2nd Year MBBS

Study Guide

National University of Medical Sciences
Pakistan

CMH Lahore Medical College & Institute of Dentistry Lahore Cantt, Pakistan

MBBS ANATOMY PROGRAMME AT NUMS

Vision:

To train undergraduate students by qualified faculty and state of the art infrastructure and technology so that students can meet the community challenges of 21st century.

Mission:

To impart core knowledge of anatomy in interesting, compact and practical way to undergraduate students by Hybrid/Spiral integrated system of teaching so that they can differentiate between normal and abnormal structure at gross, microscopic and embryological level.

Objectives:

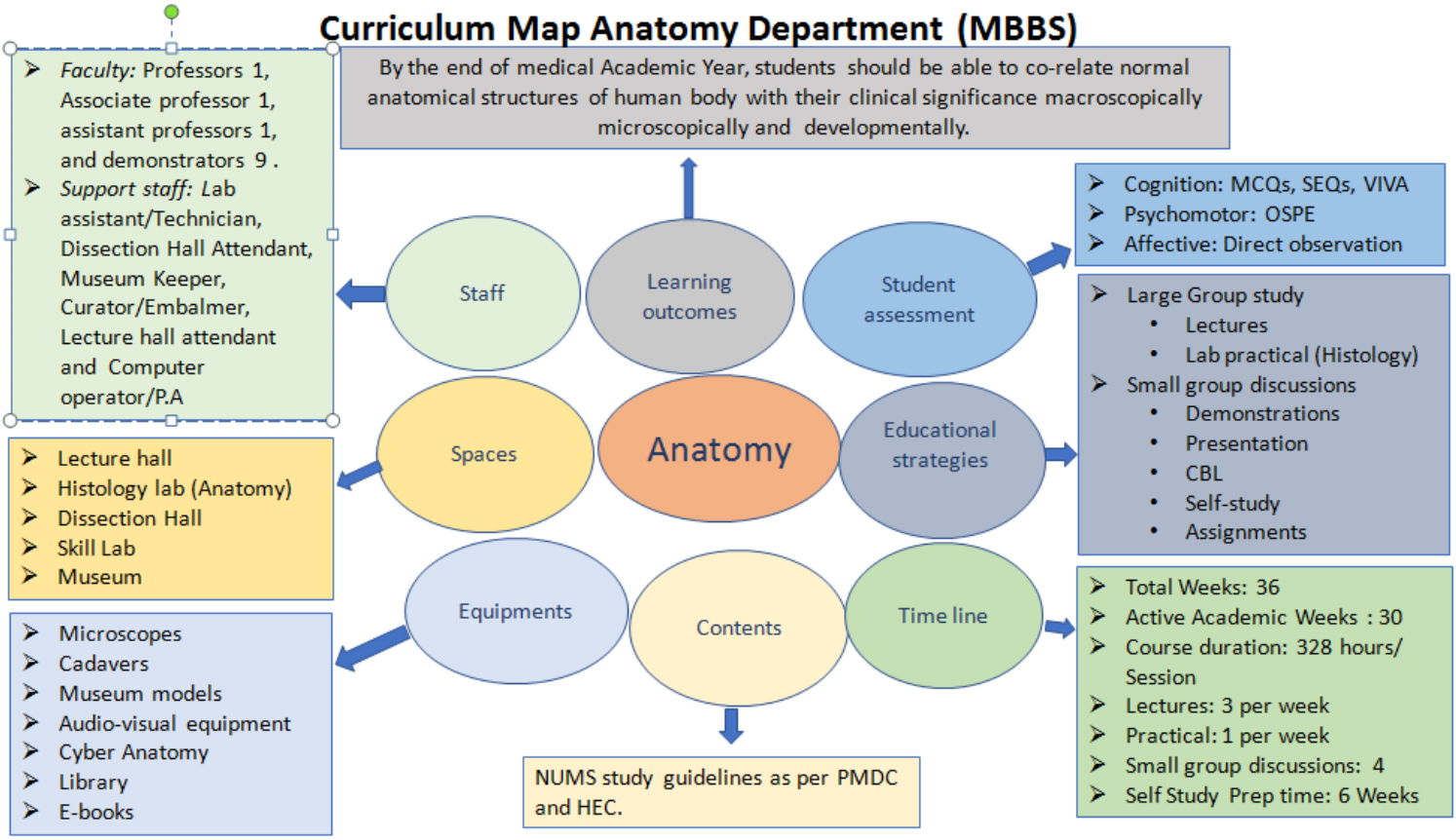
For this we need to impart:

Knowledge of Anatomy - On principles of pedagogy

Skills
- Dissection & Prosection
- Simulation – Models
- Cyber teaching
- Surface Anatomy
- Modern Histological techniques

Attitude:
- Communication Skills
  - Lecture & Presentation
- Self directed learning
  - CBL, Museum Atlas
  - Integrated Journal
  - Cyber Teaching
  - E-Learning
- Quest for Research
  - Journal club meeting
  - Library
- Professionalism
- Empathy
- Inter Personal Skills
- Extra Curricular activities

Curriculum Map Anatomy Department (MBBS)



Contents

Faculty

Dr. Uzma Naseer	Professor & Head of Department
Dr. Shaista Arshad Jarral	Associate Professor
Dr. Tayyaba Mahmud	Assistant Professor
Dr. Saadia Hafeez	Assistant Professor

Demonstrators

Dr. Amina Liaqat
Dr. Fatima Sikander
Dr. Nabiya Gul
Dr. Nimra Mazhar
Dr. Hadia Ahsan
Dr. Yumna Muzafar
Dr. Zimal Hassan

Overview

Module No	Subject	Teaching & Learning	Evaluation
Block-I (12 Weeks)	Gross Anatomy	Abdomen, Pelvis & Perineum	3 Substages *EOB - I
	Embryology	Development of: GIT Urinary System	*EOB - I
	Histology	GIT Urinary System	*EOB - I
Block-II (10 Weeks)	Gross Anatomy	Brain & Neuro Anatomy	2 Substages *EOB - II
	Embryology	Development of: CNS Skull Genital System	*EOB – II
	Histology	Nervous System Special Senses Reproductive System	*EOB – II
Block-III (12 weeks)	Gross Anatomy	Head & Neck	3 Substages *EOB – III
	Embryology	Development of: Head & Neck Special Senses Integumentary System	*EOB - III
	Histology	Endocrine Glands Integumentary System	*EOB - III
*EOB – End of Block Exam			

TIME TABLE FOR THE SECOND YEAR M.B.B.S CLASS (SESSION 2022-23)
C.M.H LAHORE MEDICAL COLLEGE, LAHORE
ANATOMY DEPARTMENT

Day	08:00 – 08:55	08:55 – 9:50	09:50 – 10:45	10:45 – 11:15	11:15 - 12:10	12:10 - 13:05	13:05-13:15	13:05-14:00	14:00 - 15:00
Monday	Medicine (ClinLec)	Physiology Lecture	BioChem	Break	Anatomy Lecture	Gynea	Prayer Break	Tutorial Physiology (T1,T2) Biochemistry (T3, T4)	
Tuesday	Anatomy Lecture	Anatomy –DH			Physiology Lecture	Biochemistry Lecture		Tutorial Physiology (T1,T2) Biochemistry (T3, T4)	
Wednesday	Physiology Lecture	Practical C Anatomy B Physiology A Biochemistry			Physiology Lecture	Biochemistry Lecture		Behavioral Sciences	Anatomy –DH
Thursday	Biochemistry Lecture	Practical B Anatomy A Physiology C Biochemistry)			Anatomy Lecture	Anatomy – DH		Physiology Lecture	ISL/PAK BEHAVIOURAL SCIENCE
	08:00-08:50	08 :50-10 :35		10:35-11:15	11:15-13:00			13:00 – 14:00	11:15 – 13:00
Friday	Anatomy Lecture	Practical A Anatomy C Physiology B Biochemistry)		Surgery (CLIN LEC)	Anatomy –DH			Jumah Break	Directed Self Learning BEH SC

All lecture in Lecture Theatre C. Biochemistry Tutorial class in Lecture Theatre C. Physiology Tutorial class in Lecture Theatre B.

Practical Batch 1—38**A** 39—76**B** 77— 114**C** **115 onwards D**

Senior Faculty: **Professor Dr. Uzma Naseer** **All Staff:** **Dr. Sadia Hafeez** **Dr. AmnaLaiqat** **Dr. Fatima Sikandar**
Dr. Nabiya Gul **Dr. Nimra Mazhar** **Histology Practical:** **Dr. Tayyaba Mahmud** **Dr. YumnaMuzaffar** **Dr. Zimal Hassan**

INTRODUCTION

a. Preamble

Integration has been accepted as an important educational strategy in medical education. The recently revised standards by the Pakistan Medical and Dental Council (PM&DC) encourages integration of major subjects both horizontally and longitudinally. This curriculum meets the standards of Pakistan Medical and Dental Council and our students, on completion of program will develop required competencies as defined worldwide in a graduate doctor.

MBBS Years I & II will deal with the normal structure, function and biochemical aspects of human body which is delivered in an integrated manner in clinical context. Early Clinical Exposure will be ensured by interspersed sessions throughout the curriculum, wherein the students will learn via discussing real life scenarios which they will encounter in clinical settings. This curriculum also aims to improve different skills of the future doctors including communication, leadership & management and research skills and inculcate ethical values and professionalism.

This curriculum has been developed by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with NUMS Academic Directorate

b. Curriculum perspective

NUMS curriculum is evolved taking into consideration Constructivist, Cognitivist, behaviorist with some element of Constructivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

c. Level of integration: The `complementary' approach which is both subject-based and integrated teaching will be used. The integrated sessions will represent a major feature of the curriculum

d. Competencies The focus of this curriculum is on the roles of a general physician as identified in the can MEDS. These are Medical Expert, Manager, Communicator, Health Advocate, Collaborator, Professional and Scholar. Competencies focused in year I and II are: -

1) Medical Knowledge
2) Problem solving
3) Procedural skills
4) Communication skills
5) Empathy
6) Professionalism
7) Leadership and Management skills

8) Research skills

e. Outcomes

By the end of second year, students should be able to:

1) Correlate the developmental and anatomical knowledge of GIT & metabolism, renal, neurosciences, Genetics, Craniocervical, Special senses, Endocrinal & Reproductive systems to their physiological, and biochemical basis.
2) Integrate the fundamental concepts of social and behavioural sciences with knowledge of other medical subjects
3) Apply the principles of research for writing research proposal
4) Analyze multiple perspectives of Pakistan studies

<table>
<tr><td colspan="7">YEAR TWO</td></tr>
<tr><td colspan="3">BLOCK I
10+2=12 weeks</td><td colspan="2">BLOCK II
8+2=10 weeks</td><td colspan="2">BLOCK III
10+2=12 weeks:</td></tr>
<tr><td>4 weeks</td><td>6 weeks</td><td>2w</td><td>8 weeks</td><td>2w</td><td>10 weeks</td><td>2w</td></tr>
<tr><td>GIT / Bioenergetics & Biological Oxidation</td><td>Renal</td><td rowspan="3">EOB</td><td>Neuroscience</td><td rowspan="3">EOB</td><td rowspan="2">Special Senses, Endocrinology & Reproduction (ENR)/ Nutrition</td><td rowspan="3">EOB</td></tr>
<tr><td colspan="2">Carbohydrate metabolism</td><td>Molecular Medicine & Genetics</td></tr>
<tr><td colspan="2">Abdomen, Pelvis, Perineum</td><td>Brain and Spinal cord</td><td>Head & Neck</td></tr>
<tr><td colspan="7">Behavioral Sciences, Research Methodology & Evidence based Medicine , Medicine & Allied and Surgery & Allied</td></tr>
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f. Academic Calendar Year II

g. Proposed Contact Hours Distribution Year-II

SUBJECTS	SECOND YEAR
Aatomy • Embryology • Histology • Gross Anatomy	**250**
Physiology	**225**
Biochemistry	**125**
Research Methodology & Evidence based Medicine	**10**
Medicine	**25**
Surgery	**25**
Pakistan Studies	**15**
Behavioral Science	**30**
Self-Directed Learning	**100**
Co-curricular activities	**40**
TOTAL HOURS	**845**

h. Educational Strategies

1) Lectures

2) Small group discussion
3) Lab practical
4) Skill lab
5) Problem based learning/ Case based learning
6) Tutorials

i. Resources. To be filled in by the institute

1) Faculty
2) Facilities
3) Administration for Course
4) Administrative structure
5) Communication with students

j. Internal Assessment

Students will be assessed at the end of each block. The weighting of internal assessment is 20% in 2nd professional MBBS Examination. There will be three end of blocks and one pre -annual examination. The scores of tests of each end block assessment and pre-annual examination will be used for calculation of the internal assessment.

k. Annual Professional Examination.

