WAH MEDICAL COLLEGE

2022-2026

Department of Medical Education

STUDY GUIDE
2nd YEAR MBBS
Y2BIV

2022-2026

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VISION

National University of Medical Sciences envisions a world with a better quality of life for all by enhancing our contribution to healthcare, education, innovation and research.

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MISSION

“To produce competent medical professional graduates equipped with sound knowledge & research capabilities based on scientific principles, imbued with ethics and moral values primed to serve the community through the profession and pursue research & advanced training in any branch of medicine”.

1. Outcomes of WMC MBBS Program:

At the end of our five-year MBBS program, the graduates should be able to:
1. Independently manage common, non-critical clinical problems.
2. Assist in the management of critically ill patients & demonstrate competency in life saving procedures.
3. Exhibit the attributes of an ethical professional.
4. Conduct research which brings relevance to health care practices.
5. Act as an efficient community health promoter.
6. Exhibit scientific knowledge in all professional activities.
7. Demonstrate clear and efficient written & verbal communication skills.
8. Exhibit the habits of a lifelong learner.

2. Introduction to the Study Guide:

i. Objectives of the Study Guide

Dear Students,

We, at the Department of Medical Education, Wah Medical College, have developed this study guide especially for you. This study guide aims to:

- Inform you about the organization of learning programs in this block which will help you to contact the right person in case of any difficulty.
- Help you in organizing and managing your studies throughout the block
- Guide you on assessment methods, rules, and regulations.
- Define the outcomes which are expected to be achieved at the end of the block.
- Identify the learning strategies that will be implemented to achieve the block outcomes such as lectures, small group discussions, clinical skills, demonstration, tutorial, and case-based learning
- Provide a list of learning resources such as books, and journals for students to consult to maximize their learning.

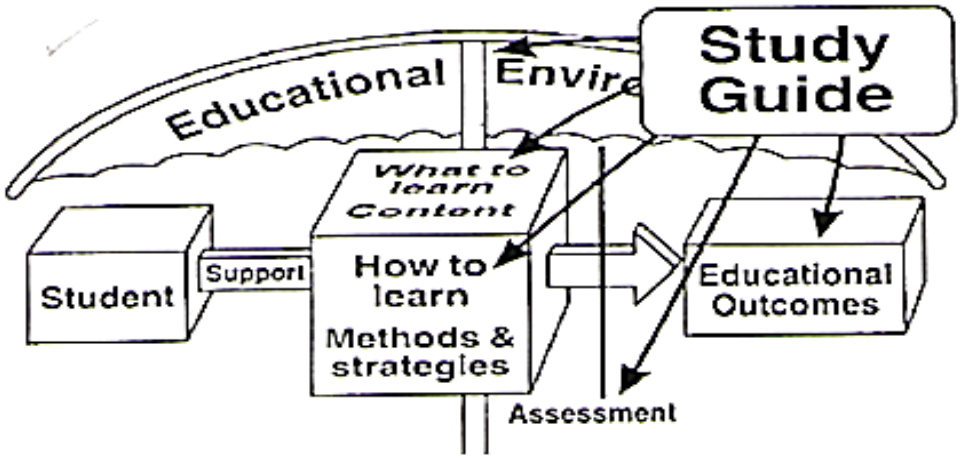


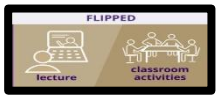
Figure1: Objectives of the study Guide(HARDEN, J.M. LAIDLAW, E.A. HESKETH, 1999)

ii. Commonly used abbreviations & Logos in the study guide

Learning Outcomes:

Learning outcomes are statements that define the expected goal of your course, lesson, or activity in terms of demonstrable skills or knowledge that will be acquired by you as a result of instruction. In simple words, these are the things that you must be able to tell or do with the required attitude after learning a particular topic.

1. **Educational Strategies:** These are the methodologies through which you will be taught by your instructors. These include:

Abbreviation	Logos
LGIS: Large Group interactive session/Lecture	
Flipped Classroom	
CBL: Case based learning.	
Practicals	
Demonstrations	
SGD: Small group discussions	
BST: BedSide Teaching	
Skill Lab	
Clinical Teaching (OPD/ OT/ IPD	
Gamification	

Large Group Interactive Sessions

In a large group, the lecturer introduces a topic or common clinical condition and explains the underlying phenomena through questions, pictures, videos of patient's interviews, exercises, etc. Students are actively involved in the learning process.

Flipped classroom

A pedagogical approach in which the conventional notion of classroom-based learning is inverted: students are introduced to the learning material before class with classroom time then being used to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers.

Small Group Discussion

This format helps students to clarify concepts, acquired skills or attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews, or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials, and self-study. The facilitator's role is to ask probing questions, summarize, or rephrase to help clarify concepts.

Case-Based Learning

This is a small group discussion format where learning is focused around a series of questions based on a clinical scenario. Specifically designed case scenarios and the learning outcomes to be achieved are shared with the student before the session. Students prepare for the CBL and during class they discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences during the block. Faculty members are present as a guide and an assessor.

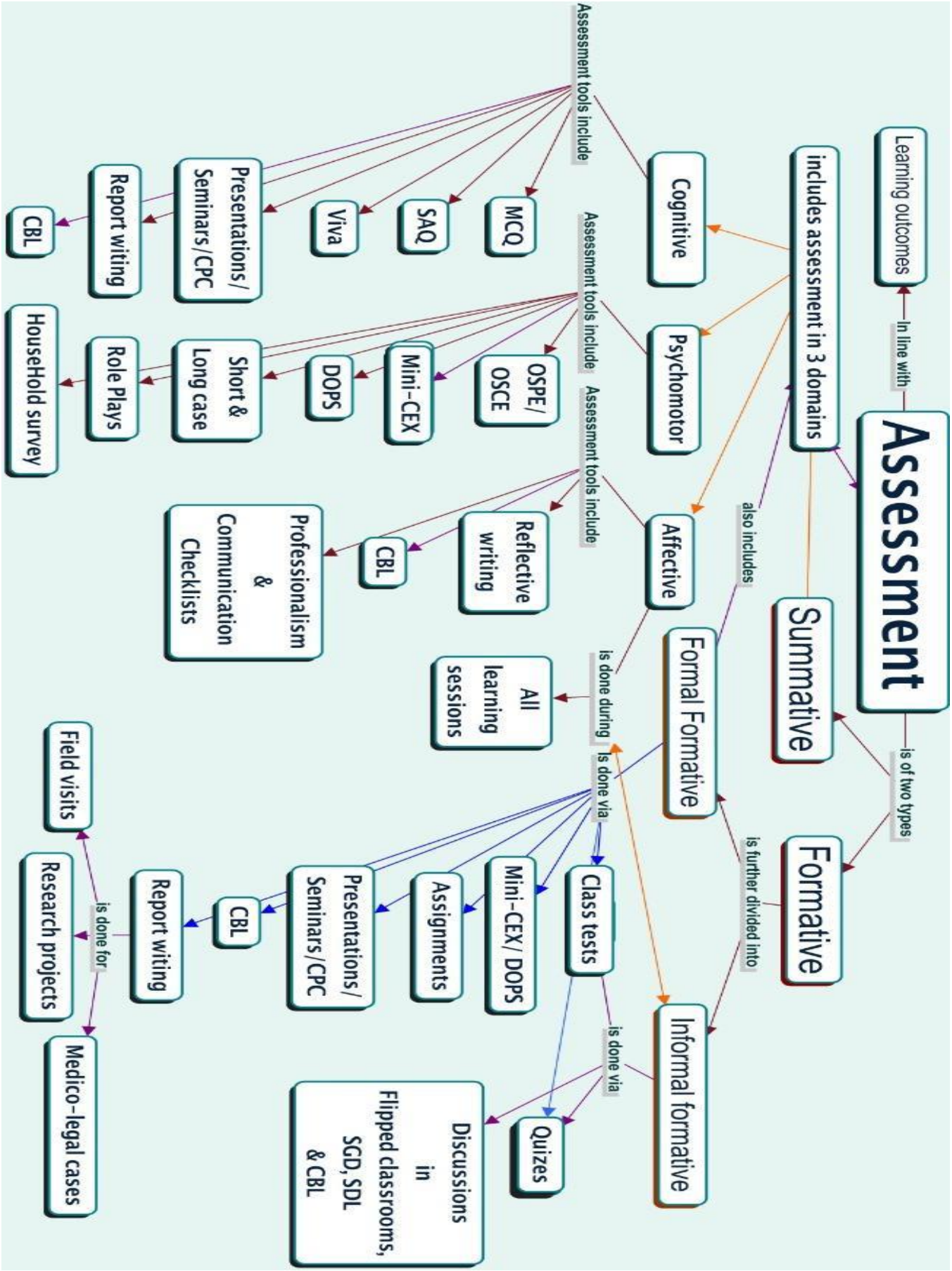
Self-Directed Study

Students assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from the Learning Resource Center, teachers, and resource persons within and outside the college. Students can utilize the time within the college schedule hours for self-study under supervision.

Gamification:

The educators apply game design elements to an educational setting. The goal is usually to make learning more engaging.

3. Assessment Map, Policies & Strategies:



4. Assessment Strategies:

During the block, you shall be continually formatively assessed in all three learning domains i.e., Cognitive, Psychomotor & Affective.

- The weighting of internal assessment shall be 20% in 1st professional MBBS Examination.
- There shall be three EBE and one pre-annual examination. To be eligible to sit in the Pre-annual exam a student must pass at least 50% of all the formal formative & summative assessments conducted during the year. The final decision of eligibility to sit in the pre-annual exam for the students failing to meet the requirements will be taken by the respective HODs & the dBOS. This decision will be on a case to case basis depending upon the student's performance in all 3 learning domains throughout the year.
- The scores of class tests, each EBE & pre-annual examination shall be used for calculation of the internal assessment according to NUMS curriculum.

Internal Assessment Structure for theory	
Weighting 20%	
Component	**Weightings**
1. Attendance in theory learning sessions a. >90%=10 b. 80-89% = 7 c. 75-79% = 5	10%
EBE/ ECE (Theory)	45%
Continuous formal formative assessments- Average score in all the class tests or quizzes during the academic year	20%
Pre-Annual Exam	25%
Total	100%
Internal Assessment Structure for Practical	
Weighting 20%	
Component	**Weighting**
1. Attendance in practical learning sessions a. >90%=10 b. 80-89% = 7	10%

c. 75-79% = 5	
2. OSPE/ OSCE conducted in EBE/ ECE	45%
3. Continuous formal formative assessments- Average score in all the skill tests during the academic year	20%
Pre-Annual Exam	25%
Total	100%

End Block and Pre-Annual Examination:

- There will be three-EBE, one at the end of each block & one pre-annual examination at the end of the academic year.
- The structure of the paper of all the end block examination and pre-annual will be the same as that for the annual examination though syllabus will be different.
- The syllabus for EBE will be announced by the department at least 02 weeks prior to examination.
- Pre-annual examination will be from the whole syllabus.
- The date sheet for EBE and pre-annual examinations will be prepared by coordinators of 1st & 2nd year while the examinations will be conducted by the respective departments.
- The result will be utilized for calculation of internal assessment which will be submitted to NUMS examination branch at least two weeks prior to the annual exam.

