Sex Determination	3
30.5	Skeletal Clues: Male vs. Female	4
30.6	Forensic Estimation Challenges	3
31.1	Smart Imaging: The AI Advantage	3
31.2	Advancing Angiography: DSA, CTA & MRA	3
31.3	Angiography, IVU, and Fluoroscopy	4
31.4	Imaging Insights: Barium, Cholecystography & Salpingography	4
31.5	Contrast Agents vs. Other Imaging Modalities for GIT & Gallbladder Evaluation	3
31.6	Contrast Agents in GIT, Uterine Tube, and Gallbladder Imaging.	3
32.1	Mastering Organ Preservation	5
32.2	Ethical Donor Assessment	5

32.3	Ethical Treatment in Anatomy Labs	5
32.4	Ethics in Handling Human Remains	5

Table 5 : Experiential learning Activity

(*Refer table 3 of similar activity number)

Experiential learning No*	Experiential name	Hours
1.1	Fertilization and Implantation.	7
1.2	Basics of General Embryology	6
1.3	The Placenta	7
1.4	Early Embryonic Development.	6
2.1	Developmental Anatomy of Organ systems.	7
2.2	General systemic embryology	6
2.3	Congenital abnormalities with Teratogenesis.	7
2.4	Anatomical Basis Of Congenital Anomalies.	6
3.1	Cellular biology.	7
3.2	Cellular organelles.	6
3.3	Cytoskeleton and Cell inclusions.	6
3.4	Stem Cells and Cryobanking.	7
4.1	Basics of nucleus	7
4.2	DNA and protein synthesis.	6
4.3	Cellular activity.	7
4.4	Microscopic organization of the cell.	6
5.1	Identification of chromosomes.	7
5.2	Chromosomes and their abnormality.	6
5.3	Molecular genetics.	7

5.4	Various histochemimcal and Immunohistochemical Techniques.	6
6.1	Single gene pattern inheritance.	7
6.2	Sex chromosomal pattern and intermediate pattern of inheritance.	6
6.3	Alleles,Non-Mendelian inheritance and Mitochondrial inheritance.	7
6.4	Genome Imprinting and parental Disomy.	6
7.1	Multifactorial Pattern of Inheritance.	7
7.2	Teratology and Gene structure.	6
7.3	Molecular Screening and Cancer Genetics.	7
7.4	Haematological malignancies and Pharmacogenetics.	6
8.1	Reproduction Genetics and Male and Female Infertility.	7
8.2	Genes and Ethics	6
8.3	Applied Gene Therapy and Defense Systems Analysis.	7
8.4	Cell Types in Defence Mechanism	6
9.1	Osteology of head region.	6
9.2	Arthrology of head region.	4
9.3	Myology of head region	6
9.4	Anatomy of brain.	6
9.5	Gross and applied anatomy of head region	4
10.1	Osteology of neck region.	5
10.2	Arthrology of neck region.	3
10.3	Myology of neck region.	3
10.4	Splanchology of neck region.	6
10.5	Gross and applied anatomy of neck region.	5

10.6	Spinal cord.	4
11.1	Osteology of upper limbs.	7
11.2	Arthrology of upper limbs.	6
11.3	Myology of upper limbs.	7
11.4	Gross and applied anatomy of upper limbs.	6
12.1	Osteology of lower limbs.	6
12.2	Arthrology of lower limbs	7
12.3	Myology of lower limbs.	6
12.4	Gross and applied anatomy of lower limbs.	7
13.1	Osteology of thorax.	5
13.2	Arthrology of thorax.	4
13.3	Myology of thorax.	5
13.4	Splanchology of thorax.	7
13.5	Gross anatomy, surgical and clinical anatomy of thorax.	5
14.1	Osteology of lumbar spine	4
14.2	Arthrology of lumbar spine	4
14.3	Myology of abdomen.	5
14.4	Anatomy of inguinal region.	3
14.5	Gross, surgical and clinical anatomy of abdomen.	4
14.6	Splanchology of abdomen.	6
15.1	Osteology of Pelvis and perineum.	5
15.2	Arthrology of Pelvis and perineum.	3
15.3	Myology of pelvis and perineum.	4

15.4	Gross, surgical and clinical anatomy of Pelvis and perineum	3
15.5	Splanchology of Pelvis and perineum.	7
15.6	Anatomy of male and female, internal and external genitalia.	4
16.1	Applied Anatomy for Unani Procedures of treatment/Management.	5
16.2	Embalming Procedures	5
16.3	General Anatomy of Human Body.	6
16.4	Embalming of Cadaver.	3
16.5	Preservation of Cadaver and specimen	4
16.6	Museum preparation for the display of anatomical structures.	3
17.1	Structure and function of synapses	7
17.2	Neuron structure, classification neurons	6
17.3	Autonomic Nervous System (ANS)	4
17.4	Enteric Nervous System	4
17.5	Somatic Nervous System.	5
18.1	Development of the Central Nervous System	7
18.2	Development of Peripheral Nervous System	6
18.3	Development of Autonomic Nervous System	7
18.4	Development of Enteric Nervous System	6
19.1	Structure and function of the olfactory pathway	6
19.2	Optic pathway	7
19.3	Cochleovestibular Pathway	6
19.4	Gustatory pathway	7
20.1	The Motor Pathway	7