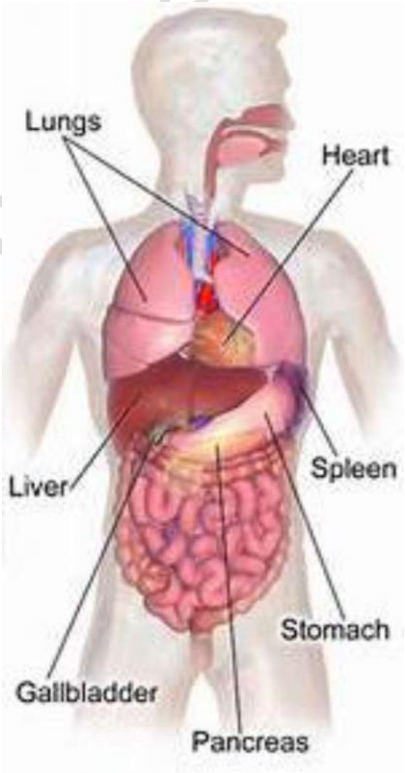
The University will take the first professional Examination as per PM&DC guidelines at the end of the academic year. Annual Theory & Practical Examination will be of 200 marks for Anatomy, Physiology, Biochemistry and 50 marks theory paper each of Islamiat and Pakistan Studies. The passing score is 50% in theory and practical separately.

l. Evaluation of the Course. To be filled in by the institute

BLOCK-I
(10 Weeks)

Consist of following 04 Modules:

- **Gastrointestinal system**
- **Renal**
- **Abdomen, pelvis, perineum**
- **Carbohydrates metabolism**



1. **Introduction:**

   This block comprises of following modules:

   a. Gastrointestinal system **(4 weeks)**
   b. Renal **(6 weeks)**
   c. Carbohydrates metabolism **(throughout the Module)**

2. **Duration**:

   Total duration of the block is 12 weeks. 10 weeks are for teaching and learning and 2 weeks are for end block assessment

   a. <u>Gastrointestinal system (4 weeks)</u>

This module focuses on histo-morphological and embryological structure and physiological and biochemical function of gastrointestinal system along with basic understanding of structure of abdomen and role of ATP in health and disease. Learning process involves delivering the content with clinical relevance. At the very outset medical student should understand the importance of gastrointestinal system in the fields of Medicine. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Learning Outcomes

At the end of this module, student will be able to:

- Correlate the gross anatomical, developmental & light microscopic features of gastrointestinal system with their physiological functions and biochemical basis
- Apply the knowledge of gross anatomy of abdomen to understand relevant clinical
- scenarios
- Relate the role of ATP and energy metabolism for understanding the disease
- process
- Relate their relevant knowledge of this module in subsequent years of clinical training
- and practice
- Relate the development, macro and microscopic features, physiological and biochemical aspects of digestive tract & its associated glands with their specified clinical presentations

b. <u>Renal (6 weeks)</u>

This module includes basic understanding of structure of pelvis and perineum along with histo-morphological, embryological structure and function of KUB. Learning process involves delivering the content with clinical relevance. At the very outset medical student should understand the importance of KUB in the fields of Medicine. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Learning Outcomes

At the end of this module, student will be able to:

- Recognize the normal histomorphological features of KUB and apply this knowledge in identifying common relevant histopathological in future.
- Appraise the normal development of KUB and evaluate the embryological basis of common congenital anomalies related with development of this system.
- Appraise the topographic anatomy of pelvis & perineum to deal with common clinical problems related with them.
- Correlate the gross anatomical, developmental & light microscopic features of KUB with their physiological functions and biochemical basis

- Relate their relevant knowledge of this module in subsequent years of clinical training and practice
- Relate the development, macro and microscopic features, physiological and biochemical aspects of renal system with its specified clinical presentations

c. <u>Carbohydrates Metabolism</u> (Throughout the block). Carbohydrates chemistry and metabolism is very important for understanding different metabolic disorders so this topic will be taught longitudinally throughout the module wherever required. At the end of this module, student will be able to apply the biochemical knowledge of carbohydrates for understanding their related disorders

GASTROINTESTINAL SYSTEM

Anatomy

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	MIT	Assessment tool
		By the end of this block, students should be able to:			
1.	**Introduction to GIT histology**	Appraise the light microscopic structure of different components of digestive system and predict functional outcomes of their altered structure. Identify H&E stained slides of different components of digestive system and appreciate their characteristic histological features to distinguish them from common pathological conditions.	**<u>Knowledge</u>** • Describe the general structural plan of alimentary canal	LGIS	MCQ SEQ SAQ
2.	**Histology of esophagus**		**<u>Knowledge</u>** • Correlate various layers of esophagus with general structural plan of GIT • Differentiate between 3 parts of esophagus microscopically	LGIS	MCQ SEQ SAQ Viva Voce
			<u>Skill</u> • Identify a slide of esophagus under a microscope • Draw a labeled diagram showing its section on the journal • List two points of identification	Lab	OSPE SAQ Viva Voce
3.	**Histology of Stomach**		**<u>Knowledge</u>** • Differentiate between a gastric gland and pit • Enumerate cells forming gastric glands • Correlate the structure and function of cells forming gastric glands • Compare the histological structure of cardia, fundus and pylorus of stomach on the basis of glands	LGIS	MCQ SEQ SAQ Viva Voce

			• Correlate a case of gastritis with pernicious anemia on basis of histology		
			Skill • Identify a slide of stomach under light microscope • Draw a labeled diagram showing its section (fundus and pylorus) on the journal • List two points of identification	Lab	OSPE SAQ Viva Voce
4.	**Histology of small intestine**		**Knowledge** • List and justify the modifications of small intestine working as adaptive measures for carrying out its functions effectively • List the cells forming intestinal mucosa • Describe the light microscopic structure of duodenum, jejunum and ileum • Tabulate the histological differences between duodenum, jejunum and ileum	LGIS	MCQ SEQ SAQ Viva Voce
			Skill • Identify the slides of duodenum, jejunum and ileum under microscope. • List two points of identification of each. • Draw a labeled diagram of these structures in the journal	Lab	OSPE SAQ Viva Voce
5.	**Histology of large intestine**		**Knowledge** • Describe the histological structure of large intestine and correlate it with its functions	LGIS	MCQ SEQ SAQ Viva Voce

			• Justify the increase in number of goblet cells in comparison with the absorptive cells down the tract		
			Skill • Identify the slides of appendix, and colon under microscope • List two points of identification of each • Draw labeled diagrams showing the microscopic sections of colon and appendix in the journal	Lab	OSPE SAQ Viva Voce
6.	**Histology of liver & gall bladder**		**Knowledge** • Describe the histological structure of liver • Illustrate the three concepts/ interpretations of liver structure/microscopic functional units (mentioning the basis/ emphasis of each concept/ interpretation) • Describe the light microscopic structure of gallbladder	LGIS	MCQ SEQ SAQ Viva Voce
			Skill • Identify the slides of liver and gall bladder under microscope • List two points of identification of each • Draw labeled diagrams of liver and gall bladder in journal.	Lab	OSPE SAQ Viva Voce
7.	**Histology of Pancreas**		• Describe the light microscopic structure of parenchyma, stroma and duct system of pancreas	LGIS	MCQ SEQ SAQ Viva Voce
			Skill • Identify the section of pancreas on given	Lab	OSPE SAQ Viva Voce

			slides under microscope • List two points of identification. • Draw labeled diagram of histological structure of pancreas in journal		
SPECIAL EMBRYOLOGY					
8.	**Development of foregut**	Correlate the embryological basis of common congenital anomalies related with development of Fore, mid and hindgut	• Describe the development of primitive gut. • List divisions of primitive gut along with their extent • List derivatives of foregut • Describe the development of esophagus • Correlate the trachea-esophageal fistula, esophageal stenosis and hiatal hernia with its normal development • Describe the development of stomach with special reference to its rotations and relocation of both vagi • Enlist derivatives of ventral and dorsal mesentery of foregut • Explain the formation of lesser sac • Explain pyloric stenosis by applying the embryological knowledge. • Describe the development of duodenum • Describe the development of liver, biliary apparatus and spleen • Explain the origin of pancreatic buds and correlate them with their derivatives in adult pancreas	LGIS	MCQ SEQ SAQ Viva Voce