Annual Professional Examination:

- The university shall take the 1st professional Examination as per PMC guidelines at the end of the academic year.
- Annual theory and practical Examination shall be of 200 marks each in Anatomy, Physiology and Biochemistry.
- The pass score shall be 50% in theory and practical separately.

5. Block Development Committee

Chairperson	**Prof. Zubia Ather**	
Block In-charge	Dr. Nomana Mahmood	
Members/ Resource persons	Anatomy Physiology Biochemistry Medicine Surgery Behavioral Sciences EBM & RM P-CMILE	Dr. Nomana Mahmood Dr. Hina Umair Dr. Rabbiah Manzoor Dr. Ayesha Rani Dr. Sadia Farhan Mr. Hassan Ali Dr. Khola Waheed Khan Dr. Ambreen Ansar
Study guide developed by	Department of Medical Education Wah Medical College under Supervision of Prof. Dr. Musarat Ramzan	
Resource person for Study Guide	Dr. Ambreen Ansar	

6. Structured Summary of Y2BIV- MVIII

Block Code	**Y2BIV- MVIII**
Prerequisite	Passing the first professional MBBS examination.
Duration	05 weeks
Rationale	This module of the block aims to form the basis of knowledge and skills related to the Anatomy, Physiology and Biochemical aspect of the gastrointestinal system. This module of 5 weeks duration, focuses on histo-morphological and embryological structure as well as physiological and biochemical functioning of the digestive system. It is part of the second year integrated curriculum at WMC.
Anatomy	The gross anatomical, developmental & light microscopic features of GIT and Hepatobiliary system.
Physiology	Gastrointestinal Physiology
Biochemistry	Gastrointestinal System: Secretions, hormones & metabolism Carbohydrates
Surgery & Radiology	Abdomen & Imaging of Abdomen and pelvis
Medicine	Dyspepsia, Peptic ulcer, Malabsorption, Jaundice
Behavioral sciences	Significance of Behavioral Sciences, Determinants of health and disease, Factors affecting health and disease , Human personality development, Medical ethics

7. Course content

Anatomy

Subject Learning outcomes:

After studying two years in anatomy department, the student should be able to:

1. Correlate the histomorphological features of tissues and organs of human body with their functions
2. Correlate the developmental events of human body with common congenital anomalies
3. Interpret the topographic and radiographic anatomy of human body and its presentations in common clinical conditions

Block Learning outcomes:

1. Correlate the histomorphological features of tissues and organs of the digestive and genitourinary system of the human body with their functions.
2. Correlate the developmental events of the digestive and genitourinary system with common congenital anomalies
3. Interpret the topographic and radiographic anatomy of the digestive and genitourinary system and the relevant presentations in common clinical conditions
4. Demonstrate professionalism, effective communication skills, ethics and leadership while participating in all learning activities including dissection, surface marking, CBLs and practicals.

Digestive system and Metabolism-I				
Sr. No.	**Topics**	**Educational Strategies**	**Name of instructor**	**Importance (Must Know Should Know Could Know)**
1.	Anterior Abdominal Wall	SGD	Dr.Ayesha Yasser Dr Bushra Mohsin.	Must know
Learning Outcomes: ● Identify nine regions of the abdominal cavity to locate the topographic arrangement of the underlying abdominal organ. ● Recognize the clinical importance of membranous layer of superficial fascia with anatomical reasoning. ● Describe the attachments, & nerve supply and actions of muscles of anterolateral abdominal wall. ● Describe the formation of rectus sheath at different levels of abdomen and enlist its contents. ● Describe the blood supply, nerve supply & lymphatic drainage of anterolateral abdominal wall ● Describe various types of abdominal hernias.				
2	External Male genitalia	SGD	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Recognize the significance of pampiniform plexus				

- Describe the blood supply, lymphatic drainage and innervation of testis.
- Trace the route for the involvement of different group of lymph nodes in the carcinoma of testis and scrotum
- Differentiate among hydrocele, hematocele & varicocele on anatomical basis.
- Justify the more common occurrence of varicocele on left side of body with anatomical reasoning

3	Inguinal Canal	SGD	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwahh	Must know

Learning Outcomes:

- Describe the extent and enlist the structures forming various walls of inguinal canal
- Interpret the functions & mechanics of the inguinal canal.
- List the structures passing through the inguinal canal in males and females.
- 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.
- Describe extent, coverings & contents of spermatic cord.

4.	**Peritoneum**	SGD	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe Peritoneum and its modifications
- Enumerate intraperitoneal, extraperitoneal, & secondarily retroperitoneal organs.
- Explain following with one example each:
  - Mesentery
  - Omentum,
  - Ligaments
  - Folds
  - Recesses
  - Pouches
  - Gutters
- Demonstrate the vertical and horizontal disposition of peritoneum on the model of abdomen and pelvis.
- Demonstrate the attachment of greater & lesser omentum in the given model.
- Demonstrate the differences in arrangement of peritoneum in males and females in the given model of pelvis
- Explain peritoneal infection, adhesions & anatomical basis of spread of pathological fluid in various peritoneal compartments along with their surgical approach
- Describe the basis of peritoneal pain with reference to its parietal and visceral layers

5.	Abdominal esophagus	SDL	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe abdominal esophagus regarding its relations, blood supply, nerve supply and lymphatic drainage.
- Describe the anatomical basis of bleeding esophageal varices.

6.	Stomach	SGD	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Demonstrate the position & gross features of the stomach on the given model and identify the omenta attached.
- Describe the blood supply, nerve supply and lymphatic drainage of stomach
- Enumerate the structures lying in stomach bed
- Explain gastric and peptic ulcers with reference to their common locations and blood vessels endangered as a consequence of perforation
- Summarize the anatomic impediments to Nasogastric Tube Passage.

7.	Small intestine	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe the gross features, relations, blood supply, nerve supply and lymphatic drainage of various parts of small intestine
- Differentiate between gross features of jejunum and ileum in tabulated form.
- Explain the common sites and the effects of perforation of ulcers affecting different parts of duodenum applying your knowledge of gross anatomy.

8.	Large intestine	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Differentiate between small and large intestine on gross inspection
- Explain the topographic Anatomy of large intestine with the help of a model
- Explain the clinical importance of variable positions of appendix with anatomical reasoning.
- Analyze the clinical presentation of a scenario of appendicitis applying your knowledge of gross anatomy
- Define diverticulosis, volvulus, intussusception, cecostomy & colostomy.

9.	Blood supply of intestinal tract	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe coeliac trunk with reference to its origin, branches and distribution
- Describe superior mesenteric artery with reference to its origin, branches and distribution
- Describe inferior mesenteric artery with reference to its origin, branches and distribution
- Explain the clinical problems occurring due to occlusion of GIT blood vessels.

10.	Hepatic portal system	SGD	Dr Fauzia Siraj Dr Bushra Mohsin	Must know

			Dr Urwah	
Learning Outcomes: ● Describe the formation, relations, significance & tributaries of portal vein. ● Describe the sites of portosystemic shunts mentioning the names of veins involved. ● Explain the role of portosystemic anastomosis in portal hypertension ● Explain the clinical manifestations of portal hypertension at various sites of Porto-systemic anastomosis.				
11.	**Liver**	**SGD**	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe the position, lobes, size, shape, coverings and ligaments of liver. ● Describe the dual blood supply, lymph drainage and nerve supply of liver ● Correlate the concept of hepatic lobectomy and segmentectomy with anatomical reasons ● Justify the preference of site for liver biopsy.				
12.	Hepato-biliary apparatus	SGD	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe the gross features, formation, relations and blood supply of Intra & Extrahepatic Biliary Systems ● Explain the anatomical basis of clinical presentation of gallstones and cholecystitis.				
13.	Pancreas	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe the location, parts, relations and ducts of pancreas. ● Describe the blood supply, nerve supply, lymphatic drainage of pancreas. ● Correlate the clinical scenario of obstructive jaundice with pancreatitis, obstruction of hepatopancreatic ampulla, cancer of head of pancreas & bile duct. ● Justify the referred pain of acute pancreatitis with anatomical reasoning.				
14.	Spleen	SDL	Dr Fauzia Siraj Dr Ayesha Yasser Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe location, relations, blood supply, nerve supply & lymphatic drainage of spleen. ● Justify the direction of splenomegaly with anatomical knowledge of its ligaments ● Justify the possibility of splenic rupture in case of fracture of lower left ribs				
15.	Skills	SGD	Dr Fauzia Siraj Dr Bushra Mohsin	Must know

			Dr Urwah	
Learning Outcomes: ● Identify the various organs, impressions, ligaments, nerves, muscles, blood vessels related to digestive system on given models and prosected specimens.				
16.	Surface marking	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know
Learning outcomes: ● 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: ● Stomach ● Liver ● Pancreas ● Duodenum ● Spleen ● Large intestine ● McBurney's point				
SPECIAL HISTOLOGY				
17	Introduction to GIT histology	LGIS	Dr Nomana Mahmood	Must know
Learning outcomes: ● Describe the general structural plan of alimentary canal				
18	Histology of esophagus	LGIS	Dr Nomana Mahmood	Must know
Learning outcomes: ● Describe the histomorphological features of esophagus ● Differentiate between 3 parts of esophagus microscopically				
19	Histology of stomach	LGIS	Dr Nomana Mahmood	Must know
Learning outcomes: ● Differentiate between a gastric gland and pit ● Enumerate cells forming gastric glands ● Describe the structure and function of cells forming gastric glands ● Compare the histological structure of cardia, fundus and pylorus of stomach ● Correlate a case of gastritis with pernicious anemia on the basis of histology.				
20	Histology of small intestine	LGIS	Dr Nomana Mahmood	Must know
Learning outcomes: ● Describe the mucosal modifications of small intestine for carrying out its functions effectively (adaptive measures) ● Describe the light microscopic structure of duodenum, jejunum and ileum ● Tabulate the histological differences between duodenum, jejunum and ileum				
21	Histology of large intestine	LGIS	Dr Nomana Mahmood	Must know
Learning outcomes:				

- Describe the histological structure of large intestine
- Justify the increase in number of goblet cells in comparison with the decrease in the absorptive cells down the tract.