20.2	The Sensory Pathway	6
20.3	The hypothalamic-pituitary-adrenal (HPA) axis and Hypothalamic-sympathetic pathway	7
20.4	Brainstem-parasympathetic pathway and Spinal-sympathetic reflex	6
21.1	Hypothalamo-Hypophyseal System	7
21.2	Limbic System	6
21.3	Reticular System	6
21.4	Basal Ncclei	7
22.1	Cross Sectional Anatomy of the Brain.	7
22.2	Cross Sectional Anatomy of Spinal Cord	6
22.3	Applied Aspects of the Peripheral Nervous System	6
22.4	Applied Aspects of the Central Nervous System.	7
23.1	Central Nerve and its applied aspects	5
23.2	Peripheral nerves and Nerve Plexuses	4
23.3	Applied Aspects of Peripheral nerves and nerve plexuses	4
23.4	Applied aspect of Upper Motor Neuron	6
23.5	Applied aspect of Lower Motor Neuron (LMN) lesions.	7
24.1	Ventral Thalamus	6
24.2	Dorsal Thalamus	7
24.3	Applied Aspects of Ventricular System	7
24.4	Applied Aspects of Sub Arachnoid Spaces	6
25.1	Cranial Nerve Examination Protocol	3
25.2	Neurovascular Injury Prediction	4
25.3	Scalp & Forehead Assessment	3

25.4	Referred Pain Hypothesis	3
25.5	Neck Pain Referral Mapping	4
25.6	Neck Anatomy & Clinical Variations	5
25.7	Neck Anatomy Research Proposal	4
26.1	Structured Imaging Reporting Across Modalities	5
26.2	Structured Medical Image Interpretation	4
26.3	Imaging Modalities Strengths & Limitations	4
26.4	Structured Imaging Reporting	5
26.5	Imaging Case Discussions	4
26.6	Imaging Modalities Comparison	4
27.1	Imaging Case Scenarios for Peer Teaching	5
27.2	Imaging-Based Differential Diagnosis	4
27.3	Research on X-ray, CT & USG in Disease Diagnosis	4
27.4	Advancements in CECT, MRI & Radionuclide Imaging	4
27.5	Radiology Report Construction	4
27.6	Evidence-Based Imaging Strategy for Diagnosis	5
28.1	Thoracic Surface Landmarks & Underlying Structures	3
28.2	Accuracy of Imaging Modalities in Thoracic Surface Anatomy	3
28.3	Effectiveness of Thoracic Palpation Techniques	4
28.4	Surgical Entry Points & Surface Anatomy	3
28.5	Abdominal Anatomy & Referred Pain Correlation	3
28.6	Surface Anatomy & Abdominal Imaging Correlation	3
28.7	Surface Anatomy in Clinical Procedures	3

28.8	3D	4
29.1	Mastering Palpation & Neurological Tests	4
29.2	Surface-Based Insights for Upper Limb Injuries	5
29.3	Palpating the Arterial Pulse of the Upper Limb	4
29.4	Mechanics of Movement in Athletics	5
29.5	Body Mapping Through Art	4
29.6	Case-Based Surface Anatomy Interpretation	4
30.1	Estimating Time: Bone Preservation Insights	4
30.2	Forensic Report Essentials	5
30.3	Skeletal Clues in Forensics	4
30.4	Cranial & Pelvic Insights in Forensics	5
30.5	Sex and Age Determination from Skeletal Remains	4
30.6	Postmortem Influences on Estimations	4
31.1	IVU vs. CTU vs. MRU: A Case-Based Analysis	4
31.2	Case-Based Imaging Analysis	5
31.3	Comparative Analysis of Traditional Angiography, CTA, and MRA: Advantages and Limitations	4
31.4	Contrast Essentials: Safety & Selection	5
31.5	Salpingography, Cholecystography and Barium Studies.	4
31.6	Salpingography, Cholecystography, and Barium Studies	4
32.1	Organ Procurement	4
32.2	Laws and Lives: Organ Allocation	5
32.3	Ethics of Embalming	4
32.4	Anatomy Laws Across Borders	4

32.5	The Ethics of Dissection	4
32.6	Trial of Ethics	5

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-TB	4	100 x 4 Papers = 400	400	800

6 B : Scheme of Assessment (Formative and Summative Assessment)

Credit frame work

UNIPG-TB 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 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)						
M 1 علم الجنین عمومی)(Ilmul Janeen Umoomi) General Embryology.	2	60		50		
M 2 علم الجنین نظامی)(Ilmul Janeen Nizami) Systemic Embryology.	2	60		50		
Paper No : 2 (تشریح البدن وتشریح اطلاقی)(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)						
M 9 خطہ رُاس کی ظاہری واطلاقی تشریح)(Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.	2	60		50		
M 10 خطہ عُنق کی ظاہری واطلاقی تشریح)(khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.	2	60		50		
Paper No : 3 (تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)						
M 17 نظام عصبی کا تعارف)(Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System	2	60		50		
M 18 نظام اعصاب کی بالیدگی)(Nizam-e- A'asab ki Baleedgi) Development of the Nervous System.	2	60		50		
Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات)(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)						
M 25 خطہ راس وعنق کی سطحی تحدید)(Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region.	2	60		50		
M 26 تشریح شعاعی)(Tashreeh-e- Shua'ei) Radiological Anatomy.	2	60		50		
	16	480		400		