			• Explain Annular pancreas by applying your knowledge of normal development of pancreas. • Explain occurrence of accessory pancreatic tissue by applying your knowledge of normal development of pancreas.		
9.	**Development of midgut**		• Enlist derivatives of midgut • Describe physiological herniation with emphasis upon rationale behind its occurrence and reduction • Correlate the rotation of midgut loop with definitive positioning of mid gut derivatives in abdomen • Enlist common congenital anomalies of midgut • Correlate development of midgut with abnormalities of mesenteries, vitelline duct abnormalities, gut rotation defects, gut atresia & stenosis • Differentiate between omphalocele and gastroschisis on the basis of embryology	LGIS	MCQ SEQ SAQ Viva Voce
10.	**Development of hindgut**		• Enlist derivatives of hindgut • Define cloaca • Describe the partitioning of cloaca and its consequences • List derivatives of anorectal canal • Describe the development of derivatives of anorectal canal • Correlate the anomalies of		MCQ SEQ SAQ Viva Voce

			anorectal region of hindgut with normal development		
11.	**Development of digestive system**	Correlate the knowledge of development of digestive tract with three-dimensional spatial arrangement of developing structures with help of models.	**Skill** • Identify parts of developing digestive system on given models and diagrams showing different developmental phenomena	SGD	OSPE Viva Voce
GROSS ANATOMY OF ABDOMEN, PELVIS AND PERINEUM (To be covered during Digestive and Renal modules in the logical order)					
12.	**Anterior abdominal wall**	Elucidate the gross anatomy of anterior abdominal wall to gain access to various abdominal organs & to analyze common relevant clinical problems in future training and practice	• Identify nine regions of abdominal cavity to locate the topographic arrangement of underlying abdominal organ. • Identify the layers of anterolateral abdominal wall in the prosected specimen. • Explain the clinical importance of membranous layer of superficial fascia with anatomical reasoning. • Describe the origin, insertion, & nerve supply of muscles of anterolateral abdominal wall and demonstrate them in the prosected specimen / model. • Correlate the attachment of muscles of anterolateral abdominal wall with their actions • Describe the formation of rectus sheath at different levels of abdomen and enlist its contents. • Describe the blood supply, nerve supply & lymphatic drainage	SGD	MCQ SEQ SAQ OSPE Viva Voce

			of anterolateral abdominal wall • Locate various surgical incisions commonly used to gain entry into the abdominal cavity		
13.	**Inguinal Canal**	Apply the knowledge of Anatomy of inguinal canal in differentiating between various types of inguinal hernias	• Describe the extent and enlist the structures forming various walls of inguinal canal in correlation with muscles and fasciae of anterior abdominal wall. • Locate the superficial & deep inguinal rings on the surface of given subject/manikin • Analyze the functions & mechanics of inguinal canal • Enlist the structures passing through the inguinal canal in males and females • Define hernia. Name different parts of a hernial sac. • Differentiate between direct & indirect inguinal hernia with regards to their relation with age, predisposing factor, frequency, coverings on exit from abdominal cavity, course, & exit from anterior abdominal wall • Define spermatic cord. Describe its extent, coverings & contents	SGD	MCQ SEQ SAQ OSPE Viva Voce
14.	**External Male genitalia**	Apply the anatomical knowledge of male external genitalia in identifying common clinical problems related with them	• Explain the significance of pampiniform plexus • Correlate the descent of testis to its blood supply, lymphatic	SGD	MCQ SEQ SAQ OSPE Viva Voce

			drainage and innervations. • Define hydrocele, hematocele & varicocele • Justify the more common occurrence of varicocele on left side of body with anatomical reasoning		
15.	**Peritoneum**	Interpret the common clinical problems associated with peritoneal cavity with relevance to its gross features	• Define peritoneum & extent of its layers. • Enumerate intraperitoneal, extrapertinoeal, & secondarily retropertoneal organs. • Define following with one example each: Mesentry, Omentum, Ligaments, Folds, Recesses, Pouches, Gutters • Trace the vertical and horizontal disposition of peritoneum and demonstrate it on the model of abdomen and pelvis. • Describe the role of visceral and parietal layers in peritoneal adhesions, ascites and paracentesis • Demonstrate the attachment of greater & lesser omentum in the given model. • Describe the walls and recesses of omental bursa • Demonstrate the structures crossed by root of mesentry in the prosected specimen. • Demonstrate the differences in arrangement of peritoneum in males and females in the given model.	SGD	MCQ SEQ SAQ OSPE Viva Voce

			• Explain the role of greater omentum as abdominal policeman • Explain peritoneal infection & basis of peritoneal pain using your knowledge of gross anatomy of peritoneum		
16.	**Abdominal esophagus**	Elaborate the gross anatomy of esophagus to explain common clinical problems related with it	• Describe abdominal esophagus regarding its relations, blood supply, nerve supply and lymphatic drainage of esophagus. • Explain achalasia of cardia, GERD and bleeding esophageal varices using your knowledge of gross anatomy	SGD	MCQ SEQ SAQ OSPE Viva Voce
17.	**Stomach**	Elaborate the gross anatomy of stomach to explain common clinical problems related with it	• Demonstrate the position & gross features of stomach on the given model • Mark the stomach on the surface of given subject • Identify the omenta attached to stomach on a given model. • Enumerate the structures lying in stomach bed • Enumerate the structures endangered by perforating ulcer of posterior wall of stomach • Describe the blood supply, nerve supply and lymphatic drainage of stomach.	SGD	MCQ SEQ SAQ OSPE Viva Voce
18.	**Small Intestine**	Apply the knowledge of gross Anatomy of small intestine in identifying the relevant common clinical presentations in training and practice	• Identify the gross features of duodenum, jejunum & ileum on the given model. • Identify the structures in relation	SGD	MCQ SEQ SAQ OSPE Viva Voce

			with duodenum, jejunum, & ileum on the prosected specimen/model • Explain the common sites and the effects of perforation of ulcers affecting different parts of duodenum applying your knowledge of gross anatomy • Differentiate between gross features of jejunum and ileum in tabulated form		
19.	**Large intestine**	Apply the knowledge of gross Anatomy of large intestine in appraising the relevant common clinical presentations in training and practice	• Differentiate between small and large intestine on gross inspection • Explain the topographic Anatomy of large intestine with the help of a model • Describe the location of ileocecal valve • Explain the clinical importance of variable positions of appendix with anatomical reasoning. • Mark the McBurney point on the given model / manikin • Analyze the clinical presentation of a scenario of appendicitis applying your knowledge of gross anatomy • Define diverticulosis, volvulus, intussusception, cecostomy, & colostomy	SGD	MCQ SEQ SAQ OSPE Viva Voce
20.	**Blood supply of intestinal tract**	Comprehend the blood supply to the intestinal tract while ascertaining the parts prone to ischemic effects of occlusion of various blood vessels	• Describe coeliac trunk with reference to its origin, branches and distribution • Describe superior mesenteric artery with reference to its	SGD	MCQ SEQ SAQ OSPE Viva Voce

			origin, branches and distribution • Describe inferior mesenteric artery with reference to its origin, branches and distribution • Correlate the parts of intestinal tract derived from fore, mid and hindgut with their blood supply from relevant arteries • Discuss the anatomical basis of clinical problems occurring due to occlusion of GIT blood vessels		
21.	**Hepatic portal system**	Justify the clinical presentation of portal hypertension with anatomical reasoning	• Describe the formation, significance & tributaries of portal vein. • Describe the communications between portal & systemic systems (sites of porto-systemic anastomosis) mentioning the names of veins involved. • Explain the role of porto-systemic anastomosis in portal hypertension • Analyze a case of portal hypertension with anatomical reasoning.	SGD	MCQ SEQ SAQ OSPE Viva Voce
22.	**Liver**	Comprehend the gross anatomy of liver to explain common clinical problems related with it.	• Describe the position, lobes, size, shape, coverings and ligaments of liver. • Mark the lobes, borders, surfaces, impressions of surrounding viscera & peritoneal reflections on liver • Describe the dual blood supply lymph	SGD	MCQ SEQ SAQ OSPE Viva Voce

			drainage and nerve supply of liver • Discuss the concept of hepatic lobectomies and segmentectomy with anatomical reasons		
23.	**Extrahepatic biliary apparatus**	Comprehend the gross anatomy of extrahepatic biliary apparatus to explain common clinical problems related with it.	• Enumerate the components of Intra & Extra Hepatic Biliary Systems • Describe the appearance, relations and blood supply of gall bladder • Describe the formation, course and termination of common bile duct • Identify the right & left hepatic ducts, common hepatic duct, cystic ducts, bile duct in the given model / specimen • Explain the gall stones, acute cholecystitis, cholecystectomy by applying your knowledge of gross anatomy • Justify the referred pain of cholecystitis with anatomical reasoning	SGD	MCQ SEQ SAQ OSPE Viva Voce
24.	**Pancreas**	Correlate the gross anatomy of pancreas to anatomical basis of common clinical problems related with it.	• Identify the location, parts relations and ducts of pancreas in the given model / specimen • Describe the blood supply, nerve supply, lymphatic drainage of pancreas. • Correlate the clinical scenario of obstructive jaundice with cancer of head of pancreas & bile duct. • Justify the referred pain of acute	SGD	MCQ SEQ SAQ OSPE Viva Voce

			pancreatitis with anatomical reasoning		
25.	**Spleen**	Correlate the gross anatomy of spleen to anatomical basis of common clinical problems related with it.	• Identify the gross relations of spleen on the model / specimen • Describe location, blood supply, nerve supply & lymphatic drainage of spleen, • Justify the direction of splenomegaly with anatomical knowledge of its ligaments	SGD	MCQ SEQ SAQ OSPE Viva Voce
26.	**Surface Anatomy**	Utilize the knowledge of topography of abdominal organs in plotting the same on body surface and inferring relevant clinical presentations.	• Mark transpyloric, intercristal, subcostal and midclavicular planes on the abdomen of subject/model for delineation of abdominal regions • Mark the following on the surface of given subject: o Stomach o Liver o Pancreas o Duodenum o Spleen o Large intestine o	SGD	Viva Voce

RENAL

Anatomy

S.No.	Title/Theme	Learning outcomes By the end of this block, students should be able to:	Learning Objectives/Contents	MIT	Assessment tool
SPECIAL HISTOLOGY					
1.	**Histology of Kidney**	Explain the light microscopic structure of different components of urinary system and predict functional outcomes of their altered structure. Identify H&E stained slides of different components of urinary system and appreciate their characteristic histological features to distinguish them from common pathological conditions in future.	**Knowledge** • List parts of a uriniferous tubule and glomerulus • Locate the different parts of uriniferous tubule in cortex and medulla of kidney topographically • Describe the light microscopic structure of different parts of uriniferous tubule with special reference to epithelium • Differentiate between cross section of PCT and DCT	LGIS	MCQ SEQ SAQ Viva Voce
			Skill • Identify the histological features of kidney on a slide under microscope • Write two points of identification • Draw a labeled diagram of identified tissue in journal	Lab	OSPE SAQ Viva Voce
2.	**Histology of ureter and urinary bladder**		**Knowledge** Describe the histological structure of ureter (upper and lower parts) and urinary bladder	LGIS	MCQ SEQ SAQ Viva Voce
			Skill • Identify the histological features of Ureter & Urinary bladder under microscope • Write two points of identification • Draw a labeled diagram of identified tissue on histology notebook	Lab	OSPE SAQ Viva Voce
SPECIAL EMBRYOLOGY					
3.	**Development of kidneys**	Apply the knowledge of development of kidneys, ureter, urinary bladder and urethra in analyzing the relevant congenital anomalies	• Enlist the sources of urinary system • Enlist three models of renal development • Interpret the following stages of development of kidneys briefly a. Pronephros	LGIS	MCQ SEQ SAQ Viva Voce

			b. Mesonephros c. Metanephros • Describe the development of definitive kidney with reference to the sources of different parts of uriniferous tubule, rotation and ascent of kidneys • Correlate following congenital anomalies with normal development a. Horseshoe kidney b. Pelvic kidney c. Poly cystic kidneys d. Ectopic kidney e. Agenesis of kidney		
4.	**Development of ureter, urinary bladder and urethra**		• Enumerate different parts and derivatives of urogenital sinus • Enlist the sources of ureter, urinary bladder and urethra • Describe the development of urinary bladder • Explain the relative position of ductus deferens and ureter with embryological reasoning • Correlate various urachal anomalies, exstrophy of bladder and exstrophy of cloaca with normal development	LGIS	MCQ SEQ SAQ Viva Voce
5.	**Development of urinary system**	Correlate the knowledge of development of urinary system with three-dimensional spatial arrangement of developing structures with help of models.	**Skill** Identify parts of developing urinary system on given models and diagrams showing different developmental phenomena	SGD	OSPE Viva Voce
GROSS ANATOMY					
6.	**Kidney and suprarenal glands**	Comprehend the gross anatomy of kidney to explain common clinical problems related with it.	• Describe the gross features of kidney, relations, and its coverings • Draw and label the relations of anterior and posterior surfaces of both kidneys • Identify the impressions of surrounding structures on both kidneys in the given model. • Describe the blood supply, nerve supply, & lymphatic drainage of kidney	SGD	MCQ SEQ SAQ OSPE Viva Voce