22	Histology of liver and gallbladder	LGIS	Dr Nomana Mahmood	Must know

Learning outcomes:

- Describe the histological structure of liver & gallbladder
- Correlate the common clinical conditions of liver with their normal histological features

23	Histology of pancreas	LGIS	Dr Nomana Mahmood	Must know

Learning outcomes:

- Describe the light microscopic structure of pancreas

SPECIAL EMBRYOLOGY

24	Development of foregut	LGIS	Dr Uzma Shahid	Must know

Learning outcomes:

- List derivatives of foregut
- Describe the development of esophagus
- Explain the embryological basis of the tracheo- esophageal fistula, esophageal atresia and hiatal hernia
- 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 the embryological basis of pyloric stenosis
- Describe the development of duodenum
- Describe the development of liver, biliary apparatus and spleen
- Explain the embryological basis of accessory hepatic ducts, duplication of gall bladder, extra and intra-hepatic
- Explain the development of pancreas
- Explain the embryological basis of Annular pancreas and accessory pancreatic tissue.

25	Development of midgut	LGIS	Dr Uzma Shahid	Must know

Learning outcomes:

- List 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
- Correlate development of midgut with abnormalities of mesenteries, vitelline duct abnormalities, gut rotation defects, gut atresia & stenosis
- Differentiate between omphalocele, umbilical hernia and gastroschisis on the basis of embryology

26	Development of hindgut	LGIS	Dr Uzma Shahid	Must know

Learning outcomes:

- List derivatives of hindgut
- Describe the partitioning of cloaca and its consequences

● Describe the development of derivatives of anorectal canal				
27	Skill (Development of Digestive System)	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	
Learning outcomes: ● Identify parts of the developing digestive system on given models and diagrams.				

Practical

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Esophagus	Practical	Dr Ayesha Yasser	Must Know
Learning Outcomes: ● Identify a slide of esophagus under a microscope ● Illustrate its section on the journal ● List two points of identification				
2	Stomach	Practical	Dr Ayesha Yasser	Must Know
Learning Outcomes: ● Identify slides of different regions of stomach under light microscope ● Illustrate its section (fundus and pylorus) on the journal ● List two points of identification				
3	Small intestine	Practical	Dr Ayesha Yasser	Must Know
Learning Outcomes: ● Identify the slides of duodenum, jejunum and ileum under microscope. ● List two points of identification of each. ● Illustrate the microscopic structure of these structures in the journal				
4	Large intestine	Practical	Dr Ayesha Yasser	Must Know
Learning Outcomes: ● Identify the slides of appendix and colon under microscope ● List two points of identification of each ● Illustrate the microscopic sections of colon and appendix in the journal.				
5	Liver and gallbladder	Practical	Dr Ayesha Yasser	Must Know
Learning Outcomes: ● Identify the slides of liver and gall bladder under microscope ● List two points of identification of each ● Illustrate the microscopic structure of liver and gallbladder in journal				
6	Pancreas	Practical	Dr Fauzia Siraj	Must know
Learning Outcomes:				

- Identify the section of pancreas on given slide under microscope
- List two points of identification.
- Illustrate the histological structure of pancreas in journal

ANATOMY CBLs:

CBL-I: Liver Cirrhosis

A 54-year-old mechanic was admitted to the hospital because of severe epigastric pain and repeated episodes of vomiting of blood (hematemesis). His blood pressure was 90/40mmHg and his pulse rate was 120/min. The patient revealed that he had exhibited upper gastrointestinal bleeding on previous occasions, but never so profusely. He was a patient of hepatitis C infection for the past 5 years.

On Examination, the patient's skin and conjunctivae were jaundiced. His abdomen was enlarged and rounded, with protuberant umbilicus. Several bluish, dilated varicose veins radiated from his umbilicus, forming caput medusae.

Palpation revealed that the liver measured 14 cm indicating hepatomegaly and his spleen was palpable 3 cm below the left costal margin (splenomegaly).

During a proctoscopic examination internal hemorrhoids were observed. The USG abdomen showed ascites and his liver was nodular, portal vein diameter was increased. The investigations confirmed the diagnosis of cirrhosis of the liver.

Learning objectives:

- Describe the gross anatomy of the liver regarding its lobes, surfaces, relations, ligaments, peritoneal reflections, blood supply, nerve supply, lymphatic drainage and functions.
- Identify the impressions of surrounding structures of the liver on its visceral surface.
- Explain the intra hepatic and extra hepatic biliary apparatus.
- Describe the formation of portal veins. Enumerate its relations and tributaries.
- Describe the sites of porto-caval anastomosis with reference to the veins participating in each anastomosis.
- Describe portal hypertension. Justify its relation with cirrhosis of liver.

Reading References for CBL-1:

- Clinical Anatomy by regions, Richard S. Snell
- Moore Clinically Oriented Anatomy, Keith L. Moore
- Last's Anatomy

CBL-2: Case of Appendicitis.

A 35-year-old man is seen in the emergency with complaint of severe abdominal pain for the last 12 hours. The patient gives history that the pain began around his umbilicus and then shifted to the right lower part of the abdomen accompanied by nausea. Physical examination reveals rigidity in the right lower quadrant with positive psoas sign, cough reflex and rebound tenderness. Lab investigations reveals leukocytosis and unremarkable urine analysis. Ultrasound abdomen reveals localized ascites. The diagnosis of peritonitis after perforation of the appendix is made.

Learning objectives:

- Explain the division of the regions and quadrants of the abdomen with their contents.
- Justify the shift in location of the pain in this case.

- Interpret the anatomical basis of rigidity in the right lower quadrant, psoas sign, cough reflex and rebound tenderness.
- Enumerate the various positions of the appendix highlighting the location of referred pain if the appendix is retrocecal.
- Explain the innervation of peritoneum.
- How does the appendix differ from the rest of the colon histologically?
- Summarize the histological features of the appendix?
- What is the treatment of choice when appendicitis is confirmed?
- What is Mc Burny`s point?
- Summarize the most likely vulnerable nerves to be damaged in appendicitis.

Reading References for CBL-2:

- Clinical Anatomy by regions, Richard S. Snell
- Moore Clinically Oriented Anatomy, Keith L. Moore
- Last's Anatomy.
- The Developing Human Clinically Oriented Embryology, Keith L Moore

Learning Resources:

Learning Resources:

- Clinical Anatomy by regions, Richard S. Snell
- Moore Clinically Oriented Anatomy, Keith L. Moore
- Medical histology by Laiq Hussain, 7th edition.
- Junqueira's Basic Histology
- Langman's Medical Embryology 14th edition.
- The Developing Human Clinically Oriented Embryology, Keith L Moore
  - William, Susan Stranding Gray's anatomy
  - Gray's Anatomy for students
  - Sinnatamby, C.S Last Anatomy

1. **Online resources**
   - E books
   - Online lectures
   - Google classroom
2. **Library resources**
   - Text and reference books
   - Handouts of lectures and CBLs

Teaching faculty

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Prof Dr Zubia Athar	zubiaathar@hotmail.com
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Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
• Assignments • Presentations • Low Stake Quizzes • Discussions in flipped classroom, SGD, SDL & CBL • Reflective writing	• Block Tests • (MCQs, SEQs, Viva voce) • OSPE/ Observed spotting on models & prosected specimens during viva voce • Logbook (long slide, CBLs, surface marking)

Physiology

Departmental/Subject learning Outcomes:

1. Explain various physiological processes involved in the normal functioning of the body. (PLOs 1,6,8)
2. Relate the interconnections of various organ systems in maintenance of homeostasis. (PLOs 1,6,8)
3. Interpret the effects of alterations in Physiological mechanisms in common clinical disorders. (PLOs 1,2,6,8)
4. Demonstrate common clinical and laboratory procedures to interpret their results. (PLOs 1,2,8)

Block learning Outcomes: By the end of the session, students will be able to

1. Appraise physiologic anatomy of gastrointestinal tract with specific focus on role of interstitial cells of Cajal.(SLO1 & SLO2)
2. Link the role of different factors in the generation of action potential in GI smooth muscle. (SLO1 & SLO2)
3. Analyze the interplay of autonomic and enteric nervous systems in GI functions. (SLO1 & SLO2)
4. Correlate the pathophysiology of mastication and deglutition with specified clinical presentation. (SLO2 & SLO3)
5. Correlate physiological basis of gastric functions with specified clinical conditions. (SLO2 & SLO3)
6. Categorize movements and functions of each part of the small intestinal in detail. (SLO1 & SLO2)
7. Correlate physiology of colon with specified clinical conditions. (SLO2 & SLO3)
8. Relate digestive functions of gallbladder with known diseases. (SLO2 & SLO3)
9. Explain the process and reflexes of defecation. (SLO1 & SLO2)
10. Discuss different hormones from G.I.T and their regulation. (SLO1 & SLO2)
11. Describe mechanism (stimuli, pathways, center) and clinical significance of vomiting reflex. (SLO1,2& SLO3)
12. Relate metabolic and non-metabolic functions of the liver with different functions of GIT. (SLO1 & SLO2)
13. Differentiate between types of jaundice on the basis of its physiology. (SLO2 & SLO3)

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Introduction to GIT physiology	Lectures/SGD/ CBL (Knowledge, critical thinking,	Dr. Sumaira Iqbal	Must Know

		communication skills, professionalism)		
Learning Outcomes: ● Discuss the physiologic anatomy of the gastrointestinal tract. (BLO1) ● Identify the role of interstitial cells of Cajal in the electrical activity of G.I smooth muscle. (BLO1)				
2	Action potential in GIT smooth muscles	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumaira Iqbal	Must Know
Learning Outcomes: ● Differentiate between slow wave potentials and spike potentials in GIT. (BLO2) ● Explain the role of other factors like stretch, & paracrine hormones in the generation of action potential in GI smooth muscle. (BLO2)				
3	Enteric Nervous System	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumaira Iqbal	Must Know
Learning Outcomes: ● Describe the organization of the enteric nervous system and elaborate its role in control of G.I function. (BLO3) ● Appraise the role of ANS in controlling the gut motility and secretions. (BLO3) ● Differentiate between myenteric and submucosal plexuses. (BLO3) Explain the autonomic control of G.I tract. (BL03)				
4.	Mastication and Swallowing	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumaira Iqbal	Must Know
Learning Outcomes: ● Discuss the mechanism of chewing reflex. (BLO4) ● Describe the process of swallowing. (BLO4) ● Enumerate different phases of swallowing reflex and be able to make its flow diagram. (BLO4) ● Elaborate different steps occurring in the involuntary phase of swallowing. (BLO4) ● Identify the effects of the pharyngeal phase of swallowing on respiration. (BLO4) ● Discuss how different types of peristalsis in the esophagus are taking place. (BLO4) ● Identify the importance of esophageal sphincter. (BLO4)				

- Discuss the disorders of swallowing (dysphagia, achalasia).(BLO4)
- Explain the pathophysiology of achalasia cardia.(BLO4)

5	Function of stomach/Gastric Emptying	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumaira Iqbal	Must Know

Learning Outcomes:

- Enlist and discuss different functions of the stomach. (BLO5)
- Discuss the role of basic electrical rhythm in regulation of G.I motility. (BLO5)
- Discuss the process and phases of stomach emptying. (BLO5)
- Explain the different factors regulating stomach emptying. (BLO5)
- Enlist different hormones secreted in the stomach. (BLO5)
- Explain disorders of the stomach. (BLO5)
- Describe the mechanism of development of peptic ulcers. (BLO5)
- State the mechanism for damage to the gastric mucosal barrier by aspirin, bile acids, and Helicobacter pylori.(BLO5)

6	Movement of small Intestine	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr Hina Umair	Must Know

Learning Outcomes:

- Enlist secretory functions of the small intestine. (BLO6)
- Differentiate between propulsive and mixing movements of the small intestine. (BLO6)
- Identify the role of ileocecal valve. (BLO6)
- Describe different disorders of small intestine .(BLO6)

7	Movement of Large intestine	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must Know

Learning Outcomes:

- Categorize different functions of the large intestine. (BLO7)
- Compare the propulsive and mixing movements taking place in the colon. (BLO7)
- Identify the role of gastrocolic and duodenocolic reflexes in regulation of mass movements. (BLO7)

- Enlist the secretory functions of the large intestine and its nervous control. (BLO7)

8	Physiology of Gallbladder	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must Know

Learning Outcomes:

- Enlist and explain the main functions of Gallbladder. (BLO8)
- Identify the factors affecting emptying of the Gallbladder. (BLO8)
- Explain known diseases of Gallbladder. (BLO8)

9	Defecation Reflex	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must Know

Learning Outcomes:

- Explain the process of defecation. (BLO9)
- Explain the pathway of defecation reflex with the help of a flow diagram. (BLO9)
- Enlist and explain different types of defecation reflexes. (BLO9)
- Describe the pathophysiological basis of megacolon. (BLO9)

10	Hormones of GIT	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr Hira	Must Know

Learning Outcomes:

- Classify different types of G.I hormones. (BLO10)
- Discuss the sites of secretion and stimuli for secretion of different hormones from G.I.T and their regulation. (BLO10)

11.	Vomiting Reflex	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr Hina Umair/ Dr Hira	Must Know

Learning Outcomes:

- Enumerate the factors leading to the process of vomiting. (BLO11)
- Identify the location of the vomiting center in the brain. (BLO11)
- Comprehend the vomiting reflex and make its flow diagram. (BLO11)

• Discuss the role of the chemoreceptor trigger zone for initiating vomiting. (BLO11)				
12.	Functions of Liver	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must Know
Learning Outcomes: • Enlist different functions of the liver. (BLO12) • Elaborate the metabolic and non-metabolic functions of the liver and correlate with different functions of GIT. (BLO12)				
13.	Jaundice	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must Know
Learning Outcomes: Identify and differentiate the types of jaundice and discuss physiological basis of each type. (BLO13)				

LIST OF PRACTICALS

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	General Physical Examination (GPE)	SGD (Knowledge, critical thinking, demonstration skill/clinical skills, communication skills, professionalism)	Dr. Atayyab Shaukat	Must know
Learning Outcomes: • Enlist the components of GPE. • Describe the aspects of general appearance. • Identify the five major vital signs. • Demonstrate GPE.				
2	Calculate body mass index (BMI) & Waist Circumference	SGD (Knowledge, critical thinking, demonstration skill/clinical skills, communication skills, professionalism)	Dr. Hira	Must Know
Learning Outcomes:				

- Define BMI.
- Explain clinical significance of BMI.
- Calculate personal BMI.
- Categorize BMI according to WHO classification.
- Identify underweight, normal weight, overweight and obese persons based on BMI

3	Recording Body Temperature	SGD (Knowledge, critical thinking, demonstration skill/clinical skills, communication skills, professionalism)	Dr Khalid	Must Know

Learning Outcomes:

- Define temperature.
- Explain the response of the body when it is exposed to severe cold or heat.
- Label different parts of the clinical thermometer.
- Describe the procedure of recording body temperature.

4	Examination of Abdomen	SGD (Knowledge, critical thinking, demonstration skill/clinical skills, communication skills, professionalism)	Dr Atayyab	Must Know

Learning Outcomes:

- Examine the abdomen on SP following the correct sequence of inspection, palpation, percussion and auscultation.

CBLs

CBL No 1: Achalasia

A 49 years old man presented in OPD with complaints of digestive problems. He had difficulty swallowing both solids and liquids and occasionally regurgitated them. The problem is more noticeable when he is under stress or when he eats too fast. He had the feeling that food is stuck in his esophagus and is not going down. He lost 10 pounds in the last 2 months. After physical examination the physician advised barium swallow. The report suggested that he had achalasia. He was advised to proceed to physically dilate LES.

Learning objectives:

By the end of the session, student should be able to:

1. Discuss the given case scenario.
2. Outline the details of electrical activity of GIT.
3. Explain the enteric nervous system.
4. Explain peristalsis, law of gut and its significance.
5. Summarize the role of esophageal peristalsis in normal swallowing.
6. Explain in detail the phases of swallowing.
7. Comment on events occurring at LES and their timing.

CBL No 2: Peptic Ulcer

A 44-year-old woman presented with a 1-month history of intermittent, burning epigastric abdominal pain that was moderately severe in intensity. Her pain radiated toward her back in a band-like fashion. She also noted nausea and vomited once, with the vomit consisting of food particles. The patient denied having signs and symptoms of melena and hematemesis. Her medical history was significant for gastritis, and the patient had had multiple endoscopies in the past 6 years. It was learned that she had 2 clean-based antral ulcers 5 years prior and was started on lansoprazole, which she could not afford and so was switched to omeprazole, which she used intermittently. She also admitted to past use of over-the-counter analgesics. After thorough history and workup, she was diagnosed with Peptic Ulcer.

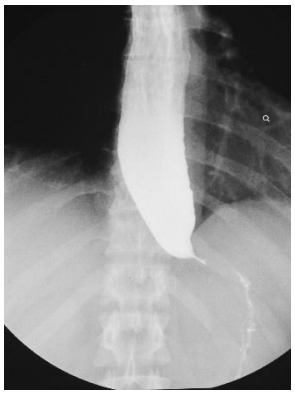
Learning objectives:

By the end of the session, student should be able to:

1. Discuss the given case scenario.
2. Explain the pathophysiology of peptic ulcer disease.
3. Summarize the functions of stomach
4. Explain the factors affecting gastric emptying.
5. Outline the secretion of different hormones taking place in the stomach.
6. Summarize the regulation of HCl secretion.

CBL No 3: Megacolon

A 12-month-old boy with past medical history significant for constipation and gastroesophageal reflux presented to our emergency room with symptoms of persistent vomiting over a 2-day period. His abdominal exam was significant for severe distention. Patient was admitted for further evaluation and management. An upper gastrointestinal study with oral contrast revealed normal anatomy. An abdominal x-ray was obtained that revealed a large amount of retained barium contrast within moderately dilated descending and severely dilated proximal sigmoid colon. A surgical consultation was placed, and the patient underwent a full-thickness rectal biopsy that revealed absence of ganglion cells and abnormal acetylcholinesterase staining confirming the diagnosis of Hirschsprung's disease (HD).



Learning objectives:

By the end of the session, student should be able to:

1. Discuss the given case scenario.
2. Comment on myenteric plexus in light of the above case.
3. Summarize the control of ileocecal valve.
4. Discuss basic movements of the large intestine.
5. Summarize the defecation reflex.

Teaching faculty contact:

Email address : physiologywmc@gmail.com

1.Learning Resources:

- Human Physiology 9th Edition by Sherwood
- Ganong's Review of Medical Physiology, 25th Edition

- BRS Physiology ,5th edition by Linda S.Costanzo
- A textbook of practical physiology,8th edition by CL Ghai
- Guyton and hall review ,3rd edition

2.Online resources

- Google classroom
- Understandingphysiology.wordpress.com

3.Library resources:

- Guyton and Hall Textbook of Medical Physiology (14th Edition)
- Human Physiology 9th Edition by Sherwood
- Ganong's Review of Medical Physiology, 25th Edition
- BRS Physiology ,5th edition by Linda S.Costanzo 50
- A textbook of practical physiology,8th edition by CL Ghai
- Guyton and hall review ,3rd edition

Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
CBL Case Discussion CBL Quiz Class Discussion Flipped Class Format Reflective writing	MCQs SEQs OSPE VIVA

Biochemistry

Block learning Outcomes (SLO 1 and 2):

- Explain the chemistry of Gastrointestinal secretions, digestion and absorption of macromolecules and biochemical disorders of GIT.
- Explain the chemistry of Gastrointestinal secretions,
- Describe the digestion and absorption of macromolecules and biochemical disorders of GIT.
- Describe the names and role of hormones in functioning of GIT.
- Classify and explain different Carbohydrates along with their clinical and biomedical importance
- Describe primary and secondary metabolism of Glucose
- Describe secondary metabolism of disaccharides and monosaccharides other than Glucose
- Apply the knowledge of carbohydrate metabolism for understanding relevant metabolic disorders
- Illustrate regulation of blood glucose level and diabetes mellitus
- Compare the role of different body organs in integration of metabolism in health and disease
- Appraise the nutritional requirements of each food constituent for better understanding of relevant disorders.
- Outline nutritional requirements in different commonly occurring disorders.
- Review hazards of “under and over nutrition".

Sr. No.	Topic	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Biochemistry of Digestive Tract	LGIS/ CBL	Dr. Rabbiah Manzoor Malik	Must Know
Learning Outcomes: ● Describe the composition, functions, daily secretion, stimulants and depressants of Saliva Gastric Juice, HCl Pancreatic Juice, Bile juice & Succus entericus, GIT hormones (gastrin, secretin, CCK). ● Discuss the digestion and absorption of Carbohydrates, Proteins, Lipids & Nucleic acids in the human body. ● Describe the biochemical disorders of GIT, e.g. achlorhydria, peptic ulcers, lactose intolerance, cholelithiasis and related disorders				
4	Integration and regulation of Metabolic Pathways in Different Tissues	LGIS/ CBL/SGD/SDL	Dr. Zahid Mehmood	Must Know

Learning Outcomes:

- Discuss regulatory effects of Insulin and Glucagon on CHO metabolism.
- Describe the regulation of Blood Glucose in the human body.
- Explain Hyperglycemia, hypoglycemia and their regulating factors.
- Describe the Diabetes Mellitus, its Laboratory findings, Diagnosis, and biochemical complications.
- Describe Feed fast cycle and explain its adaptation by different tissues to changing energy conditions of the body.
  Describe the Integration and regulation of Metabolic Pathways in Different Tissues.