Semester No : 4						
Paper No : 1 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)						
M 3 تشریح خوردبینی(Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology.	2	60		50		
M 4 نواۃ(Nawat) Nucleus دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle. جسم کی خردبینی ساخت(Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body.	2	60		50		
Paper No : 2 (تشریح البدن وتشریح اطلاقی)(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)						
M 11 طرف اعلیٰ کی ظاہری واطلاقی تشریح(Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.	2	60		50		
M 12 طرفِ اسفل کی ظاہری واطلاقی تشریح(Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.	2	60		50		
Paper No : 3 (تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)						
M 19 طریق حسی مخصوصہ(Tariq-e- Hissi Makhsoosa) Special Sensory Pathways	2	60		50		
M 20 طرائق عصبی(Taraiq-e- A'sabi) Neural Pathways	2	60		50		
Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات)(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)						
M 27 تصویروں کی تعبیر(Tasveeron Ki Ta'abeer) Interpretation of Radiographs.	2	60		50		
M 28 خطہ صدر وبطن کی سطحی تحدید(Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region.	2	60		50		
	16	480		400		
Semester No : 5						
Paper No : 1 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)						
M 5 اجسام لونیہ وکیمیائے نسیجی(Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry	2	60		50		

M 6 اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل (Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی ومناعتی تکنیک (Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques.	2	60		50		
Paper No : 2 (تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)						
M 13 صدر کی ظاہری، جراحی وسریری تشریح (Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax.	2	60		50		
M 14 بطن کی ظاہری، جراحی وسریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.	2	60		50		
Paper No : 3 (تشریح اعصابی (Tashreeh-e-A'sabi) Neuroanatomy)						
M 21 نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system	2	60		50		
M 22 تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy	2	60		50		
Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات (Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)						
M 29 طرف اعلیٰ وطرف اسفل کی سطحی تحدید (Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs.	2	60		50		
M 30 تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy.	2	60		50		
	16	480		400		
Semester No : 6						
Paper No : 1 (تشریح جنینی، خوردبینی وعلم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)						
M 7 نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی (Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics.	2	60		50		

M 8 علم النسل تناسلی (Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی وعلم المناعت (Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology.	2	60		50		
Paper No : 2 تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)						
M 15 کمانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia.	2	60		50		
M 16 عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management.	2	60		50		
Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy)						
M 23 عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.	2	60		50		
M 24 مجموعہ سریری (Majmo'ah-e- Sareeri) Thalamic complex نظام بطنی وخلاء تحت العنکبوت (Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) Ventricular system and Sub Arachnoid spaces.	2	60		50		
Paper No : 4 تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات (Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)						
M 31 تشریح میں جدید تحقیقات (Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy	2	60		50		
M 32 قانون تشریح وتشریح اخلاقیات (Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics	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 تشریح جنینی، خوردبینی وعلم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics

A S.No	B Module number and Name	C MGP
1	M1. علم الجنین عمومی (Ilmul Janeen Umoomi) General Embryology.	C 1
2	M2. علم الجنین نظامی (Ilmul Janeen Nizami) Systemic Embryology.	C 2

Paper No : 2 تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy

A S.No	B Module number and Name	C MGP
3	M9. خطہ رُاس کی ظاہری واطلاقی تشریح (Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region.	C 3
4	M10. خطہ عنق کی ظاہری واطلاقی تشریح (khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region.	C 4

Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy

A S.No	B Module number and Name	C MGP
5	M17. نظام عصبی کا تعارف (Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System	C 5

6	M18.نظام اعصاب کی بالیدگی(Nizam-e- A'asab ki Baleedgi) Development of the Nervous System.	C 6
Paper No : 4 تشریح سطحی، شعاعی، قانونی و جدید تشریحی تحقیقات(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
7	M25. خطہ راس وعنق کی سطحی تحدید(Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region.	C 7
8	M26.تشریح شعاعی(Tashreeh-e- Shua'ei) Radiological Anatomy.	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 تشریح جنینی، خوردبینی وعلم النسل(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
1	M3.خوردبینی تشریح(Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology.	C 1
2	M4.نواۃ(Nawat) Nucleus دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle. جسم کی خردبینی ساخت(Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body.	C 2
Paper No : 2 تشریح البدن و تشریح اطلاقی(Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
3	M11.طرف اعلیٰ کی ظاہری واطلاقی تشریح(Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs.	C 3