			• Describe the structures involved in perinephric abscess with their anatomical relations • Explain the anatomical basis of typical renal colic and renal transplantation • Describe location, gross features, relations, blood supply, nerve supply, & lymphatic drainage of suprarenal glands • Explain surgical significance of renal fascia and separate compartment for suprarenal gland		
7.	**Ureter**	Apply the knowledge of ureteric Anatomy in appraising the commonly occurring conditions related to it	• Describe the gross features, relations, & course of both ureters on the model / specimen while mentioning its constrictions. • Describe the blood supply and venous drainage of ureter. • Mark the ureter on the surface of given subject • Explain the cases of ureteric stones with anatomical reasoning.	SGD	MCQ SEQ SAQ OSPE Viva Voce
8.	**Lumbar vertebral column and nerves of posterior abdominal wall**	Comprehend the basic anatomy of lumbar vertebral column and related soft nervous tissues to identify the likely source of pain and pathologic processes causing it.	• Describe the fascia of posterior abdominal wall • Distinguish lumbar vertebrae from cervical & thoracic vertebrae • Describe anatomical features of a typical lumbar vertebra • Explain the anatomical basis of clinical presentation of nerve root pain, herniated intervertebral discs, & narrowing of spinal canal. • Correlate the compression & injury of spinal nerve to the basic anatomy of intervertebral foramina. • Define Spondylolisthesis, lumbar spinal stenosis • Describe the formation, relations and branches of lumbar plexus	SGD	MCQ SEQ SAQ OSPE Viva Voce

			• Demonstrate the nerves of posterior abdominal wall in the given model.		
9.	**Muscles of posterior abdominal wall**	Correlate the gross anatomy of posterior abdominal wall to anatomical basis of common clinical problems related with it.	• Identify the origin, insertion, nerve supply and actions of muscles of posterior abdominal wall in prosected specimen • Describe the fascial lining of the abdominal walls • Analyze the anatomical basis of a case of psoas abscess and its spread	SGD	MCQ SEQ SAQ OSPE Viva Voce
10.	**Major vessels of posterior abdominal wall**	Analyze the presentation of clinical conditions associated with major abdominal vessels on the basis of anatomical knowledge	• Describe the extent, relations, branches and their distribution regarding abdominal aorta • Mark the abdominal aorta in the given subject. • Describe the obliteration of abdominal aorta & iliac arteries. • Explain formation, & tributaries of inferior vena cava • Identify the abdominal relations of inferior vena cava in the given model. • Explain the collateral routes for abdominopelvic venous blood & compression of inferior vena cava.	SGD	MCQ SEQ SAQ OSPE Viva Voce
11.	**Lymphatic drainage of abdomen**	Explain the continuity of abdominal lymphatic system with that of other regions with reference to spread of malignancy.	• Name the groups of lymph nodes draining the abdomen. • Describe the terminal group of lymph nodes around abdominal aorta • Describe the lymphatic trunks, cisterna chili & commencement of the thoracic duct. • Differentiate between the location and area of drainage of pre and para aortic lymph nodes • Explain the continuity of abdominal lymphatic system with other regions with reference to spread of malignancy an infection of various abdominal organs	SGD	MCQ SEQ SAQ OSPE Viva Voce

12.	**Pelvic walls**	Comprehend the significant anatomy of pelvic walls in relevance to the clinical problems.	• Demonstrate the boundaries of true and false pelvis in the given model. • Explain the bony landmarks & sites of muscular attachments on sacrum • Differentiate b/w anatomical features of male & female pelvis in the given model • Demonstrate the orientation of pelvic girdle. • Demonstrate the features of bony pelvis in the given model • Demonstrate boundaries of pelvic inlet and pelvic outlet • Describe the type, articulations, ligaments & movements of joints of pelvis. • Describe anatomical basis of sacroiliac joint diseases • Explain anatomy of complications of pelvic fractures • Enumerate the structures forming pelvic diaphragm. • Describe the origin, insertion, nerve supply & actions of muscles of pelvic walls & floor • Explain the functional significance of pelvic floor in females • Analyze the clinical presentation of a case of injury to pelvic floor with anatomical reasoning • Demonstrate the line of attachment of pelvic peritoneum on the given model.	SGD	MCQ SEQ SAQ OSPE Viva Voce
13.	**Pelvic organs**	Analyze the anatomical basis of common clinical conditions related to various pelvic organs in both males and females	• Describe relation, blood supply, lymphatic drainage and nerve supply of sigmoid colon • Describe the relations, peritoneal reflections, curvatures, blood supply, lymphatic drainage & nerve supply of rectum	SGD	MCQ SEQ SAQ OSPE Viva Voce

			• Correlate blood supply of rectum with the arrangement of internal hemorrhoids • Identify parts and surfaces of urinary bladder on the given model • Describe the gross features, peritoneal covering, blood supply nerve supply and lymphatic drainage of urinary bladder • Differentiate between the relations of urinary bladder in models of both genders. • Identify the location and relations of vas deferens, seminal vesicles & ejaculatory ducts on a model • Explain the Anatomy of prostate with reference to its surfaces, lobes, relations, blood supply, nerve supply and lymphatic drainage of prostate • Identify the parts of prostate most likely to be involved in benign and malignant growths of prostate • Justify the metastasis of carcinoma of prostate to vertebral column & cranial cavity on basis of venous drainage • Identify the gross features of ovaries and fallopian tubes on the given model • Describe the blood supply, nerve supply, lymphatic drainage of ovaries and fallopian tubes • Correlate the anatomy of female genital tract with hysterosalpingography, ligation of uterine tubes, ectopic tubal pregnancy • Describe the parts, ligaments, relations and support of uterus • Describe blood supply, nerve supply, & lymphatic drainage of uterus • Comprehend a case of uterine prolapse on the basis		

			of gross anatomy of uterus with the help of given model • Identify the relation of uterine artery and ureter in the prosected specimen & explain its clinical importance. • Illustrate sacral plexus showing its branches • Enlist the branches of internal iliac artery • Demonstrate the main arteries & veins of pelvis on the given model. • Enumerate different groups of lymph nodes of pelvis. • Explain the role of lymphatics and lymph nodes in spread of malignancies of pelvis		
14.	**Perineum**	Apply the knowledge of anatomy of perineum, its parts and contents in appraising the relevant clinical scenarios in both males and females	• Define perineum. Identify its borders, relations & divisions in the given model. • Explain the boundaries of superficial and deep perineal pouches and enumerate their contents in both genders • Illustrate the cutaneous nerves of the perineum. • Define perineal body. Enlist structures attached with it. Justify its clinical importance • Describe the relations, internal features, blood supply, lymphatic drainage, & innervations of anal canal • Compare the gross features and presentation of external & internal hemorrhoids • Elucidate perianal hematoma, fissure, abscess and fistulas of anal canal with anatomical basis of their occurrence and presentation • Describe the boundaries, contents & recesses of ischiorectal fossa • Justify the possible routes of spread of ischiorectal abscess with anatomical reasoning • Explain area of anesthesia, indications, & enlist steps of pudendal nerve block	SGD	MCQ SEQ SAQ OSPE Viva Voce

			• Describe the gross features of vagina including relations, blood supply, nerve supply & supports • Apply the anatomical knowledge in analyzing a case of vaginal prolapse • Enlist the structures pierced during culdocentesis. • Explain gross features of all parts of male & female urethra, its arterial, venous drainage & nerve supply • Apply anatomical reasoning in justifying the route of extravasation of urine in case of injury to different parts of male urethra • Enlist parts of female external genitalia and describe their blood and nerve supply		
15.	**Surface Anatomy**	Utilize the knowledge of topography of contents of posterior abdominal wall in plotting the same on body surface and inferring relevant clinical presentations.	• Mark the following on the surface of given subject: • Kidneys • Suprarenal glands • Ureter • Abdominal aorta • Inferior vena cava	SGD	Viva Voce

LIST OF PRACTICALS:

S.No.	Practicals
Identify and illustrate the following slides:	
1	Esophagus
2	Stomach
3	Small Intestine
4	Colon and Appendix
5	Liver and Gall bladder
6	Pancreas
7	Kidney
8	Ureter & urinary bladder

LEARNING RESOURCES:

a. Clinical Anatomy for Medical Students by Richard Snell (9th edition).

b. Basic Histology Text and Atlas by Luiz Carlos and Junqueira (14th edition)

c. Basic Histology by Laiq Hussain Siddiqui (5th Revised edition)

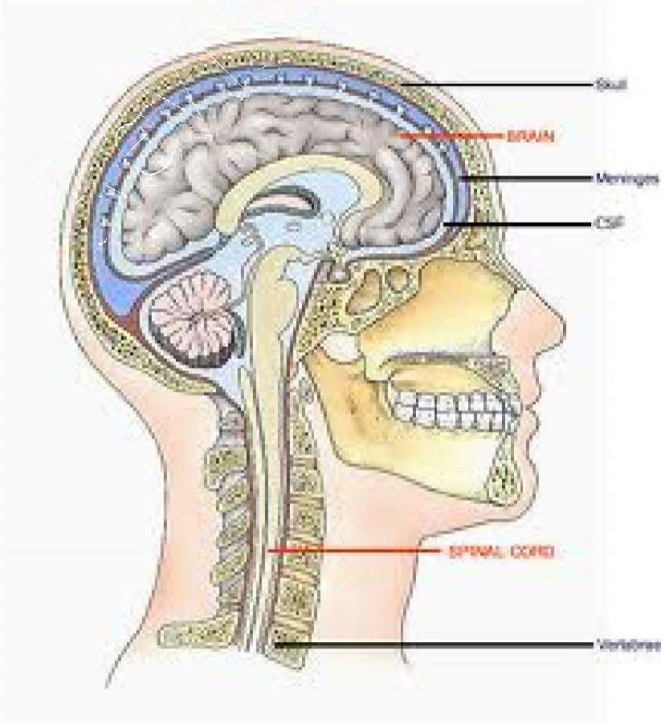
d. Medical Embryology by Langman (14th edition).

e. Essential Clinical Anatomy by Keith Moore (7th edition).

f. The Developing Human by Keith Moore (10th edition).

BLOCK-II

- Neuroscience
- Brain & Spinal Cord
- Molecular Medicine & Genetics



1. Introduction:

This block comprises of following modules:

a. Neuroscience/ Brain & Spinal Cord/ Molecular Medicine & Genetics

2. Duration:

Total duration of the block is 10 weeks. 8 weeks are for teaching and learning and 2 weeks are for end block assessment

3. Preamble

This module provides an insight to histo-morphological and embryological structure and function of Central Nervous system. It also focuses on biochemical basis of nucleotide, molecular medicine and Genetics, Xenobiotics, cancer & aging and antioxidants & free radicals. Learning process involves delivering the content with clinical relevance. This module allows medical student to understand the importance of Central Nervous System in the fields of Medicine.