10	**Nutrition**	LGIS/ CBL/SGD/SDL	Dr. Anas Khalil	Must Know

Learning Outcomes:

- Give the caloric requirements of the human body
- Define Balanced Diet and elaborate various DRIs (EAR, DA, AI, UL), AMDR
- Explain the nutritional requirements in Pregnancy, Lactation, new-born and in nutritional disorders, hypertension, diabetes, cirrhosis, end stage renal disease
- Describe Protein turnover, amino acid Pool, Nitrogen Balance, BMR, BMI, Respiratory quotient, Protein Quality and Glycemic Index.
- Describe the nutritional requirement and biomedical importance of CHO, lipid & protein in human body
- Define Malnutrition. Discuss Protein energy Malnutrition in particular
  Compare and contrast between Marasmus and Kwashiorkor

24	Chemistry of Carbohydrates	LGIS/ CBL	Dr. Zahid Mehmood	Must Know

Learning Outcomes:

- Classify Carbohydrates and explain their Biochemical functions.
- Discuss the structure and functions of Monosaccharides and enumerate their various derivatives
- Explain the structure and functions of Disaccharides with examples
- Describe Oligosaccharides and their combination with other macromolecules.
- Enumerate important examples of Polysaccharides and give their biochemical role.
- Outline the Phases reactions of Glycolysis and regulation of Glycolysis.

29	Metabolism of Carbohydrates	LGIS/ CBL	Dr. Zahid Mahmood	Must Know

Learning Outcomes:

- Describe the bioenergetics of Aerobic and Anaerobic glycolysis and their biochemical importance.
- Discuss fate of Lactic acid & Pyruvate.
- Draw Cori's cycle.
- Outline the Citric Acid Cycle-Reactions
- Describe the energetics, regulation, importance and amphibolic nature of citric acid cycle.

- Discuss Gluconeogenesis & state the three important bypass reaction & significance of gluconeogenesis
- Compare and contrast Glycolysis & gluconeogenesis
- Discuss the Glycogen Metabolism & Write down the reactions of Glycogenesis and glycogenolysis.
- Outline the importance of UDP- Glucose & regulation of Glycogen metabolism
- Describe the disorders of Glycogen metabolism (Glycogen Storage Diseases).
- Compare and contrast Glycogenesis and glycogenolysis
- Describe Hexose Monophosphate Shunt, its reactions and importance.
- Explain Glucuronic acid pathway, its reactions and importance.
- Describe the metabolism of Fructose, Galactose and Lactose.

Reference Books:

i. Harper's Biochemistry
ii. Lippincott's Biochemistry
iii. Principles of Biochemistry by Mushtaq Ahmed
iv. Medical Biochemistry by Chatter Jea
v. Hashmi's Textbook of Medical Biochemistry by Mukhtar Ahmed Hashmi
vi. Mark's Biochemistry

CBLs

CBL 1:

Topic: Biochemistry of Digestive Tract (Lactose Intolerance)

A 30 year old white man from the British embassy reported bloating, abdominal pain and diarrhea for 3 hours.He was a known patient of IBD and a careful history revealed ingestion of ice cream just before the onset of symptoms. Attending physician suspected lactose intolerance (not adult hypolactasia) and advised the patient on a lactose free diet after symptomatic management.

Related Lab Investigations:

TestName	Result	NormalValues
Hydrogen breath Test	Hydrogen30 ppm after 1.5 hrs of ingestion of ice cream 50g lactose	Less than20 ppm
Stool RE	Normal study	Normal study

Lactase is an intestinal brush border enzyme which hydrolyzes disaccharide lactose to glucose and galactose. Its expression is maximum in infants and gradually decreases with advancing life in most people of non-European ancestry.More Than 70-90 percent people of Caucasians, Africans and American ancestry exhibit a decline in lactase expression also called adult hypolactasia. Moreover some GIT diseases which affect mucosa like, IBD (Crohn's Disease),

short bowel syndrome, malnutrition, sprue etc may also lead to lactase deficiency. Ingested lactose is neither digested or absorbed and passes to the colon where bacterial fermentation of lactose produces gas and organic acids. Organic acids osmotically draw water and cause increased peristalsis, cramps and diarrhea. The treatment and prevention rely on lactose free diet.

Learning Objectives:

1. Explain Digestion and absorption of carbohydrates
2. Describe biochemical cause of Lactose intolerance
3. Enlist other diseases related to digestion and absorption of carbohydrates

CBL 2:

Topic: Pyruvate Kinase deficiency

A two year old girl was referred to a hematologist after her pediatrician found her to be severely anemic with splenomegaly and jaundice. Her mother gave a possible history of "blood problem "in her family but did not know for sure. Her complete blood count revealed normal hemoglobin with normocytic anemia. The platelet and white cell count was normal. On the peripheral smear there were many bizarre erythrocytes including spiculated cells. A diagnosis of Pyruvate Kinase deficiency was made.

Explanation

The normal erythrocyte lacks mitochondria and is completely dependent on glycolysis for production of ATP. ATP is required to meet the metabolic needs of the RBCs and to fuel the pumps necessary for the maintenance of the biconcave, flexible shape of the cell, which allows it to squeeze through narrow capillaries. The anemia observed in glycolytic enzyme deficiencies is a consequence of the reduced rate of glycolysis, leading to decreased ATP production. The resulting alterations in the red blood cell membrane lead to changes in the shape of the cell and, ultimately, to phagocytosis by the cells of the reticuloendothelial system, particularly macrophages of the spleen. Th premature death and lysis of red blood cells results in hemolytic anemia.

Learning Objectives:

1. Describe reactions of Glycolysis
2. Comprehend biochemical mechanism of Reduction of Pyruvate to Lactate
3. Elaborate Fates of pyruvate and hormonal regulation of glycolysis
4. Describe detailed mechanism of transportation through Glucose Transporters

CBL 3:

Topic: Carbohydrate Metabolism (G6PD deficiency)

A 23 year old boy was prescribed Septran (**sulfamethoxazole** and trimethoprim) and **paracetamol** for urinary tract **infection** and fever (10 hrs. history of symptoms). After two days the boy presented again with sub-siding initial symptoms but **lethargy, fatigue, dyspnea and**

slight pallor. His lab investigations are given in the table below. Doctor suspected **G6PD deficiency** which was confirmed by genetic analysis later.

Related Lab Investigations:

Test Name	Result	NormalValues
Hemoglobin	9g/Dl	12–17 g/Dl
RBCs	$3.2x\ 10^6$	$4.1–5.6x10^6/\mu L$
PCV (hematocrit)	28	35-50%
MCV	84	80-98fL
MCH	28	27-34pg
MCHC	30	32-36 g/dL
WBCs	$13x\ 10^3/\mu L$	$4\text{-}11\ x\ 10^3/\mu L$
Fluorescent spot test (Butler test)	Positive	Negative

Glucose6-phosphate dehydrogenase (G6PD) deficiency is an inherited disease characterized by **hemolytic anemia** caused by the inability to detoxify oxidizing agents. G6PD deficiency is the most common disease-producing enzyme abnormality in humans. Diminished G6PD activity impairs the ability of the cell to form the **NADPH** that is essential for the maintenance of the **reduced glutathione pool**. This results in a decrease in the cellular **detoxification of free radicals and peroxides** formed within the cell. Glutathione also helps maintain the reduced states of sulfhydryl groups in proteins, including hemoglobin. Oxidation of those sulfhydryl groups leads to the formation of denatured proteins that form insoluble masses (called **Heinz bodies**) that attach to the red cell membranes.

Learning Objectives:

1. Describe HMP shunt and its importance
2. Describe Sources of NADPH and its Uses in human body

CBL 04

Topic: Diabetes Mellitus:

A 19-year-old marine was brought to the infirmary after passing out during basic training. He had repeatedly complained of severe weakness, dizziness, and sleepiness during the preceding 4 weeks of boot camp. In a previous episode 3 weeks earlier, he had drowsiness and generalized tiredness, and was brought to the infirmary, where after IV administration of saline, he was returned to duty with the diagnosis of dehydration. Upon questioning, he reported unquenchable thirst, and the repeated need to urinate. Although he ate all of his rations as well as whatever he could get from his fellow trainees, he had lost 19 pounds. (Baseline body weight was 150 pounds, height 5'8"). On the last day, he complained of vague abdominal pain, which was worse on the morning of admission. He had vomited once. During examination, he was oriented but tachypneic. He appeared pale, dehydrated with dry mucous membranes, and poor skin turgor. His respiratory rate was 36/minute with deep, laborious breathing; his heart rate was 138/minute regular, and his blood pressure was 90/60. His chest was clear, heart tones were normal. There

was an ill-defined generalized abdominal tenderness, which was otherwise soft to palpation and showed no rebound. There was a generalized muscular hypotonia; his deep tendon reflexes were present but very weak. Laboratory, on admission, showed glucose of 560 mg/dl, sodium 154, potassium 6.5, pH 7.25, bicarbonate 10 mM/liter, chloride 90, BUN 38 mg/dl, creatinine 2.5 mg/dl. (Normal values: glucose, 70-114 mg/dl; Na = 136-146; K, 3.5-5.3; Cl, 98-108; CO2, 20-32 [all in mM/l]; BUN, 7-22mg/dl; creatinine, 0.7-1.5 mg/dl). A urine sample was 4+ for glucose and had "large" acetone. HbA1c was 14% (n=4-6.2%). Serum acetone was 4+ undiluted, and still positive at the 4th dilution. Beta-Hydroxybutyrate level was 20 millimoles/liter (normal=0.0-0.3 mM/l).

He was treated with insulin and saline I.V. By the 4th hour of treatment, potassium chloride was added to the IV at a rate of 15 mEq/hour. Sixteen hours later, he was active, alert, well hydrated and cheerful, indicating he felt extremely well. He requested that his IV be discontinued. His physician decided to switch his insulin to subcutaneous injections and to start a liquid diet. He was later put on a diabetes maintenance diet and treated with one injection of Human Lente insulin in the morning. Although his blood sugars the next morning were 100-140 mg/dl, he had frequent episodes of hypoglycemia during the day, and his HbA1c was 9%. Eventually, he was put on 3 injections of regular insulin/day, and a bedtime intermediate duration (Lente) insulin.

Questions

1.Why did the patient improve after being given IV saline in his first admission?

2. Why was dyspnea his presenting symptom?

3. He was hyperkalemic on admission, and yet, why was potassium later added to the IV infusion?

4. What is the possible reason why a single injection of insulin in the morning failed to control his diabetes without causing hypoglycemia?

Learning Outcomes:

After attending the session students should be able to:

- Describe the Diabetes Mellitus, its Laboratory findings, Diagnosis and biochemical complications.