4	M12.طرفِ اسفل کی ظاہری واطلاقی تشریح(Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs.	C 4
Paper No : 3 تشریح اعصابی(Tashreeh-e-A'asabi) Neuroanatomy		
A S.No	B Module number and Name	C MGP
5	M19.طریق حسی مخصوصہ(Tariq-e- Hissi Makhsoosa) Special Sensory Pathways	C 5
6	M20.طرائق عصبی(Taraiq-e- A'sabi) Neural Pathways	C 6
Paper No : 4 تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances		
A S.No	B Module number and Name	C MGP
7	M27.تصویروں کی تعبیر(Tasveeron Ki Ta'abeer) Interpretation of Radiographs.	C 7
8	M28.خطہ صدر وبطن کی سطحی تحدید(Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region.	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 تشریح جنینی، خوردبینی وعلم النسل(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics		
A S.No	B Module number and Name	C MGP
1	M5.اجسام لونیہ وکیمیائے نسیجی(Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry	C 1

2	M6.اجسام لونیہ جنسیہ کے نقائص (Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل (Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی ومناعتی تکنیک (Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques.	C 2
Paper No : 2 تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
3	M13.صدر کی ظاہری، جراحی وسریری تشریح (Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax.	C 3
4	M14.بطن کی ظاہری، جراحی وسریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen.	C 4
Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
5	M21.نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system	C 5
6	M22.تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy	C 6
Paper No : 4 تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات (Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
7	M29.طرف اعلیٰ وطرف اسفل کی سطحی تحدید (Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs.	C 7
8	M30.تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy.	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 تشریح جنینی، خوردبینی وعلم النسل (Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
1	M7. نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی (Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics.	C 1
2	M8. علم النسل تناسلی (Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی وعلم المناعت (Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology.	C 2
Paper No : 2 تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
3	M15. کمانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e-Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia.	C 3
4	M16. عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management.	C 4
Paper No : 3 تشریح اعصابی (Tashreeh-e-A'asabi) Neuroanatomy		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
5	M23. عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.	C 5

6	M24.مجموعہ ثریری(Majmo'ah-e- Sareeri) Thalamic complex ,نظام بطنی وخلاء تحت العنکبوت(Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) Ventricular system and Sub Arachnoid spaces.	C 6
Paper No : 4 تشریح سطحی،شعاعی،قانونی وجدید تشریحی تحقیقات(Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances		
A **S.No**	**B** **Module number and Name**	**C** **MGP**
7	M31.تشریح میں جدید تحقیقات(Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy	C 7
8	M32.قانون تشریح وتشریح اخلاقیات(Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics	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-TB

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 (تشریح جنینی، خوردبینی وعلم النسل)(Tashreeh-e-Janeeni, Khurd-Beeni wa Ilmul Nasal) Embryology, Microscopic Anatomy and Genetics)				
(M-1) علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology. (Marks: Range 5-20)				
1	**(U-1)** علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology -1	Yes	Yes	Yes
2	**(U-2)** علم الجنین عمومی(Ilmul Janeen Umoomi) General Embryology -II	No	Yes	No
(M-2) علم الجنین نظامی(Ilmul Janeen Nizami) Systemic Embryology. (Marks: Range 5-20)				
1	**(U-1)** علم الجنین نظامی(Ilmul Janeen Nizami) Systemic Embryology-I	Yes	Yes	No
2	**(U-2)** علم الجنین نظامی(Ilmul Janeen Nizami) Systemic Embryology-II	Yes	Yes	Yes
(M-3) خوردبینی تشریح(Tashreeh-e- Khurd-beeni) Microscopic Anatomy. علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology. (Marks: Range 5-20)				
1	**(U-1)** علم حیاتِ خلوی(Ilm-e-Hayat-e-Khalwi) Cell Biology	No	Yes	Yes
2	**(U-2)** خوردبینی تشریح(Tashreeh-e- Khurd-beeni) Microscopic Anatomy	Yes	Yes	No
(M-4) نواۃ(Nawat) Nucleus دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle. جسم کی خردبینی ساخت(Jism ki Khurdbeeni Sakhten) Microscopic Structures of the body. (Marks: Range 5-20)				
1	**(U-1)** نواۃ(Nawat) Nucleus	Yes	Yes	No
2	**(U-2)** دورۂ خلیہ(Daurah-e-Khaliyah) cell cycle	Yes	Yes	No
(M-5) اجسام لونیہ وکیمیائے نسیجی(Ajsam-e-Launiyah wa Kimya-e-Naseeji) Human Chromosomes and Histochemistry (Marks: Range 5-10)				
1	**(U-1)** اجسام لونیہ(Ajsam-e-Launiyah)	Yes	Yes	Yes
2	**(U-2)** کیمیائے نسیجی (Kimya-e-Naseeji)	Yes	Yes	No
(M-6) اجسام لونیہ جنسیہ کے نقائص(Ajsam-e-Launiyah jinsiyah ke naqais) Sex Chromosomal Abnormalities. علم النسل(Ilmul Nasal) Genetics. مختلف نسیجی کیمیاوی ومناعتی تکنیک(Mukhtalif Naseeji Keemyawi wa Mana'ati Takneek) Various Histological and Immunohistochemical Techniques. (Marks: Range 5-20)				