The Research Methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Learning Outcomes

At the end of this module, student will be able to:

- Correlate the gross anatomical, developmental & light microscopic features of Nervous System with their functions to apply this knowledge in relevant clinical scenarios encountered in subsequent years of training and practice.
- Correlate the developmental and light microscopic features of reproductive system with their functions and apply this knowledge in relevant clinical conditions encountered in subsequent years of training and practice.
- Relate the basic knowledge of nucleotide metabolism, Molecular medicine and Genetics, Xenobiotics, Cancer & aging and Antioxidants & free radicals with their clinical significance
- Apply their relevant knowledge of this module in subsequent years of clinical training and practice
- Explain the physiological mechanisms controlling the functions of Central Nervous System in relationship with sensory, motor and autonomic nervous system.

ANATOMY					
S.No.	**Topic/ Theme**	**Learning outcomes**	**Learning Objective/ Content**	**Instructional strategies**	**Assessment tool**
1.	**Histology of nervous tissue**	1. Correlate the light micro-structure of different components of nervous system with their	• Enlist the components of nervous tissue. • Summarize the histological features and functions of neuron and neuroglia.	LGIS/ Practical	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		functions and predict functional outcomes of their altered structure. 2. Differentiate between H&E stained slides of different components of nervous system, and appreciate their characteristic histological features to predict functional outcomes that result from their altered structure and function.	• Classify neurons according to their morphology and functions with one example of each. • Define neuroglia and enlist its main types. • Explain the myelinated and unmyelinated nerve fibers of central and peripheral nervous system • Explain the histomorphological composition of peripheral nerve. • Define ganglia. Differentiate between sensory and autonomic ganglia in tabulated form. • Apply knowledge of histology to explain the clinical scenarios related to multiple sclerosis, Alzheimer disease, Parkinson disease and neuron injuries. • Describe the histological features of white and grey matter of spinal cord. • Enumerate layers of cerebral and cerebellar cortices and enlist different cell types of these layers. Identify & illustrate histological features of peripheral nerve, ganglia, spinal cord, cerebrum and cerebellum under light microscope and enlist two points of identification for each.		
2.	**Histology of male**	• Relate the light micro-structure of different	• Correlate the histomorphological features of testes and	LGIS/ Practical	MCQs/ SEQs/ SAQs/

	reproductive system	components of male reproductive system with their functions and predict functional outcomes of their altered structure. • Differentiate between H&E stained slides of different components of male reproductive system and appreciate their characteristic histological features to predict functional outcomes that result from their altered structure and function.	blood-testes barrier with their functions. • Explain the histomorphological features of male genital ducts. • Explain the histomorphological features of accessory glands of the male reproductive system and penis. • Apply the knowledge of histology to explain the clinical scenarios regarding the following conditions. ○ Immotile cilia syndrome ○ Benign prostatic hypertrophy ○ Carcinoma of prostate • Identify, differentiate and illustrate the light microscopic structure of following components of male reproductive system: ○ Testis ○ Epididymis ○ Vas deferens ○ Seminal vesicle Prostate		OSPE/ VIVA VOCE
3.	**Histology of female reproductive system**		• Describe the histomorphological features of following female reproductive organs ○ Ovaries ○ Fallopian tubes ○ Uterus ○ Cervix ○ Vagina	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			• Apply the knowledge of histology to explain the clinical scenarios regarding the following conditions. o Endometriosis o Cervical carcinoma • Identify, differentiate and illustrate following components of female reproductive system. o Ovary o Fallopian tube o Uterus o Vagina		
4.	**Development of central nervous system and skull**	Comprehend the embryological basis behind formation of different components of nervous system and correlate them with various relevant clinical presentations.	• Describe the development of neural tube with reference to neurulation, vesicles, brain flexures and ventricles. • Describe the development and positional changes of spinal cord. • Describe the formation and developmental changes in alar and basal plates. • Comprehend the embryological basis of various types of Spina bifida. • Enumerate the derivatives of rhombencephalon, mesencephalon and prosencephalon. • Compile the organization of Alar and Basal plate neurons in brain stem with reference to their type, type of innervation, cranial nerve and location. • Describe the development of the following	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			○ Medulla oblongata ○ Midbrain ○ Pons ○ Cerebellum ○ Pituitary gland ○ Supra renal gland • Apply the knowledge of embryology to explain the clinical scenarios regarding: ○ Holoprosencephaly ○ Schizencephaly ○ Exencephaly ○ Hydrocephy ○ Microcephaly • Tabulate the cranial nerves with their composition (brain region, type and innervation). • Summarize in a tabulated form the contribution of neural crest cells and placodes to ganglia of the cranial nerves • Demonstrate different parts of brain and spinal cord on the given model. • Explain development of viscerocranium • Describe the stages of differentiation of neurocranium into membranous neurocranium and chondrocranium. • Describe the importance of fontanelle of skull in new born with reference to: ○ Normal ossification of the skull ○ Changes in intracranial pressure ○ Newborn Cranium.		

			○ Closure of different fontanelle • Explain the embryological basis of cranioschisis and craniosynostosis • Enlist different types of skeletal dysplasia's and explain achondroplasia and hypochondroplasia.		
5.	**Development of reproductive system**	Comprehend the embryological basis behind formation of different components of male/female reproductive systems and correlate them with various relevant clinical presentations.	• Explain the indifferent stage of gonad development. • Explain the development and descent of testis. • Describe the embryological basis of cryptorchidism • Summarize the development of ovaries • Describe the indifferent stage of genital ducts development. • Explain the development of genital ducts in the male and female. • Describe the indifferent stage of external genitalia development. • Explain the development of external genitalia in the male and female. • Describe the differentiation of male and female external genitalia from genital swellings • Enlist common anomalies of the male genitalia. • Describe the embryological basis	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			and clinical presentation of hypospadias. • Enumerate the derivatives of mesonephric duct, paramesonephric duct and urogenital sinus in males and females. • Apply the knowledge of embryology to explain the basis and clinical presentation of following disorders of sexual development: o Ambiguous genitalia o Hermaphrodites • Enumerate the causes of sexual ambiguity and describe the most common cause (Congenital adrenal hyperplasia). • Explain gonadal dysgenesis. • Identify different components of male and female reproductive system on the given model. • Apply the knowledge of embryology to explain the following congenital anomalies: o Duplications of the uterus o Uterus didelphys o Uterus arcuatus o Uterus bicornis. o Vaginal atresia		
6.	**Introduction & organization of the nervous system**	Comprehend the basic organization of the main structures that form nervous system and gain a three-dimensional appreciation of the parts of the brain	• Enlist the major divisions, components and functions of the central nervous system. • Enumerate ventricles and coverings of brain and spinal cord with special emphasis on	SGDs	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		and their relative positions to one another.	intracranial hemorrhages. • Summarize the process of lumbar puncture and enumerate the structures through which a needle will pass while performing spinal tap. • Demonstrate the structural anatomy of major divisions of central and peripheral nervous system in prosected specimens/models. • Describe the etiology, signs and symptoms of multiple sclerosis and herpes zoster. • Conclude the response of neuron in central nervous system and peripheral nerves to injuries with special reference to myasthenia gravis		
7.	**Gross Anatomy of skull**	Appraise the gross features of cranial cavity and the structures contained within it to understand the anatomical basis of clinical conditions related to them.	• Demonstrate the anatomical position of skull with special emphasis on planes of anatomical position. • Describe and demonstrate the boundaries and gross features of cranial fossae. • Enlist and demonstrate foramina along with structures passing through them in anterior, middle and posterior cranial fossae. • Recognize and demonstrate the important sutures, fontanelle and	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			impressions on the interior of cranial vault.		
8.	**Gross Anatomy of Spinal cord**	Correlate the position and functions of the main nervous pathways and nerve cell groups in the spinal cord, with associated segmental injuries and diseases.	• Explain the gross appearance and the nerve cell groups in the anterior, posterior and lateral gray columns of spinal cord • Enumerate and illustrate the arrangements of ascending and descending tracts (white matter) in spinal cord at various levels. • Explain the given clinical conditions related to ascending and descending tracts of spinal cord. ○ Tabes dorsalis ○ Pyramidal tracts (upper motor neuron) lesions ○ Extrapyramidal tracts (upper motor neuron) lesions ○ Lower motor neuron lesions ○ Acute spinal cord injuries ○ Spinal shock syndrome ○ Destructive spinal cord syndromes ▪ Complete cord transection syndrome ▪ Anterior cord syndrome ▪ Central cord syndrome ▪ Brown sequard syndrome ▪ Syringomyelia ▪ Poliomyelitis	SGD	MCQs/ SEQs/ SAQs/ OSPE VIVA VOCE

			▪ Multiple sclerosis ▪ Amyotrophic lateral sclerosis • Trace following pathways of superficial and deep sensations indicating the location of first, second and third order neurons. o Pain and temperature pathways o Light touch and pressure pathways o Discriminative touch, vibratory sense and conscious muscle joint sense. o Muscle joint sense pathways to the cerebellum ▪ Posterior spinocerebellar tract ▪ Anterior spinocerebellar tract ▪ Cuneocerebellar o Spinotectal tract o Spinoreticular tract o Spino-olivary tract o Visceral sensory tracts • Trace following pathways of voluntary movements indicating the location of first, second and third order neurons. o Cortico spinal tracts o Reticulospinal tract o Tectospinal tract o Rubrospinal o Vestibulospinal o Olivospianl o Descending autonomic fibers o Intersegmental tract		

9.	**Gross anatomy of the brainstem**	Appraise the anatomy of brainstem to assess the signs and symptoms presented by the patient in identifying the exact location of a structural lesion.	• Describe the gross appearance and internal structure of the medulla oblongata. • Illustrate the cross sections of medulla oblongata at different levels. • Explain the effects of raised pressure in posterior cranial fossa on the structures contained within it. • Apply the knowledge of neuroanatomy to explain the following clinical conditions: o Arnold-chiari malformation o Medial medullary syndrome o lateral medullary syndrome of Wallenberg. • Describe the gross features and internal structure of pons. • Illustrate cross section of pons at different levels showing major structures at each level. • Analyze the anatomical structures involved in Pontine hemorrhage and infarction of pons. • Describe the gross appearance, internal structure of mid brain. • Illustrate cross sections at the level of superior colliculus and inferior colliculus showing major structures at each level.	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE

			• Justify the lesions of midbrain structures by the blockage of cerebral aqueduct. • Identify the gross features of medulla, mid brain and pons on a given model.		
10.	**Gross anatomy of cerebellum & its connections**	Appraise the structure, function and connections of the cerebellum with the remainder of the central nervous system to understand the anatomical basis of cerebellar dysfunctions.	• Describe the gross features and phylogenetic divisions of cerebellum. • Enumerate afferent and efferent fibers of superior, middle and inferior cerebellar peduncles. • Enlist intracerebellar nuclei and types of fibers constituting white matter of cerebellum and explain their routes of entry and exit. • Summarize and demonstrate the pathways carrying afferent and efferent fibers to and from the cerebellum. • Enlist disturbances of voluntary movements, reflexes, ocular movements, speech, posture and gait resulting due to lesions of cerebellum. • Demonstrate different parts of cerebellum on given model. • Illustrate flattened view of cerebellar cortex showing the main cerebellar lobes.	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
11.	**Gross anatomy of cerebrum**	Appraise the structure, function and connections of the cerebrum	• Describe the topographic anatomy of diencephalon and demonstrate its gross	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		with the remainder of the central nervous system to understand the anatomical basis of associated clinical conditions.	features on a given model. • Enlist main sulci and gyri of cerebral hemispheres and describe the extent of each of them. • Explain the divisions of cerebral lobes on superolateral, medial and inferior surfaces of cerebral hemispheres. • Enumerate fibers making up the white matter of cerebral hemispheres and describe each of them. • Explain the effects of lesions of different parts of internal capsule • Explain the signs, symptoms, microscopic changes, diagnosis and treatment of Alzheimer disease. • Mark main sulci and gyri on lobes of cerebral hemispheres. • Identify commissural, projection and association fibers on brain prosected specimen • Describe and demonstrate the cortical functional areas in different lobes of cerebral hemispheres. • Describe the effects of lesions in the motor cortex on voluntary movements and speech. • Describe the changes in personality due to lesions in the frontal		

			eye field of cerebral hemisphere. • Enumerate types of aphasia and describe the lesions of speech areas responsible for producing aphasia. • Summarize the sign and symptoms due to lesions of sensory cortex, prefrontal cortex and somesthetic association areas. • Explain the effects of lesion in the primary and secondary visual cortex. • Illustrate diagrams showing probable pathways involved in reading a sentence and repeating it out loud. • Illustrate diagrams showing probable pathways involved in hearing a question and answering it. • Illustrate the lateral and medial views of cerebral hemispheres showing motor and sensory areas.		
12.	**Gross anatomy of reticular formation & limbic system**	Correlate the structure and function of the reticular formation and parts of the limbic system with associated clinical conditions.	• Describe the general arrangement and functions of reticular formation. • Enlist afferent and efferent projections of reticular formation • Enumerate components of limbic system and explain hippocampal formation with reference to its afferent and efferent connections • Compile the effects of destruction of	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			amygdaloid complex on behavior. • Identify different components of limbic system on given model.		
13.	**Gross anatomy of basal nuclei & their connections**	Appraise the location, connections and functions of basal nuclei to explain its common relevant diseases	• Enlist terminology commonly used to describe the basal nuclei. • Describe connections and functions of different nuclei constituting basal ganglia • Enlist hyper kinetic disorders related with basal nuclei like chorea, hemiballismus and athetosis • Describe Parkinson disease regarding etiology, characteristics signs and symptoms, types and treatment • identify different components of basal ganglia on given model/specimen	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
14	**Gross anatomy of cranial nerves**	Appraise the location and connections of motor and sensory nuclei of the cranial nerves to identify the correct site of relevant cranial nerve lesions.	• Enumerate the cranial nerves and classify them into sensory, motor and mixed nerves. • Describe the nuclei and intracranial course of all cranial nerves. • Apply the knowledge of neuroanatomy to explain the clinical conditions regarding the lesions of various cranial nerves. • Identify different cranial nerves on given model/specimen	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

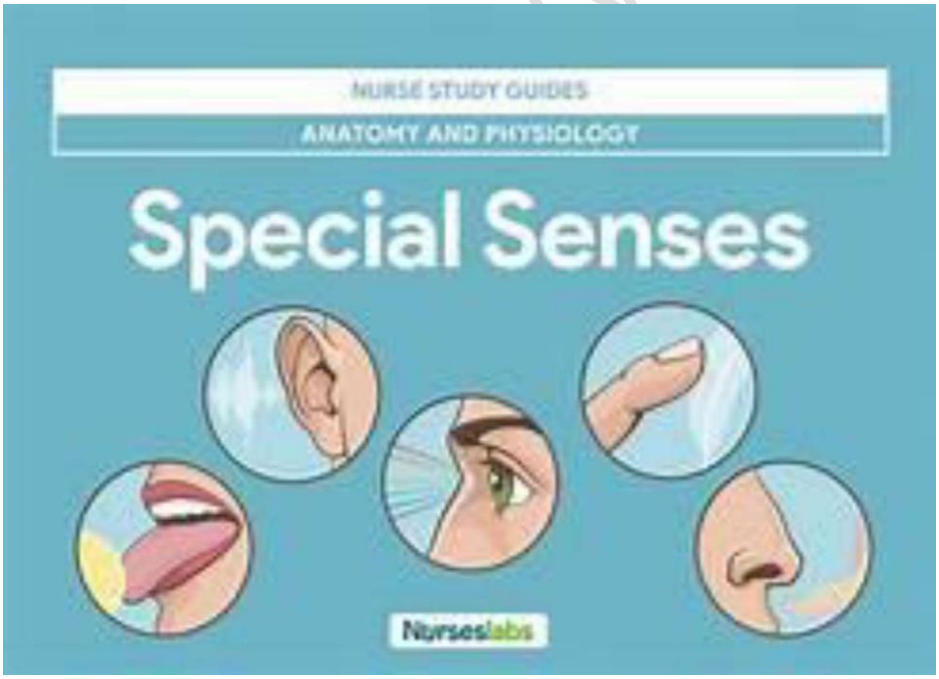
15.	**Gross anatomy of thalamus, Hypothalamus & their connections**	Appraise the structure, function and connections of the thalamus and hypothalamus with the remainder of the central nervous system to understand the anatomical basis of associated clinical conditions.	• Describe the divisions, nuclei and connections of thalamus. • Enlist nuclei and connections of hypothalamus. • Summarize the connections of hypothalamus with the pituitary gland. • Enlist the functions of main hypothalamic nuclei. • Describe the following clinical disorders associated with hypothalamic lesions. o Obesity and wasting o Sexual disorders o Hyper and hypothermia o Diabetes insipidus o Emotional disorders. o Thalamic pain o Thalamic hand	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
16.	**Gross anatomy of meninges and Dural venous sinuses of brain & spinal cord**	Appraise the arrangement of the meninges of brain and spinal cord to identify different types of cerebral hemorrhages.	• Define meninges of brain and describe the Dural reflections in brain. • Explain the meninges of spinal cord • Enumerate the nerves and blood vessels supplying the meninges. • Differentiate among different varieties of intracranial hemorrhages. • Demonstrate the supratentorial and infratentorial compartments of tentorium cerebelli in a prosected specimen. • Define and enumerate paired and unpaired	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			Dural venous sinuses along with their attachments. • Describe the location, important relations, communications of cavernous sinus and enumerate structures passing through it.		
17.	**Gross anatomy of ventricular system, the CSF, & the blood-brain & blood-CSF barriers**	Appraise the anatomical organization of ventricular system, the CSF, & the blood-brain & blood-CSF barriers to explain the relevant clinical scenarios.	• Describe the anatomical organization of ventricular system of brain and explain the boundaries of each ventricle along with their choroid plexus. • Explain formation, circulation and absorption of CSF. • Define arachnoid villous and explain the role of arachnoid villi in absorption of CSF. • Summarize the formation of different barriers of brain. • Demonstrate queckenstedt sign in localizing blockage of subarachnoid space in vertebral canal. • Illustrate the floor of fourth ventricle.	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
18.	**Blood supply of the brain & spinal cord**	• Comprehend the blood supply of brain and spinal cord • To explain the dysfunction that would result if the artery were blocked.	• Describe the blood supply of different parts of brain and spinal cord. • Explain the formation and importance of veins of brain. • Enumerate the vessels taking part in the formation of circle of Willis and summarize its importance.	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			• Relate the interruption of cerebral circulation to cerebral artery syndromes due to anterior, middle and posterior cerebral artery occlusion. • Illustrate circle of Willis.		
Practicals		Identify the slides under light microscope	Identification of following slides under light microscope • Peripheral nerve • Ganglia • Spinal cord • Cerebellum • Cerebrum • Testes • Epididymis • Vas deferens • Prostate • Seminal vesicles • Ovaries • Fallopian tubes • Uterus • Vagina		OSPE/Long slides

BLOCK-III

- Special Senses
- Endocrinology & Reproduction (ENR)
- Head & Neck



Revised curriculum (V-II) applicable for MBBS year-II students 2021 onwards

1. **Introduction:**

This block comprises of following modules:

Special Senses/Endocrinology & Reproduction (ENR) /Head & Neck

2. **Duration**:

Total duration of the block is 12 weeks. 10 weeks are for teaching and learning and 2 weeks are for end block assessment

3. **Preamble**

The emphasis of this module is on histo-morphological and embryological structure of special senses and endocrinology/reproductive system as well as the mechanisms involved in regulating hormone levels in an integrated manner. This module also includes the role of nutrition in different metabolic disorders and allows students to appraise integration and regulation of metabolic pathways in different tissues. Learning process involves delivering the content with clinical relevance. This makes medical student to understand the importance of Central Nervous system in the fields of Medicine.

The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Learning Outcomes

At the end of this module, student will be able to:

- Differentiate between H&E stained slides of specials senses, endocrine glands, integumentary system and oral cavity to predict functional outcomes that result from their altered structure and function.
- Correlate the embryological basis of specials senses, head and neck and integumentary system with various relevant congenital anomalies.
- Apply the concepts of gross anatomy of bones, viscera, muscles, neurovascular components and joints of head and neck to deal with the common prevalent diseases in future.
- Utilize the knowledge of gross anatomy, arterial supply venous drainage and lymphatic drainage of the head and neck with special emphasis on the spread of infection from face to brain.
- Correlate the physiological and biochemical concepts related to special senses and endocrinology/reproductive system with their anatomical knowledge
- Appraise the integration and regulation of metabolic pathways in different tissues
- Apply the knowledge of nutrition for better understanding of relevant disorders
- Relate their relevant knowledge of this module in subsequent years of clinical training and practice
- Describe the physiology of special senses including their nervous pathways and interpret the abnormalities related to them.
- Explain the basic principles of endocrinology along with the functions and related abnormalities of various endocrine glands.
- Describe the male and female reproductive functions and their abnormalities.

ANATOMY					
S.No	**Topic/ Theme**	**Learning outcomes**	**Learning Objective/ Content**	**Instructional strategies**	**Assessment tool**
1.	**Skull**	Elucidate the topographic anatomy of skull	• Appreciate the general plan of studying skull from different views. • Identify important bony landmarks on the bones as viewed from lateral, superior, inferior, anterior and posterior views. • List structures traversing the foramina in these bones • Identify the bones forming the boundaries of orbit, nasal cavity, oral cavity, temporal, infratemporal fossa &pterygopalatine fossa on the given bone. (detail to be done with relevant topics)	SGD (Small Group Discussion)	MCQ/ SAQ/OSPE Viva
2.	**Mandible**	Elucidate the topographic anatomy of mandible	• Identify parts of mandible • Describe ramus and body of mandible with respect to its bony features and attachments.	SGD (Small Group Discussion)	MCQ/ SAQ/OSPE Viva
3.	**Cervical vertebrae**	• Distinguish cervical vertebrae from thoracic and lumbar vertebrae. • Differentiate typical and	• Give distinguishing features of each cervical vertebra. • Enumerate structures passing through foramina	SGD (Small Group Discussion)	MCQ/ SAQ/OSPE Viva

		atypical cervical vertebrae	• Identify type and movements of atlantoaxial and atlantooccipital joints • Outline ligamentous attachments on cervical vertebrae.		
4.	**Scalp**	Correlate the structure and neurovascular supply of scalp with anatomical basis of relevant clinical conditions.	• Appraise extent of scalp on model • Enumerate layers of scalp in a sequential order • Correlate gross features of each layer with anatomical basis of black eye, profuse bleeding, gaping wound, spread of scalp infection and shape of hematoma.	SGD and dissection	MCQ/ SAQ/OSPE Viva
5.	**Temporal region (Infratemporal fossa)**	Correlate the structure of Infratemporal fossa with anatomical basis of relevant clinical conditions	• Identify the location of Infratemporal fossa on a given model and skull • Enlist structure forming boundaries of Infratemporal fossa • Enumerate communication of Infratemporal fossa and structures traversing each • Enlist contents of Infratemporal fossa • Discuss the relation of contents of Infratemporal fossa	SGD and dissection	MCQ/ SAQ/OSPE Viva
6.	**Face**	Correlate the gross anatomy of face with anatomical basis of relevant clinical conditions.	• Outline the characteristic features of facial skin. • Elucidate the cutaneous innervation of face	SGD and dissection	MCQ/ SAQ/OSPE Viva