REFERENCE BOOKS:

1. Harper’s textbook of Biochemistry
2. Hashmi’s Textbook of Medical Biochemistry
3. Medical Biochemistry by Chatter Je
4. Mushtaq’s Biochemistry Volume II

Practicals

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Estimate and clinically interpret plasma level of enzyme Amylase				
2	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know

Learning Outcomes: ● Analyze Carbohydrates qualitatively-I Molisch test, Benedict's test				
3	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Analyze Carbohydrates qualitatively -II Iodine Test, Salivenoff Test Fehling's test				
4		Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Estimate and clinically interpret the level of Glucose in blood				
5	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Interpret Diet Chart and Calculate BMI				

8. Structured Summary of Y2BIV- MIX

Block Code	Y2BIV- MIX
Prerequisite	**Y2BIV- MVIII**
Duration	07 Weeks
Rationale	This module aims to form the basis of knowledge and skills related to the Anatomy, Physiology and Biochemical aspect of the genitourinary system. It is of 7 weeks duration and focuses on histo-morphological and embryological structure as well as physiological and biochemical functioning of the genitourinary system. It is part of the second-year integrated curriculum at WMC.
Anatomy	The gross anatomical, developmental & light microscopic features of the genitourinary system.
Physiology	Genitourinary System (Renal Physiology, Reproductive System)
Biochemistry	Body Fluids + Water & Electrolyte, Acid base balance, Biochemistry of reproductive system
Surgery & Radiology	Ureteric colic & BPH + Imaging
Medicine	Renal failure
Research Methodology	Research designs, Study samples, Ethical issues related to health research

9. Course content

Anatomy

Module Learning outcomes:

1. Correlate the histomorphological features of tissues and organs of the genitourinary system with their functions.
2. Correlate the developmental events genitourinary system with common congenital anomalies
3. Interpret the topographic and radiographic anatomy of the genitourinary system and its presentations in common clinical conditions.

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Kidney and suprarenal glands	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe the gross features of kidney, relations and its coverings ● Illustrate 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 ● Describe the possible routes of spread of perinephric abscess ● Explain the anatomical basis of typical renal colic ● 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.				
2	Ureter	SDL	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know
Learning Outcomes: ● Describe the gross features, relations, & course of both ureters on the model / specimen while emphasizing upon its constrictions. ● Describe the blood and nerve supply of ureter. ● Explain the anatomical basis of ureteric stone impaction and referred pain of ureteric colic.				
3	Lumbar vertebral column and nerves of posterior abdominal wall	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe the fascia of posterior abdominal wall
- Distinguish lumbar vertebrae from cervical & thoracic vertebrae
- Describe anatomical features of a typical lumbar vertebra

4.	Muscles of posterior Abdominal wall	SDL	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Tabulate the origin, insertion, nerve supply and actions of muscles of posterior abdominal wall.
- Describe the fascial lining of the abdominal walls.
- Analyze the anatomical basis of a case of psoas abscess and its spread.

5.	Major vessels of Posterior abdominal wall	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Urwah	Must know

Learning Outcomes:

- Describe the extent, relations and branches of abdominal aorta along with their distribution.
- 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.
- Define aortic aneurysm.
- Identify the common site of abdominal aortic aneurysm.

6.	Lymphatic drainage of Abdomen	SDL	Dr Fauzia Siraj Dr Bushra Mohsin Dr Maryam	Must know

Learning Outcomes:

- Name the groups of lymph nodes draining the abdomen.
- Describe the terminal group of lymph nodes around abdominal aorta
- Describe the lymphatic trunks, cisterna chyli & commencement of the thoracic duct.
- Differentiate between the location and area of drainage of pre and para-aortic lymph nodes
- Explain the continuity of the abdominal lymphatic system with other regions with reference to spread of malignancy and infection of various abdominal organs.

7.	Pelvic walls	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Maryam	Must know

Learning Outcomes:

- Describe the boundaries of true and false pelvis.

- Explain the bony landmarks & sites of muscular attachments on sacrum
- List the anatomical landmarks measured while performing internal pelvimetry
- Justify occurrence of low back pain in sacroiliac joint disease
- Describe the type, articulations, ligaments & movements of joints of pelvis.
- List the structures commonly injured in a patient of pelvic fracture.
- 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.

1.	Pelvic organs	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Maryam	Must know

Learning Outcomes:

- Describe relation, blood supply, lymphatic drainage and nerve supply of sigmoid colon
- Describe the relations, peritoneal reflections, curvatures, blood 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
- Describe the blood supply, nerve supply, lymphatic drainage of ovaries and fallopian tubes
- Explain the procedure most commonly used to check the patency of the uterine tubes.
- Explain the ligation of uterine tubes, ectopic tubal pregnancy.
- Describe the parts, ligaments, relations and supports of uterus
- Describe blood supply, nerve supply, & lymphatic drainage of uterus
- Describe the normal and abnormal positions of the uterus in relation to vagina.
- Comprehend a case of uterine prolapse on the basis of gross anatomy of uterus and its supports.
- Define hysterectomy and explain the precautionary measures to be taken necessarily during this procedure
- Identify the anatomical routes for spread of malignancies of uterus, cervix and ovary
- Illustrate sacral plexus showing its branches
- List the branches of internal iliac artery
- Enumerate different groups of lymph nodes of the pelvis.
- Explain the role of lymphatics and lymph nodes in spread of malignancies of pelvis

9.	Perineum	SGD	Dr Fauzia Siraj Dr Bushra Mohsin Dr Maryam	Must know

- **Learning Outcomes:**
- Define perineum. Identify its borders, relations & divisions

- 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. List structures attached with it. Justify its clinical importance
- Describe the relations, internal features, blood supply, lymphatic drainage, & innervation of anal canal
- Differentiate between clinical presentation of internal and external hemorrhoids on anatomical basis
- Elucidate perianal hematoma, fissure, abscess and fistulas of anal canal with anatomical basis of their occurrence and presentation
- Justify the anatomical reasoning of anorectal incontinence
- 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, & list steps of pudendal nerve block
- Describe the gross features of vagina including relations, blood supply, nerve supply & supports
- Apply the anatomical knowledge in analyzing a case of vaginal prolapse (cystocele and rectocele, and vaginal fistula)
- Define culdocentesis and describe its diagnostic and therapeutic importance
- Explain gross features of all parts of male & female urethra, its arterial supply, 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
- List the anatomical structures encountered while performing urethral catheterization
- List parts of external genitalia and describe their blood and nerve supply
- Provide the anatomical basis of presentation of Bartholin cyst.

Special Histology				
10	Histology of Kidney	LGIS	Dr Nomana Mahmood	Must know

Learning Outcomes:

- 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
- List the components forming filtration membrane and juxtaglomerular apparatus
- Differentiate between cross section of PCT and DCT

11	Histology of ureter and urinary bladder	LGIS	Dr Nomana Mahmood	Must know

Learning Outcomes:

- Describe the light microscopic structure of ureter (upper and lower parts) and urinary bladder

	Histology of male Reproductive system	LGIS	Dr Nomana Mahmood	Must know

- **Learning Outcomes:**
- Describe the histological features of testes and correlate the blood testes barrier with its functions.
- Explain the light microscopic features of male genital ducts.
- Explain the light microscopic features of accessory glands of the male reproductive system
- Apply the knowledge of histology to explain the clinical scenarios of
  - Immotile Cilia Syndrome,
  - Benign Prostatic Hypertrophy
  - Carcinoma of Prostate

12	Histology of female Reproductive system	LGIS	Dr Nomana Mahmood	Must know

Learning Outcomes:

- Describe the light microscopic features of following female reproductive organs
  - Ovaries
  - Fallopian tubes
  - Uterus
  - Cervix
  - Vagina
  - Mammary gland

Special Embryology

15	Development of urinary system	LGIS	Prof Dr Zubia Athar	Must know

- **Learning Outcomes:**
- List the sources of urinary system
- Interpret the following stages of development of kidneys briefly:
  - Pronephros
  - Mesonephros
  - 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:
  - Wilm's tumor
  - Horseshoe kidney
  - Pelvic kidney
  - Poly cystic kidneys

- Ectopic/accessory kidney
- Malrotated kidney
- Agenesis of kidney

- 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 anatomical relationship of ductus deferens with ureter with embryological reasoning
- Correlate various urachal anomalies, exstrophy of bladder and exstrophy of cloaca with normal development

14	Development of Reproductive system	LGIS	Dr Uzma Shahid	Must know

Learning Outcomes:

- Explain the indifferent stage of gonad development.
- Explain the development and descent of testis.
- Describe the embryological basis of cryptorchidism
- Explain the development of ovaries
- Describe the indifferent stage of genital ducts
- Enumerate the derivatives of
  - Mesonephric Duct,
  - Paramesonephric Duct
  - Urogenital Sinus in Males and Females.
- Explain the development of genital ducts in the male and female.
- Apply the knowledge of embryology to explain the following congenital anomalies:
  - Uterus didelphys
  - Uterus arcuatus
  - Uterus bicornis.
  - Vaginal atresia
- Describe the indifferent stage of external genitalia.
- Explain the development of external genitalia in the male and female.
- List common anomalies of the male genitalia.
- Describe the embryological basis of hypospadias and epispadias.
- Apply the knowledge of embryology to explain the basis and clinical presentation of the following disorders of sexual development:
  - Ambiguous genitalia
  - Hermaphrodites
  - Congenital adrenal hyperplasia.
  - Gonadal dysgenesis.

Practical

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Kidney	Practical	Dr Fauzia Siraj	Must know
Learning Outcomes: ● 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				
2	Ureter and urinary bladder	Practical	Dr Fauzia Siraj	Must know
Learning Outcomes: ● 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				
3	Histology of male reproductive system	Practical	Dr Maryam	Must know
Learning Outcomes: ● Identify, differentiate and illustrate the light microscopic structure of: ○ Testis ○ Epididymis ○ Vas deferens ○ Seminal vesicle ○ Prostate ● Write two points of identification ● Draw a labeled diagram of identified tissue on histology notebook				
4	Histology of female reproductive system	Practical	Dr Bushra Mohsin	Must know
Learning Outcomes: ○ Identify, differentiate and illustrate following components of female reproductive system. ○ Ovaries ○ Fallopian tubes ○ Uterus ○ Cervix ○ Vagina ○ mammary gland ● Write two points of identification ● Draw a labeled diagram of identified tissue on histology notebook				

ANATOMY CBLs:

CBL-3 An Integrated CBL: A Case of Renal Stones

A 52-year-old male presents to the emergency department with severe right flank pain radiating to the right lower quadrant. His blood pressure was 154/96, pulse rate was 79 bpm, respiratory rate was 24 breaths per minute and the temperature was 36.7° C. The pain was constant, lasting 3 hours in duration, and he had two episodes of emesis since its onset. For several hours prior to presentation, he noticed painful micturition with red-tinged urine.

His medical history included a similar pain in the left flank two years earlier. His abdomen was soft with diffuse tenderness which increased over the right lower quadrant. An abdominal radiograph reveals a right ureteric calculus, however, and an ultrasound confirms the stone to be of 6.5mm. He was discharged from the emergency department with the hope that he would then pass the stone naturally. Unfortunately, the following day, the patient returned reporting that the medications did not significantly affect his pain, and his referral to the urology department was expedited. A computerized tomography (CT) scan was subsequently obtained which revealed a 7mm calcific density in the right proximal ureter with associated moderate hydronephrosis and perinephric stranding. Multiple 1–2mm non-obstructing calculi were additionally noted in the left renal parenchyma. The patient was diagnosed with a right ureteric calculus. The consulting urologist concluded that because his symptoms were refractory to analgesics, and because the calculus was unlikely to pass on its own, emergency laser lithotripsy was indicated.