1	**(U-1)** ورثہ نمطِ یکجینی علم النسل (Ilmul Nasal Juzvi) Molecular Genetics	Yes	Yes	No
2	**(U-2)** کیمیاوی تکنیک مناعتی (Naseeji Keemyawi Mana'ati Takneek) Immunohistochemical techniques	Yes	Yes	Yes
(M-7) نمطِ ارثی کے متعدد ترتیبی عوامل (Namt-e-Irsi ke muta'addad tarteebi Awamil) Multifactorial Pattern of Inheritance. علم النسل سرطانی وصیدلی (Ilmul Nasal Sartani wa sai'dali) cancer and Pharmacogenetics. (Marks: Range 5-20)				
1	**(U-1)** نمطِ ارثی (Inheritance)	Yes	Yes	Yes
2	**(U-2)** فحص جزوی (Fa'hs al Juzyi)	Yes	Yes	No
(M-8) علم النسل تناسلی (Ilmul Nasal Tanasuli) Reproduction genetics. علاج جینی وعلم المناعت (Ilaj-e-Jeeni wa Ilmul Mana'at) Gene therapy and Immunology. (Marks: Range 5-20)				
1	**(U-1)** علم النسل تناسلی (Ilmul Nasal Tanasul) Reproductive Genetics	Yes	Yes	No
2	**(U-2)** علاج جینی واطلاقی معلومات (Ilaj-e-Jeeni wa Itlaqi Ma'alumat) Gene therapy and its applied knowledge	No	Yes	Yes
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**
Paper No : 2 (تشریح البدن وتشریح اطلاقی (Tashreeh ul Badan wa Tashreeh-e- Itlaqi) Gross and Applied Anatomy)				
(M-9) خطہ رُاس کی ظاہری واطلاقی تشریح (Khitt'a-e- Ra's ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Head Region. (Marks: Range 5-10)				
1	**(U-1)** خطہ رُاس (Khitt'a-e- Ra's)Head Region-I	No	Yes	No
2	**(U-2)** خطہ رُاس (Khitt'a-e- Ra's) Head Region-II	No	Yes	No
(M-10) خطہ عنق کی ظاہری واطلاقی تشریح (khitt'a Unq ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Neck Region. (Marks: Range 5-20)				
1	**(U-1)** خطہ عنق (khitt'a Unq)- Neck region-I	Yes	Yes	No
2	**(U-2)** خطہ عنق (khitt'a Unq)- Neck region-II	Yes	Yes	Yes
(M-11) طرف اعلیٰ کی ظاہری واطلاقی تشریح (Taraf-e-A'ala ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Upper limbs. (Marks: Range 5-20)				
1	**(U-1)** طرف اعلیٰ (Taraf-e-A'ala) upper limb-I	Yes	Yes	Yes

2	**(U-2)** طرف اعلیٰ (Taraf-e-A'ala) upper limb-II	Yes	Yes	Yes
(M-12) طرفِ اسفل کی ظاہری واطلاقی تشریح (Taraf-e-Asfal ki Zahiri wa Itlaqi Tashreeh) Gross and Applied Anatomy of Lower limbs. (Marks: Range 5-20)				
1	**(U-1)** طرف اسفل (Taraf-e-Asfal) Lower limb-I	Yes	Yes	Yes
2	**(U-2)** طرف اسفل (Taraf-e-Asfal) Lower limb-II	Yes	Yes	Yes
(M-13) صدر کی ظاہری، جراحی وسریری تشریح (Sadr ki Za'hiri,Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Thorax. (Marks: Range 5-20)				
1	**(U-1)** صدر (Sadr) Thorax-I	Yes	Yes	Yes
2	**(U-2)** صدر (Sadr) Thorax-II	Yes	Yes	Yes
(M-14) بطن کی ظاہری، جراحی وسریری تشریح (Batan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross, Surgical and Clinical Anatomy of Abdomen. (Marks: Range 5-20)				
1	**(U-1)** بطن (Batan) Abdomen-I	Yes	Yes	Yes
2	**(U-2)** بطن (Batan) Abdomen-II	Yes	Yes	Yes
(M-15) کمانہ وعجان کی ظاہری، جراحی وسریری تشریح (Aanah wa ujan ki Za'hiri, Jarahi wa Sariri Tashreeh) Gross,Surgical and Clinical Anatomy of Pelvis, Perineum, خارجی اعضائے تناسلیہ مردانہ وزنانہ کی تشریح (Kharji Aaz'a-e- Tanasuliyah,Mardanah wa zananah ki Tashreeh) Anatomy of Male and female external genitalia. (Marks: Range 5-20)				
1	**(U-1)** نظام تناسلیہ (Nizam-e-Tanasuliya) Reproductive System-I	Yes	Yes	Yes
2	**(U-2)** نظام تناسلیہ (Nizam-e-Tanasuliya) Reproductive System-II	Yes	Yes	Yes
(M-16) عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body and cadaver care یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management. (Marks: Range 5-10)				
1	**(U-1)** عمومی تشریح بدن (Umoomi Tashreeh-e-Badan) General Anatomy of Human Body یونانی تدابیر کے لیے اطلاقی تشریح (Unani Tadabeer ke liye itlaqi tashreeh) Applied Anatomy for Unani Procedural Management, مختلف تحنیطی اعمال کا بیان (Mukhtalif Tahneeti Ama'al ka bayan) Descriptions Of Different Embalming Procedures.	No	Yes	No