			• Group facial muscles according to the orifices they are guarding • Describe the nerve supply of muscles of facial expressions. • Describe the course of arteries, veins, lymphatics and nerves of the face with the help of model. • Correlate gross features of face with anatomical basis of danger area, trigeminal neuralgia, Bell's palsy. **Skill:** • Identify muscles of facial expressions • Illustrate the cutaneous innervation of face		
7.	**Salivary glands**	Appraise the location, neurovascular supply of major salivary glands with understanding of relevant clinical conditions on anatomical basis.	• Enumerate salivary glands. • Describe the location of major salivary glands (anatomical relations) along with opening of their ducts. • Trace the secretomotor nerve supply of major salivary glands. • Discuss mumps. • Discuss benign and malignant conditions of parotid gland with special emphasis on	SGD and dissection	MCQ/ SAQ/OSPE Viva

			involvement of facial nerve. • Discuss submandibular duct stone and its surgical removal.		
8.	**Neck**	Describe skin, superficial fascia, and cutaneous nerves of neck	• Outline contents of superficial fascia of neck (platysma, external jugular vein) • Illustrate cutaneous innervation of neck	SGD and dissection	MCQ/ SAQ/OSPE Viva
9.	**Deep cervical fascia**	• Anatomize the four layers of deep cervical fascia in detail. • Correlate the topography of cervical fascial spaces to mediastinal and contralateral spread of infection.	• Enumerate the layers of deep cervical fascia. • Trace the attachments of investing, pre-tracheal, carotid sheath and prevertebral layers of fascia. • Identify various modifications and neck spaces formed by fascial attachments. • Comprehend the clinical importance of neck spaces in spread of infection	SGD and dissection	MCQ/ SAQ/OSPE Viva
10.	**Triangles of neck**	Link the anatomical location of triangles of neck and their contents with their clinical significance.	• Tabulate the attachments, nerve supply, actions of superficial and deep muscles of neck (sternocleidomastoid, suprahyoid, infrahyoid, sub occipital, prevertebral muscles,). • Identify boundaries and contents of	SGD and dissection	MCQ/ SAQ/OSPE Viva

			triangles of neck on model • Describe the origin, course and distribution of vessels and nerves of neck (cervical plexus, Ansa cervicalis, Common carotid artery, Internal jugular vein, subclavian vessels) • Analyze a case of lesion to accessory, glossopharyngeal and vagus nerve on anatomical basis. • Describe the clinical features of torticollis		
11.	**Submandibular region**	Correlate the anatomy of Submandibular region with its clinical significance	• Revisit boundaries of submandibular triangle • Describe the parts, relations, neurovascular of submandibular gland. • Trace the routes of submandibular ganglion • Describe the distribution of • submandibular ganglion • Correlate the anatomy of submandibular fascial space with Ludwig's angina	SGD and dissection	MCQ/ SAQ/OSPE Viva
12.	**Parotid region**	Correlate the anatomy of parotid region with its clinical significance	• List contents of parotid region • Elucidate the surfaces, borders, shape, location, parts,	SGD and dissection	MCQ/ SAQ/OSPE Viva

			relations and drainage of parotid gland • Trace the pathway of autonomic supply of parotid gland. • Enumerate structures embedded in parotid gland in a sequential order. • Analyze anatomical basis of clinical presentation of mumps. • Correlate the extracranial course of facial nerve with Bell's palsy.		
13.	**Temporomandibular joint**	Correlate the gross anatomical features of temporomandibular joint with clinical significance	• Outline the type, articular surfaces, capsule, ligaments, supporting factors, movements and nerve supply of TMJ • Describe movements of TMJ with reference to axes and muscles producing them • Correlate a case of dislocation and reduction of TMJ with anatomical knowledge of TMJ.	SGD and dissection	MCQ/ SAQ/OSPE Viva
14.	**Temporal and Infra-temporal region**	Correlate the location, boundaries and contents of temporal and Infratemporal fossa with relevant clinical conditions.	• Identify the location, boundaries, contents and communications of temporal and infratemporal fossa on a given model and skull. • Describe the course and distribution of mandibular nerve	SGD and dissection	MCQ/ SAQ/OSPE Viva

			from origin to distribution • Tabulate the attachments, actions and nerve supply of muscles of mastication. • Trace location, various routes and distribution of otic ganglion • Justify role of lateral pterygoid as a peripheral heart on anatomical basis of pterygoid venous plexus • Elucidate importance of pterygoid venous plexus in case of intracranial spread of infection to cavernous sinus. • Trace origin and distribution of superficial temporal, First and second parts of maxillary artery • Trace origin and distribution of Chorda tympani from origin to till it joins the lingual nerve.		
15.	**Oral Cavity and tongue**	Correlate the gross anatomy of oral cavity and tongue with anatomical basis of relevant clinical conditions	• Outline the floor, roof, lateral walls and vestibule of oral cavity. • Describe topographic features of tongue. • Tabulate the actions and nerve supply of	SGD and dissection	MCQ/ SAQ/OSPE Viva

			muscles (intrinsic and extrinsic) of tongue • Differentiate a case of UMN and LMN lesion of hypoglossal nerve • Correlate Lymphatic drainage of different parts of tongue with spread of malignancy and infection of tongue. • Tabulate the attachments, nerve supply, actions of muscles of soft palate. Trace the pathway of gag reflex		
16.	**Nose and paranasal sinuses**	Correlate the gross anatomy of Nose and paranasal sinuses with relevant clinical conditions	• Describe the skeletal framework of different walls of nose • Describe the features, vascular supply, nerve supply and openings in lateral wall of nose • Describe the features, vascular supply, nerve supply of medial wall of nose • Highlight the significance of little's area in a case of epistaxis • Trace the location and drainage of paranasal sinuses in skull and on radiograph	SGD and dissection	MCQ/ SAQ/OSPE Viva
17.	**Pterygopalatine fossa**	Describe the anatomy of Pterygopalatine fossa in relation with surrounding structures	• Identify the location of pterygopalatine fossa on skull • List bones forming walls of pterygopalatine fossa	SGD and dissection	MCQ/ SAQ/OSPE Viva

			• Enumerate its contents and communications • Describe the distribution of third part of maxillary artery, nerve and pterygopalatine ganglion • Justify the role of pterygopalatine ganglion in hay fever/allergies		
18.	**Pharynx**	Correlate the gross anatomy of pharynx with relevant clinical conditions	• Differentiate extent, anatomical features, vascular supply, nerve supply of three parts of pharynx on anatomical basis • List muscles of pharynx with nerve supply and action • Name structures passing through the spaces between muscles of pharynx • Trace origin of pharyngobasilar fascia on base of skull. • Correlate anatomical knowledge of pharayngobasilar fascia with patency of nasopharynx • Justify role of Eustachian tube in equalizing middle ear pressure, age related obliquity • Describe anatomical route of spread of infections from	SGD and dissection	MCQ/ SAQ/OSPE Viva

			nasopharynx to middle ear. • Relate boundaries of tonsillar fossa and tonsillar bed with significant structures that must be protected during tonsillectomy. • Define Kilian's dehiscence		
19.	**Larynx**	Correlate the gross anatomy of larynx with relevant clinical conditions	• Describe laryngeal wall in detail with emphasis on cartilages, ligaments, muscles, vascular supply and nerve supply. • Analyze mechanism of abduction and adduction of vocal cords • Distinguish clinical presentations of injury to external, internal and recurrent laryngeal nerves. • Recognize Clinical significance of piriform fossa	SGD and dissection	MCQ/ SAQ/OSPE Viva
20.	**Thyroid and parathyroid glands**	Correlate the gross anatomy of thyroid and parathyroid glands with relevant clinical conditions	• Identify gross features of thyroid and parathyroid glands on models. • Describe capsule, relations and blood supply of thyroid and parathyroid gland • Justify anatomical basis of movement of thyroid gland during deglutition	SGD and dissection	MCQ/ SAQ/OSPE Viva

			• Discuss surgical precautions in thyroid surgery while ligating vessels and enucleation		
21.	**Lymphatic drainage of head and neck**	Appraise the lymphatic drainage of neck with understanding of relevant clinical conditions on anatomical basis.	Enumerate the groups of lymph nodes draining the neck. Describe their location and areas of drainage. Describe the formation of jugular lymph trunk. Describe the clinical importance of `lymphatic drainage of head and neck. Enlist paired & unpaired laryngeal cartilages and identify their gross features. Enlist intrinsic & extrinsic membranes of larynx identify their gross features & formation of vestibular and vocal ligaments.	SGD and dissection	MCQ/ SAQ/OSPE Viva
22.	**External Ear**	Correlate the gross anatomy of external ear with relevant clinical conditions	• Describe the gross anatomical features of auricle, external auditory meatus and tympanic membrane. • Correlate nerve supply of external ear and tympanic membrane with clinical significance (perforation of tympanic membrane) • Justify the anatomical basis of otoscopy in infants and adults.	SGD and dissection	MCQ/ SAQ/OSPE Viva
23.	**Middle ear**	Correlate the gross anatomy of middle ear with relevant clinical conditions	• Describe the gross anatomical features, boundaries, structures	SGD and dissection	MCQ/ SAQ/OSPE Viva

			and contents of middle ear cavity. • Describe the structures forming the walls of middle ear cavity on the given model. • Highlight the importance of infection in middle ear cavity in relation to its communications. • Trace the pathway and distribution of facial nerve within petrous part of temporal bone.		
24.	**Gross anatomy Inner ear**	List the parts of inner ear with their functions	identify the parts of bony and membranous parts of inner ear on model	SGD and dissection	MCQ/ SAQ/OSPE Viva
25.	**Facial nerve**	Correlate the anatomy of facial nerve with its lesions	• Revisit the course and distribution of facial nerve • Revisit the relationship of facial nerve with pterygopalatine and submandibular ganglia • Revisit the effects of lesion of facial nerve at different levels • Differentiate anatomical basis of clinical presentation of UMN and LMN lesion of facial nerve	LGIS	MCQ/ SAQ/OSPE Viva
26.	**Orbit**	Correlate the anatomy of orbital contents with relevant clinical significance.	• Describe the skeletal framework of bony orbit and its communications	SGD and dissection	MCQ/ SAQ/OSPE Viva

			• List the contents of orbit • Identify the parts of eyeball on a model • Tabulate the attachments, nerve supply and actions of extraocular muscles • Justify the movements of extraocular muscles based on their attachments • Trace the course and distribution of 3, 4 and 6 CN. • Justify the peculiar Position of eyeball in case of lesion of 3, 4 and 6 CN • Trace the route and distribution of ciliary ganglion. • Describe the course and distribution of ophthalmic nerve • Name different components of lacrimal apparatus • Describe the nerve supply of Lacrimal gland		
27.	**Cranial nerves**	Correlate the anatomy of each cranial nerve with their lesions	Revisit the course and distribution of all cranial nerves	SGD and dissection	MCQ/ SAQ/OSPE Viva
28.	**Radiography**	Identify the important bony landmarks in region of head and neck on x rays.	Identify the important bony landmarks of cervical vertebrae, paranasal sinuses, skull on x ray.	SGD and dissection	MCQ/ SAQ/OSPE Viva