Learning objectives:

- Summarize important relations of the kidneys and the coverings that encase both kidneys.
- Identify the sites of anatomic narrowing of the ureter where stones may be arrested,
- Explain the anatomical basis of renal colic and the areas where this pain can be referred.
- Explain the mechanism of colicky pain.
- Describe the formation of dilute urine and the mechanism involved in urine concentration
- Define glomerular filtration rate and explain the factors effecting it.
- Explain dehydration and its role in formation of renal stones.
- Correlate serum calcium regulation with kidney stone formation
- Describe the role of acid base imbalance in formation of renal calculi.
- Enumerate different causes of recurring renal stones and advise workup for that
- Comprehend causes of acute kidney injury in this particular case.
- Name the condition in which urgent surgical intervention is needed.
- Briefly describe the management of renal /ureteric colic.
- Describe the stone preventive diet.

Reading References for CBL-3:

- Clinical Anatomy by regions, Richard S. Snell

- Moore Clinically Oriented Anatomy, Keith L. Moore
- Last's Anatomy
- Guyton and hall review ,3rd edition
- Medical Biochemistry By Mushtaq, Vol I, Lippincott's Biochemistry
- Bioenergetics-Lippincott's Biochemistry
- Davidson's Principles and Practice of Medicine 23rd Edition
- Campbel and Walsh Urology 11th edition.

CBL-4: Uterine prolapse& Professional Ethics

A 50-year-old woman visited the gynaecology OPD complaining of back pain, feeling of heaviness in pelvis and the sensation of something "coming down" her vagina, especially when she was standing. In addition, she was troubled by stress incontinence from coughing, sneezing, or lifting a heavy object. She also had a need to micturate frequently during the whole of the day.

The patient has six children, all born by vaginal delivery and had prolonged labor in the last three deliveries. This was her second visit to the gynecologist in a year, for the same problem. She was advised pelvic floor exercises in the last visit which she did not carry out regularly and she feels that her problems have aggravated. The general examination was unremarkable. Gynecological pelvic examination revealed a moderate downward bulging of the anterior vaginal wall that increased on straining. On examination while standing, the cervix of the uterus was found in the vagina, close to the vestibule. It recedes somewhat when the patient was supine but did not assume its normal position.

A diagnosis of 2nd degree uterine prolapse and cystocele was made. A vaginal hysterectomy and an anterior colporrhaphy were recommended. The patient asks you not to tell her husband and children.

Learning objectives:

- Define uterine prolapse, stress incontinence and cystocele.
- Describe the gross features of the uterus and vagina, along with the relations, blood supply, nerve supply and the lymphatic drainage.
- Demonstrate the peritoneal reflections of the pelvis and the uterus in the given model.
- Describe the ligaments and the supports of the uterus.
- Describe the anatomy of the pelvic diaphragm. Enlist muscles forming it.
- Justify the significance of pelvic diaphragm.
- Enlist structures that can prolapse and cause bulge in the anterior and posterior wall of vagina.
- Understand the ethical dimensions of patient privacy.

Reading References for CBL-3:

- Clinical Anatomy by regions, Richard S. Snell
- Moore Clinically Oriented Anatomy, Keith L. Moore
- Last's Anatomy
- Handbook of Behavioral sciences, Mowadat Rana - 3rd Edition.

Learning Resources:

- Clinical Anatomy by regions, Richard S. Snell

- Moore Clinically Oriented Anatomy, Keith L. Moore
- Medical histology by Laiq Hussain, 7th edition.
- Junqueira's Basic Histology
- Langman's Medical Embryology 14th edition.
- The Developing Human Clinically Oriented Embryology, Keith L Moore
- William, Susan Stranding Gray's anatomy
- Gray's Anatomy for students
- Sinnatamby, C.S Last Anatomy

3. **Online resources**
    - E books
    - Online lectures
    - Google classroom
4. **Library resources**
    - Text and reference books
    - Handouts of lectures and CBLs

Teaching faculty

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Dr Ayesha Yasser	Ayesha.yasser.a30@gmail.com
Dr Urwah	imurwahh@gmail.com

Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
• Assignments • Presentations • Low Stake Quizzes • Discussions in flipped classroom, SGD, SDL & CBL • Reflective writing	• Block Tests • (MCQs, SEQs, Viva voce) • OSPE/ Observed spotting on models & prosected specimens during viva voce • Logbook (long slide, CBLs, surface marking)

Physiology

Departmental/Subject learning Outcomes:

1. Explain various physiological processes involved in the normal functioning of the body. (PLOs 1,6,8)
2. Relate the interconnections of various organ systems in maintenance of homeostasis. (PLOs 1,6,8)
3. Interpret the effects of alternations in Physiological mechanism in common clinical disorders. (PLOs 1,2,6,8)
4. Demonstrate common clinical and laboratory procedures to interpret their results. (PLOs 1,2,8)

Block learning Outcomes:

By the end of the session, students will be able to

1. Relate pathophysiological basis of water balance in the body with its clinical implications (Dehydration, vomiting, hemorrhage, SIADH). (SLO2 & SLO3)
2. Elucidate edema types, clinical significance and factors responsible for causing edema. (SLO2 & SLO3)
3. Recognize functions of kidneys. (SLO1)
4. Correlate plasma clearance methods to quantify kidney functions. (SLO1 &SLO2)
5. Explain regulation of Blood Pressure. (SLO1 & SLO2)
6. Analyze the mechanical and neural control of the micturition process. (SLO1 & SLO2)
7. Analyze the process of urine formation, concentration and dilution. (SLO1 & SLO2)
8. Diagnose acid base disorders on clinical scenarios and arterial blood gas analysis. (SLO2 & SLO3).
9. Describe the male reproductive functions and related abnormalities. (SLO1 ,2& 3)
10. Describe the female reproductive functions and the related abnormalities. (SLO1,2,3)
11. Appreciate the physiological phenomenon underlying pregnancy, parturition and lactation. (SLO1,2)
12. Appreciate the physiological basis of fetal growth and neonatal adjustment to extrauterine life. (SLO1,2)

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Body fluid compartments -I	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must know
Learning Outcomes:				

- Explain total body water content and its distribution in different body compartments. (BLO1)
- Quantify daily intake and output of water from body. (BLO1)
- Compare and contrast the ionic composition of ECF and ICF. (BLO1)
- Explain the indicator dilution principle for the measurement of fluid volumes in the different body fluid compartments. (BLO1)

2	Regulation of fluid exchange between ICF &ECF	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must know

Learning Outcomes:

- Given the capillary and Bowman's capsule hydrostatic and oncotic pressures, calculate the net filtration force at the glomerular capillaries. (BLO1&2)
- Predict the changes in glomerular filtration caused by increases or decreases in any of those pressures. (BLO1&2)
- Explain the effects of adding isotonic, hypotonic and hypertonic solution (to
- ECF) on ICF and ECF compartments (BLO1&2)

3	Edema	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Hina Umair	Must know

Learning Outcomes:

- Explain the role of Starling forces in the development/prevention of edema. (BLO2)
- Correlate role of lymphatics with prevention of edema. (BLO2)
- Appreciate the significance of the edema safety factor. (BLO2)
- Discuss the mechanism of fluid accumulation in the potential spaces. (BLO2)
- Compare and contrast the intracellular and extracellular edema. (BLO2)

4	Functional anatomy of renal system	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- Given a cross section of a kidney, identify the renal cortex, medulla, calyces, medullary pyramids, renal pelvis, renal artery, renal vein, and ureter. (BLO3)
- Describe in sequence the tubular segments through which ultrafiltrate flows. (BLO3)
- Distinguish between cortical and juxtamedullary nephrons. (BLO3)

- Identify the structures of the glomerular tuft: the afferent and efferent arterioles, glomerular capillary network, mesangium, Bowman's capsule, and the juxtaglomerular apparatus (including macula densa). (BLO3)
- Enlist the functions of kidneys (BLO3&4)

5	Micturition	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr.Sumera Gul	Must know

Learning Outcomes:

- Identify the physiological anatomy and nervous connections of the bladder. (BLO6)
- Explain the filling of the bladder and bladder wall tone; the cystometrogram. (BLO6)
- Discuss the micturition reflex and facilitation or inhibition of micturition by the brain. (BLO6)
- Describe the abnormalities of micturition. (BLO6)

6	GFR	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- Describe the three layers comprising the glomerular filtration barrier, and identify podocytes, foot processes, slits, and the basement membrane. (BLO7)
- Describe the composition of the glomerular filtrate. (BLO7)
- Discuss the determinants of the GFR. (BLO7)
- Explain the physiological control of glomerular filtration and renal blood flow. (BLO7)

7	Renal Blood Flow	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- Describe in sequence the blood vessels through which blood flows when passing from the renal artery to the renal vein, including the glomerular blood vessels, peritubular capillaries, and the vasa recta. (BLO7)

8	Autoregulation of GFR	Lectures/SGD/ CBL (Knowledge, critical thinking,	Dr. Sumera Gul	Must know

		communication skills, professionalism)		
Learning Outcomes: ● Describe the myogenic, humoral and tubuloglomerular feedback mechanisms that mediate the autoregulation of renal plasma flow and glomerular filtration rate. (BLO7)				
9	Processing of Glomerular Filtrate and Regulation of tubular reabsorption	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know
Learning Outcomes: ● Describe reabsorption and secretion by the renal tubules. (BLO7) ● Describe the function of the following renal transporters and their predominant localization along the tubules with regard to nephron segment and apical versus basolateral membranes. (BLO7) ● Transport ATPases (Na+/K+ATPase, --H+/K+ATPase, H+ATPase, and Ca2+ATPase), (BLO7) ● Ion and water channels (K+, ENaC, Cl, Ca2+, Aquaporins) (BLO7) ● Coupled transporters (Na+glucose, Na+/H+antiporter ,Na+K+2Clsymporter, Na+phosphate symporter, Na+Clsymporter, Na+HCO3symporter, Cl/HCO3antiporter) (BLO7) ● Describe the effects of different hormones on renal tubules. (BLO7)				
10	Renal Clearance	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know
Learning Outcomes: ● Identify the use of clearance methods to quantify kidney function. (BLO4) ● Describe the estimation of GFR by inulin clearance, and plasma creatinine clearance. (BLO4) ● Discuss PAH clearance for estimation of renal plasma flow. (BLO4) ● Be able to calculate filtration fraction, tubular reabsorption and secretion from renal clearance (BLO4)				
11	Formation of Urine	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills,	Dr. Sumera Gul	Must know

		professionalism)		
Learning Outcomes: ● Define the obligatory urine volume.(BLO7) ● To be able to explain the formation of dilute urine (BLO7)				
12	Renal Regulation of Osmolarity I	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know
Learning Outcomes: ● Discuss the control of extracellular fluid osmolarity and sodium concentration by kidneys. (BLO7) ● Elaborate osmoreceptor-ADH feedback system. (BLO7) ● Identify role of thirst in controlling extracellular fluid osmolarity and sodium concentration. (BLO7)				
13	Renal Regulation of blood volume	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know
Learning Outcomes: ● Describe the role of angiotensin II and aldosterone in controlling extracellular fluid osmolarity, blood volume and sodium concentration. (BLO7)				
14	Acid base disorders I	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Somia Iqbal	Must know
Learning Outcomes: ● Discuss the Renal Correction of acidosis—increased excretion of hydrogen ions and addition of bicarbonate ions to the extracellular fluid (BLO8)				
15	Acid base disorders II	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Somia Iqbal	Must know
Learning Outcomes: ● Discuss the renal correction of alkalosis—decreased tubular secretion of				

hydrogen ions and increased excretion of bicarbonate ions. (BLO8)