2	**(U-2)** تحنیط المیت(Tahneetul maiyit) Embalming of Cadaver, تحفظِ نعش و عینہ(Tahaffuz-e-N'ash wa Einah-e-Tashreeh) Preservation of Cadaver and specimen, تحذیرِ متحف(Tahzeer-e-Mat-haf) Museum preparation.	No	Yes	No
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**
Paper No : 3 (تشریح اعصابی)(Tashreeh-e-A'asabi) Neuroanatomy)				
(M-17) نظام عصبی کا تعارف(Nizam -e-A'sabi ka ta'aruf) Introduction of Nervous System (Marks: Range 5-20)				
1	**(U-1)** مرکزی نظام عصبی و محیطی کا تعارف(Markazi,Nizam e A'sabi wa Muheeti ka ta.aruf) Introduction of Central and Peripheral Nervous System. عصب و اقسام عصب(Asab wa Aqsam-e Asab) Neurons and classification of Neurons. مشابک(Mashabik) Synapses. نقلات عصبی(Naqlaat –e-As'abi) Neurotransmitters. خلایا دبقیہ(khalaya-e-Dabqiya) Neuroglia.	No	Yes	Yes
2	**(U-2)** نظام عصبی غیر ارادی(Nizam e A'sabi Ghair Iradi) Autonomic nervous system. شرکی نظامِ عصبی(Shirkee Nizam e A'sabi) sympathetic nervous system. غیر شرکی نظامِ عصبی(Ghair Shirkee Nizam e A'sabi) para sympathetic nervous system. نظام عصبی معوی(Nizam e A'sabi Mew) enteric nervous system. نظام عصبی جسدی(Nizam e A'sabi Jasdi) Somatic nervous system.	Yes	Yes	Yes
(M-18) نظام اعصاب کی بالیدگی(Nizam-e- A'asab ki Baleedgi) Development of the Nervous System. (Marks: Range 5-20)				
1	**(U-1)** نظام عصبی مرکزی کی بالیدگی(Nizam e A'sabi Markazi ki Baleedgi) Development of central nervous system. نظام عصبی محیطی کی بالیدگی(Nizam e A'sabi Muheeti ki Baleedgi) Development of peripheral nervous system.	Yes	Yes	Yes
2	**(U-2)** نظام عصبی غیر ارادی کی بالیدگی(Nizam e A'sabi Ghair Iradi ki Baleedgi) Development of Autonomic nervous system. نظام عصبی معوی کی بالیدگی(Nizam e A'sabi Mewi ki Baleedgi) Development of Enteric nervous system.	Yes	Yes	Yes
(M-19) طریق حسی مخصوصہ(Tariq-e- Hissi Makhsoosa) Special Sensory Pathways (Marks: Range 5-15)				
1	**(U-1)** شمی طریق(Tariq-e- Shammi) Olfactory pathway. بصری طریق(Tariq-e-Basari) optic pathway.	No	Yes	Yes

2	**(U-2)** طریق قوقعی (Tariq-e- Qauqa'ei) Cochleovestibular Pathway. طریق ذوقی (Tariq-e- Zawaqa) Gustatory pathway.	No	Yes	Yes
(M-20) طرائق عصبی (Taraiq-e- A'sabi) Neural Pathways (Marks: Range 5-20)				
1	**(U-1)** طریق حرکی (Tariq-e- Harki) Motor Pathways. طریق حسی (Tariq-e- Hissi) Sensory Pathways.	Yes	Yes	Yes
2	**(U-2)** طریق مرکزی غیر ارادی کا تعارف (Tariq-e- Markazi Ghair iradi ka Ta'aruf) Introduction of Central Autonomic Pathways. محور کظری نخاعی تحتانی (Mehwar-e-Kuzri tahtani) Hypothalamic-pituitary-adrenal (HPA) axis. طریق شرکی تحتانی (Tareeq-e- shirki Tahtani) Hypothalamic-sympathetic pathway. طریقِ ساقی جار شرکی (Tareeq-e-saqi jar shirki) Brainstem-parasympathetic .pathway. انعکاسِ شرکی نخاعی (Ine'ikas-e-shirki nukhae'i) Spinal-sympathetic reflex.	Yes	Yes	Yes
(M-21) نظام تحت السریری، جوفی، قاعدی اور شبکی (Nizam-e-Tahataassareeri, Jaufi, Qa'edi and Shabki) Hypothalamo-Hypophyseal System,Limbic system (Marks: Range 5-15)				
1	**(U-1)** نظام تحت السریری و تحت النخاعی (Nizam-e-Tahataassareeri wa Tahtan-Nukha,ei) Hypothalamo-Hypophyseal System. نظام جوفی (Nizam e Jaufi) Limbic system.	No	Yes	Yes
2	**(U-2)** نواۃ قاعدی (Nawat-e-Qa'edi) Basal Nuclei. نواۃ شبکی (Nizam-e-Shabki) Reticular System.	No	Yes	Yes
(M-22) تشریح عصبی اطلاقی (Tashreeh-e- A'sabi Itlaqi) Clinical Neuroanatomy (Marks: Range 5-20)				
1	**(U-1)** دماغ و نخاع کا مستعرض تراشہ (Dimagh wa Nukha ka Tashreehi Musta'raz Tarsha) Cross Sectional anatomy of Brain and Spinal cord.	No	Yes	Yes
2	**(U-2)** نظام عصبی کے اطلاقی پہلو (Nizam e-A'sbi ke Itlaqi Pehlu) Applied aspects of Nervous System.	Yes	Yes	Yes
(M-23) عصبی الیاف (Asab-e-alyaf) Nerve fibres. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses. (Marks: Range 5-20)				
1	**(U-1)** عصب مرکزی (Asab-e- Markazi) Central Nerve. عصب محیطی (Asab-e-Muheeti) Peripheral Nerve. عصبی ضفیرات (Asabi Zafiraat) Nerve Plexuses.	Yes	Yes	Yes