29.	**Surface marking**	Mark the vital structures of head and neck on skin of a subject	• Mark following structures on subject • Thyroid • Parotid Gland and duct • CCA • Common carotid artery • Facial artery • Vagus • Accessory • Hypoglossal • External jugular vein • Internal jugular vein	SGD and dissection	MCQ/ SAQ/OSPE Viva

EMBRYOLOGY				
Topic/ Theme	**Learning outcomes**	**Learning Objectives/ Contents**	**Instructional Strategies**	**Assessment Tools**
Integumentary System	Comprehend the embryological basis of congenital anomalies related to integumentary system.	• Describe the development of skin, hair nails, mammary gland • Describe the embryological basis of relevant congenital anomalies (vitiligo, ichthyoses, hemangiomas and dermatoglyphics and mammary gland anomalies)	**Lectures/ SGD**	**MCQS/ SAQS/ SEQS/ Viva**
Head and neck	Comprehend the embryological basis of congenital anomalies related to Pharyngeal Arches and pouches, tongue, nose and paranasal sinuses, face, palate thyroid and parathyroid glanda	• List embryological sources of head and neck structures • List components of pharyngeal apparatus. • Tabulate the nerve supply and derivatives of each arches, pouches, clefts and membranes • Describe the embryological basis of first arch syndrome and		

		its relation to cardiac anomalies • Correlate the normal development of tongue with its congenital anomiles • Correlate the normal development and descent of thyroid gland with its associated anomalies. • Justify the relative anatomical location of parathyroid gland • Outline the development of nose and paranasal sinuses • Enumerate the prominences of facial development • Elucidate the embryological phenomenon of development of face and palate • Correlate various facial and palatal clefts with normal development		

Development of Eye	Correlate the developmental processes involved in formation of eye with relevant congenital anomalies	• Describe the development of the optic cup • Relate the differentiation of wall of optic cup into definitive structures • Describe the differentiation of Mesenchyme in chambers of eye • Correlate the common congenital anomalies of eye with normal development. • Describe the development of various layers of eyeball.		
Development of Ear	Correlate the developmental processes involved in formation of ear with relevant congenital anomalies.	• Revisit the role of first and second pharyngeal apparatus in development of ear. • Describe the differentiation of otic capsule into inner ear • Correlate the anomalies of external ear with neural crest cells.		

Sr. No.	Topic/theme	Learning outcomes	Course content/learning objectives	Instructional strategies	Assessment tool
HISTOLOGY					
			INTEGUMENTARY SYSTEM		
1.	**Skin/ Integumentary system**	Appraise the various types of skin, their microstructure and the various skin appendages. Describe the histological basis of the various pathologies of skin and mammary gland	Describe the components of skin, its epithelium (including the various cells of epidermis along with their functions), nail, hair and mammary gland.	LGIS	MCQs, SAQs, SEQs, Viva voce
			Explain histological differences between thick and thin skin. Describe the various appendages of skin.		
			Describe the histological basis of psoriasis, vitiligo, albinism, blister disorders and cancers of skin.		
			Describe the differences in histological structure of mammary gland between inactive, active and lactating phase.		
			Describe the involution of mammary gland in old age.		
			Describe the histological basis of carcinoma of mammary gland (part of parenchyma mostly involved- intraductal carcinoma).		
			SKILL Identify an H&E stained slide of thick and thin skin and mammary gland (inactive and active phases) and draw their labelled diagrams.	Practical	OSPE
			UPPER GASTROINTESTINAL SYSTEM		
2.	**Lip & tongue**	Appraise the light microscopic structure of lip and tongue, with special emphasis on	Describe the histological features of lip, with emphasis on transition in structure from	LGIS	MCQs, SAQs, SEQs, Viva voce

		papillae of tongue and taste buds.	cutaneous to vermillion to mucosal zone.		
			Explain the histological features of dorsal and ventral surfaces of tongue, with particular focus on tongue papillae, their shape, location, keratinization, number and presence or absence of taste buds.		
			SKILL Identify an H&E stained slide of lip and tongue and draw their labelled diagrams.	Practical	OSPE
3.	**Histology of salivary glands**	Appraise the light microscopic structure of different major salivary glands.	Understand the classification of salivary glands on basis of morphology and nature of secretion.	LGIS	MCQs, SAQs, SEQs, Viva voce
			Describe the histomorphological features of salivary glands with regards to their secretory and ductal systems.		
			SKILL Identify H&E stained slides of parotid gland, submandibular gland and sublingual glands and draw their labelled diagrams.	Practical	OSPE
			Identify the differentiating features seen in different parts of esophagus with special focus on differences between upper and lower ends of esophagus.		
			Identify and understand the changes taking place in the layers of gut as it transitions from esophagus to stomach.		

			SKILL Identify H&E stained slides of upper and lower ends of esophagus, and gastroesophageal junction and draw their labelled diagrams.		
ENDOCRINE SYSTEM					
4.	**Histology of pituitary gland**	Describe the histological structure and hormones of different parts of pituitary gland to understand the basis of various hormonal disorders of pituitary gland.	Describe the various parts of pituitary gland.	LGIS	MCQs, SAQs, SEQs, Viva voce
			Identify and understand the cells forming the parenchyma of different parts of adenohypophysis, their staining characteristics, cellular features, and the hormones produced by them.		
			Describe the histological differences between adenohypophysis and neurohypophysis on the basis of embryological origin, and understand the concept of Herring bodies and the hormones contained within them.		
			SKILL Identify H&E stained slide of pituitary gland draw its labelled diagram.	Practical	OSPE
5.	**Histology of Thyroid and parathyroid glands**	Describe the histological structure and hormones of thyroid and parathyroid glands and correlate the hormonal disturbances with changes in blood calcium levels.	Describe the histological structure of thyroid gland as an endocrine gland, with special focus on structure of thyroid follicles, their lining epithelium, changes in the epithelium in different phases of activity of thyroid gland.	LGIS	MCQs, SAQs, SEQs, Viva voce
			Describe the parafollicular/C cells in thyroid gland.		

			Describe the histological structure of parathyroid gland with focus on arrangement of cells, their staining characteristics, secretion, and the relationship between the effect of Parathyroid hormone and calcitonin on blood calcium levels.		
			SKILL Identify H&E stained slide of thyroid and parathyroid glands draw their labelled diagrams.	Practical	OSPE
			Identify and understand the parenchymal components of exocrine parts of pancreas (secretory and ductal parts).		
			Describe the histological features of islets of Langerhans and understand the staining characteristics and arrangement of cells forming the islets, with identification of different hormones released by the islets.		
			SKILL Identify H&E stained slide of pancreas and draw its labelled diagram.	Practical	OSPE
HISTOLOGY OF SPECIAL SENSES					
9.	**Histology of Eye**	Appraise the histological structure of different layers of eyeball. Understand the histological basis of cataract, glaucoma,	Describe the detailed structure and function of sclera and cornea, with special emphasis on corneal transparency and its fusion with sclera at corneoscleral junction.	LGIS	MCQs, SAQs, SEQs, Viva voce

		retinal detachment and age-related macular degeneration.	Describe the light and ultramicroscopic structure of uveal tract, different layers of retina, correlating the arrangement of neuronal cells and processes with their functions.		
			Describe and correlate the gross anatomical structure of eyelid with its histological structure.		
			SKILL Identify H&E stained slide of cornea, eyelid, retina, choroid and sclera and draw their labelled diagrams.	Practical	OSPE
10.	Histology of ear	Appraise the histological structure of different parts of ear. Understand the basic histology and mechanism behind motion sickness and deafness.	Identify and understand the histological structure of different parts of ear, particularly the external and internal ear.	LGIS	MCQs, SAQs, SEQs, Viva voce
			Describe the histological structure of sensory receptor areas of internal ear like Organ of Corti, maculae acousticae and crista ampullaris.		
			Identify and understand the cells and spaces in cochlea.		
			SKILL Identify H&E stained slide of pinna and cochlea and draw their labelled diagrams.	Practical	OSPE

			Understand and describe the microscopic and ultramicroscopic structure of testis, with special emphasis on structure of seminiferous tubules (structure and function of cells of the lining epithelium, including blood-testis barrier), intratesticular and extratesticular ductal system (epididymis, ductus deferens) and structure and functions of accessory male reproductive organs.		
			Differentitate between the structures of epididymis and ductus deferens correlating with their functions.		
			Understand and identify the histological structure of prostate gland in special reference to changes occurring in old age, benign prostatic hyperplasia, prostatic adenocarcinoma, and diagnostic role of Prostatic specific antigen (PSA). Understand the histological basis of changes occurring in testis in undescended testis and mumps.		
			SKILL Identify H&E stained slide of testis, epididymis, ductus deferens, seminal vesicles and prostate gland and draw their labelled diagrams	Practical	OSPE

Practicals					
	Histology	1. Thick and thin skin 2. Mammary gland 3. Lip 4. Tongue 5. Salivary glands 6. Pituitary gland 7. Thyroid gland 8. Parathyroid gland 9. Cornea 10. Retina 11. Pinna			

BOOKS RECOMMENDED FOR MBBS (2022)

GROSS ANATOMY

Text Books	Reference Books
Clinically oriented Anatomy By Keith L Moore (8th Edition)	LAST`s Anatomy Regional & Applied (12th Edition)
Clinical Anatomy for medical students By Richard S. Snell (10th Edition)	Gray`s Anatomy By Henry Gray`s (41st Edition)
Cunningham`s manual of practical anatomy 15th Edition **Vol-1** (Upper limb & Lower limb) **Vol-2** (Abdomen & Thorax) **Vol-3** (Head & Neck, Brain) (Only For BDS) **Photocopy** of "General Introduction" from Cunningham's manual Vol-I (Page 1-19) (Only For BDS)	Atlas of Anatomy By Netter (7th Edition)/ Atlas of Anatomy By Grant`s
Sketch book Gross	
Clinical Neuroanatomy By Richard S. Snell (8th Edition) only for BDS	Atlas of Anatomy By Netter (6th Edition)/ Atlas of Anatomy By Grant`s
	Museum Atlas

HISTOLOGY

Text Books	Reference Books
Basic Histology By Luiz carlos Junqeira (14th Edition)	Medical Histology by Prof. Laiq Hussain (6th edition)
Di-fiore`s Atlas of Histology (13th Edition)	
Manual of Histology Vol – I Manual of Histology Vol – II (for BDS only) By Prof Dr Tassaduq Hussain Shaikh/ Contextual Journal of Histology	

GENERAL ANATOMY

Text Books	Reference Books
General Anatomy by Prof Laiq Hussain (5th edition)	General Anatomy By Dr Tassaduq Hussain Shaikh(16th Edition)
	General Anatomy By Prof Dr Ghulam Ahmed (7th Edition)

EMBRYOLOGY

Text Books	Reference Books
Langman's Medical Embryology(14th Edition)	Netter's Embryology Atlas
The Developing Human By Keith L-Moore (11th Edition)	