2	**(U-2)** عصبیہ حرکی اعلیٰ (Asabiyah Harki, A'la) Upper motor Neuron. عصبیہ حرکی اسفل (Asbiyah Harki asfal) Lower motor Neuron.	Yes	Yes	Yes
(M-24) مجموعہ سریری (Majmo'ah-e- Sareeri) Thalamic complex , نظام بطنی وخلاء تحت العنکبوت (Nizam-e-Batani wa khil'a Tahat-e-Ankabutiyah) Ventricular system and Sub Arachnoid spaces. (Marks: Range 5-20)				
1	**(U-1)** سریر مؤخر (Sareer-e-Moakh'ar) Dorsal thalamus. سریر مقدم (Sareer-e-Muqaddam) Ventral thalamus.	No	Yes	Yes
2	**(U-2)** نظام بطنی (Nizam-e-Batani)Ventricular system. خلاء تحت العنکبوت (Khil'a Tahat-e-Ankabutiyah) Sub Arachnoid spaces.	Yes	Yes	Yes
S.No	**List of Module/Unit**	**ABQ**	**SAQ**	**LAQ**
Paper No : 4 (تشریح سطحی، شعاعی، قانونی وجدید تشریحی تحقیقات (Tashreeh-e-Satahi ,Shua'ei wa Qanooni wa Jadeed Tashreehi Tahqeeqat) Surface, Radiological, Forensic Anatomy and Recent Advances)				
(M-25) خطہ راس وعنق کی سطحی تحدید (Khitta-e-Ra's wa Unq ki satahi Tahdeed) Surface marking of Head and Neck region. (Marks: Range 5-20)				
1	**(U-1)** خطہ راس کی سطحی تحدید (Khitta-e-Ra's ki satahi Tahdeed) Surface marking of Head region.	Yes	Yes	No
2	**(U-2)** خطہ عنق کی سطحی تحدید (Khitta-e- Unq ki satahi Tahdeed) Surface marking of Neck region.	Yes	Yes	Yes
(M-26) تشریح شعاعی (Tashreeh-e- Shua'ei) Radiological Anatomy. (Marks: Range 5-20)				
1	**(U-1)** سادہ عکس ریزی (Sadah aks srezi) Simple x-rays procedures. تصویر بالموجات الشعاعیہ (Tasveer Bil Maujatis Sautiya) Ultrasonography. تصویر مقطعی حاسوبی (Tasweer maqta'ei Hasubi) Computed Tomography Scan. تصویر مقطعی حاسوبی مع التباین (Tasweer maqta'ei Hasubi ma'attabaun) Contrast Enhanced Computed Tomography Scan.	Yes	Yes	Yes
2	**(U-2)** تصویر بالرنین المقناطیسی (Tasweer Bil Raneen Al Maqnateesi) Magnetic Resonance Imaging. تصویر شعاعی ثدیی (Tasweer-e-Shu'ai Sadyi) Mammography. تصویر شعاعی نواتی (Tasveer Shu'a'ei Navati) Radionuclide scanning.	No	Yes	Yes

(M-27) تصویروں کی تعبیر (Tasveeron Ki Ta'abeer) Interpretation of Radiographs. (Marks: Range 5-20)				
1	**(U-1)** سادہ عکس ریزی تصویروں کی تعبیر (Sadah aks srezi Tasveeron Ki Ta'abeer) plain x-rays. تصویر بالموجات الصوتیہ کی تعبیر (Tasveer Bil Maujatis Sautiyah Ki Ta'abeer) Ultrasonography. تصویر مقطعی حاسوبی کی تعبیر (Tasweer maqta'ei Hasubi Ki Ta'abeer) Interpretation of Computed Tomography Scan.	Yes	Yes	No
2	**(U-2)** تصویر مقطعی حاسوبی مع التباین کی تعبیر (Tasweer maqta'ei Hasubi ma'attabaun Ki Ta'abeer) Interpretation of Contrast Enhanced Computed Tomography Scan. تصویر بالرنین المقناطیسی کی تعبیر (Tasweer Bil Raneen Al Maqnateesi Ki Ta'abeer) Interpretation of Magnetic Resonance Imaging. تصویر شعاعی نواتی کی تعبیر (Tasveer Shua'aei al- Nawavi Ki Ta'abeer) Interpretation of Radionuclide scanning.	No	Yes	Yes
(M-28) خطہ صدر و بطن کی سطحی تحدید (Khitta-e-Sadr wa Batan ki Satahi Tahdeed) Surface marking of Thorax and Abdomen region. (Marks: Range 5-20)				
1	**(U-1)** خطہ صدر کی سطحی تحدید (Khitta-e-Sadr ki satahi Tahdeed) Surface marking of Thorax.	Yes	Yes	Yes
2	**(U-2)** خطہ بطن کی سطحی تحدید (Khitta-e- Batan ki satahi Tahdeed) Surface marking of Abdomen region	Yes	Yes	No
(M-29) طرف اعلیٰ و طرف اسفل کی سطحی تحدید (Taraf-e-Aa'la wa Taraf-e-Asfal ki satahi Tahdeed) Surface Marking of Upper And Lower Limbs. (Marks: Range 5-20)				
1	**(U-1)** طرف اعلیٰ کی سطحی تحدید (Taraf-e-Aa'la ki satahi Tahdeed) Surface marking of upper limbs.	Yes	Yes	Yes
2	**(U-2)** طرف اسفل کی سطحی تحدید (Taraf-e-Asfal ki satahi Tahdeed) Surface marking of lower limbs	Yes	Yes	No
(M-30) تشریح قانونی (Tashreeh-e-Qanooni) Forensic Anatomy. (Marks: Range 5-15)				
1	**(U-1)** تشریح قانونی (Tashreeh -e-Qanooni) Forensic Anatomy. بدنی عظام کی شناخت انکی نعش کے ذریعے کرنا (Badni Eza'm ki Shinakht unki Na'sh ke Zariye karna) Identification of human bones from their remains.	No	Yes	Yes

2	**(U-3)** تشریح کو طبی وقانونی نظریہ میں استعمال کرتے ہوئے جنس، عمر، قد کا تعین کرنا۔ (Tahreeh ko Tibbi wa Qanooni Nazariye me Iste'mal karte hue Jins, Umar wa Qa'd ka Ta'yyun karna) Determination of sex, age, and height. for medico legal application of Anatomy.	No	Yes	Yes
(M-31) تشریح میں جدید تحقیقات (Tashreeh men Jadeed Tahqeeqaat) Recent Advances in Anatomy (Marks: Range 5-20)				
1	**(U-1)** تشریح میں جدید تحقیقات جس میں ساخت و اَفعال کے باہمی تعلقات کو سمجھنے میں مدد ملتی ہے اور سریریاتی مسئلوں کو حل کرنے میں استعمال ہوتے ہیں (Tashreeh Men Jadeed Tahqeeqaat Jisse Saakht-o-af'al ke bahmi ta'luqaat ko Samajhney Mem Ma'dad Milti Hai Aur Sareeryati mas'lo ko hal karney mai iste'mal hotey hai) Recent advances in Anatomy which facilitate comprehension of structure function correlations and applications in clinical problem solving. تصویر اوعیہ (Tasveer-e-Auiyyah) Angiography.	No	Yes	Yes
2	**(U-2)** تصویر تلون فلوری اور اس کے مختلف اقسام واشارات (Tasveer-e-Talawwun Flori wa Iske Mukhtalif Aqsa'm wa Isharaat) fluoroscopy its different types and indications. اشعاع مع بیریم (ish'aa'a ma'a barium) Barium studies. تصویر مرارہ شعاعی (Tasweer mrarah shua'ei) Cholecystography. تصویر شعاعی رحمی قاذفی (Tasweer-e-shua'ei qazifi) Hystero-salpingography.	Yes	Yes	Yes
(M-32) قانون تشریح و تشریح اخلاقیات (Qanoon-e-Tashreeh wa Tashreehi Akhlaqiyat) Anatomy Law & Anatomical Ethics (Marks: Range 5-15)				
1	**(U-1)** تبرع بالاعضاء (Tabarr'u bil A'aza) organ donation.	No	Yes	No
2	**(U-2)** تشریح اخلاقیات (Tashreehi Akhlaqiyaat) Ethics of Anatomy. قانون تشریح (Qanoon-e-Tashreeh) Anatomy Law.	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	Perform a detailed dissection on Cadaver/Artificial Cadaver/Online e-Dissection/Virtual dissection of the specified region to identify and examine key anatomical structures, analyse their spatial relationships and functional connections, while highlighting their clinical relevance in medical practice. Any of the following topics may be assigned to the student for dissection. The student will be randomly assigned one topic by draw of lots. Total Duration: 1:30 Min M11 U1/ M11 U2/ M12 U1/ M12 U2/ M13 U1/ M13 U2/ M14 U1/ M14 U2/ M15 U1/ M15 U2	100
2	Demonstration of Model/Specimen Two models or specimens may be selected from any unit across the four papers for detailed demonstration, each carrying 25 marks. Time: 30 minutes.	50
3	Spotter Examination 10×5=50 marks Time :30 Min (3 Min each) Ten spotters may be selected from any unit across the four papers. Each spotter will include two questions: (i) Identification and (ii) Relevant Features.	50
4	Assessing teaching ability	25
5	Assessing presentation skills	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.

Reference Books/ Resources

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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		