- Identify and explain causes of acid base disorders. (BLO8)
- Gain concept of anion gap. (BLO8)

16	Regulation of K+ Concentration	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- Discuss the regulation of internal potassium distribution. (BLO7)
- Describe the mechanism of potassium secretion by principal cells of late distal and cortical collecting tubules. (BLO7)
- Describe the factors that regulate K+secretion in the collecting duct (i.e.,
- aldosterone, plasma K+) and distinguish these from factors that alter

K+ secretion at this site (i.e., luminal fluid flow rate, acid base disturbances, anion delivery). (BLO7)

17	Regulation of calcium, phosphate and magnesium (Ca+ PO+4 & Mg++)	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- To be able to comprehend the regulation of calcium by renal tubules. (BLO7)
- Be able to explain the role of parathyroid hormone in calcium regulation. (BLO7)
- Discuss the renal regulation of phosphate and magnesium. (BLO7)

18	Formation of Concentrated Urine I	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- Enumerate requirements for excreting a concentrated urine—high ADH levels and hyperosmotic renal medulla. (BLO7)
- Discuss the countercurrent mechanism for generating a hyperosmotic renal medullary interstitium. (BLO7)
- Identify and explain the role of distal tubule and collecting ducts in excreting a concentrated urine. (BLO7)

19	Formation of Concentrated	Lectures/SGD/	Dr. Sumera Gul	Must know

	Urine II	CBL (Knowledge, critical thinking, communication skills, professionalism)		

Learning Outcomes:

- Discuss the role of urea and explain urea cycle for generating hyperosmotic renal medullary interstitium and in the formation of concentrated urine. (BLO7)
- Describe the countercurrent exchange in the vasa recta in preservation of hyperosmolarity of the renal medulla. (BLO7)
- Explain the concentrating mechanisms and changes in osmolarity in different segments of the tubule. (BLO7)
- To be able to quantify renal urine concentration and dilution: "Free Water" and osmolar clearances. (BLO7)
- Discuss the disorders of urine concentrating ability. (BLO7)

20	Renal Failure	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumera Gul	Must know

Learning Outcomes:

- To be able to explain acute & chronic renal failure (including nephritic and nephrotic syndrome). (BLO8)
- Explain the basics of dialysis. (BLO8)
- Differentiate between peritoneal and hemodialysis. (BLO8)

REPRODUCTION

1	Male Reproductive System	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Sumaira Iqbal	Must know

Learning Outcomes:

- Explain the functional anatomy of the male reproductive organs. (BLO9)
- Describe the process of spermatogenesis. (BLO9)
- Explain the function of the seminal vesicles and prostate gland. (BLO9)
- Explain the abnormalities of spermatogenesis and male fertility and their pathophysiological basis. (BLO9)
- Describe the secretion and functions of testosterone and feedback loop regulating its secretion. (BLO9)

2	Female Reproductive System	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr.Sumaira Iqbal	Must know

Learning Outcomes:

- Summarize the functional anatomy of the female sexual organs. (BLO10)
- Enlist the ovarian hormones. (BLO10)
- Describe the functions of estrogen and progesterone. (BLO10)
- Explain the monthly ovarian cycle and the role of the gonadotropic hormones. (BLO10)
- Summarize the regulation of the female monthly rhythm and the interplay between the ovarian and hypothalamic- pituitary hormones in the feedback regulation of monthly ovarian cycle. (BLO10)
- Explain puberty and menarche and menopause. (BLO10)

3	Pregnancy	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Somia Iqbal	Must know

Learning Outcomes:

- Describe maturation and fertilization of the ovum. (BLO11)
- Explain the process of transport of the fertilized ovum in the fallopian tube.
- (BLO11)
- Describe the implantation of the blastocyst in the uterus and early nutrition of the embryo. (BLO11)
- Summarize the response of the mother's body to pregnancy. (BLO11)
- Explain the changes in the maternal circulatory system during pregnancy. (BLO11)
- Explain the role of human chorionic gonadotropin in pregnancy. (BLO11)
- Describe the placental hormones and their significance. (BLO11)

4	Parturition & Lactation	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Somia Iqbal	Must know

Learning Outcomes:

- Explain parturition and onset of labor and the hormones regulating it. (BLO11)
- Explain the mechanism of lactation and the hormones regulating it. (BLO11)

5	Neonatal Physiology	Lectures/SGD/ CBL (Knowledge, critical thinking, communication skills, professionalism)	Dr. Somia Iqbal	Must know

Learning Outcomes:

- Summarize the growth and functional development of the fetus. (BLO12)
- Explain the adjustments of the infant to extra- uterine life. (BLO12)
- Describe circulatory readjustments at birth. (BLO12)

LIST OF PRACTICALS

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Estimate urine specific gravity on a given sample	SGD (knowledge, critical thinking, demonstration skills/clinical skills, communication skills, professionalism)	Dr. Khalid	Must Know

Learning Outcomes:

- Define specific gravity.
- Recall the normal range of urine specific gravity.
- Name the methods for measuring urine specific gravity.
- Determine relative mass density/ specific gravity by using a urinometer.
- Identify various physiological and pathological factors affecting urine relative mass density.

2	Interpret Arterial Blood Gases report	SGD (knowledge, critical thinking, demonstration skills/clinical skills, communication skills, professionalism)	Dr Somia Iqbal	Must know

Learning Outcomes:

- Define acidosis and alkalosis.
- Identify acidosis and alkalosis and its types.

● Comment on compensated and uncompensated acid base disturbances.				
3	Demonstrate superficial reflexes	SGD (Knowledge, critical thinking, demonstration skills/clinical skills, communication skills, professionalism)	Dr. Hira	Must Know
Learning Outcomes: ● Define a reflex. ● Define a reflex arc. ● Define superficial reflex. ● Enlist superficial reflexes along with their root value. ● Demonstrate superficial reflexes.				
4	Demonstrate deep reflexes	SGD (Knowledge, critical thinking, demonstration skills/clinical skills, communication skills, professionalism)	Dr. Attayab	Must Know
Learning Outcomes: ● Define deep tendon reflex. ● Enlist deep tendon reflexes. ● Describe the root value of deep tendon reflexes ● ● Demonstrate deep tendon reflexes.				

CBLs

CBL No 1: Cholera

A 12-year-old boy was brought to the hospital by his parents with complaints of large amounts of watery diarrhea and vomiting for 1 day. Diarrhea was sudden in onset and painless. The stool passed having characteristic **rice-water** appearance with few flecks of mucus in it. He vomited a large amount of clear fluid 4-6 times in one day and had a continuous feeling of nausea. He was thirsty and complained of intense cramps in his calf muscles. His vitals include: BP 90/70 mm Hg, Pulse 110beats/min, RR 18 breaths/min; Temp 99 ○F. On general physical examination he was looking restless and irritable with dry tongue, decreased skin turgor and

sunken eyes. Lab investigations revealed severe electrolyte imbalance with particularly decreased plasma concentrations of Na+, Cl− & HCO3−. Microscopic examination of stool revealed teeming of diarrheal fluid with motile comma-shaped bacteria. On the basis of history and clinical findings he was diagnosed as a case of cholera. The boy's parents were very worried and confused about his treatment. They blamed themselves for letting him eat from outside home, due to which he caught the disease.

Learning outcomes:

By the end of the session, student should be able to:

1. Discuss the given case scenario.
2. Explain pathway of vomiting reflex.
3. Discuss basic movements of the large intestine.
4. Summarize the defecation reflex.
5. Identify distribution of total body water and ions in different body compartments.
6. Comment on various types of dehydration and overhydration.
7. Enlist the steps of providing information to patients according to the Calgary Cambridge model and counsel them appropriately

CBL No 2: Nephritic Syndrome

A 5-year-old boy presents to the urgent care clinic because his mother noticed that the child is not going to the bathroom and his feet are swollen. Two weeks earlier the child was treated for streptococcal throat infection with penicillin. The mother admits to ceasing administering the medication to the child after a couple of days because she thought the child felt better.
Physical Examination Vital Signs: Temp 37°C, Pulse 78/min, Resp rate 15/min, BP 120/90 mm Hg. Physical Examination: The patient is oliguric and has a slight fluid accumulation in the lower extremities and peri-orbital region. There is palpable peripheral edema in both feet.
Laboratory StudiesUrinalysis: Very dark urine, presence of red blood cells, red blood cell casts, and protein (>3g/day) Serum complement C3, C4, CH50 levels: Low ASO titer: 250 units /mL (normal: < 160 units/mL) Anti D Nase-B level: > 60 unitsBUN: 32 mg/dL (normal: 7-18 mg/dL) Creatinine: 2.0 mg/dL (normal: 0.6-1.2 mg/dL) DIAGNOSIS Post streptococcal glomerulonephritis

Learning outcomes: By the end of the session, student should be able to:

1. Discuss the given case scenario.
2. Define glomerular filtration rate and explain major factors affecting it.
3. Compare the tubular handling of Na+ and K+.
4. Explain the glomerular capillary membrane

5. Discuss tubular reabsorption and secretion of glucose.
6. State the pathophysiology of pitting and non-pitting edema.

CBL No 3: Polyuria

A 23-years-old male presented to the emergency department with concussion head injury after a road traffic accident. The patient was stabilized in the emergency department and shifted to the surgical ward for observation. On the 2nd day of admission he presented with polydipsia, polyuria and was dehydrated. The urine output on the 2nd day was 15L/day and osmolarity of urine was found to be 75mOsm/L(300 900mOsm/L). He was not on diuretics medications. On physical examination the temperature was 37C, respiratory rate was 18 breaths/min, pulse was 82/min and blood was 100/70mmHg. He looked lethargic and dehydrated. His systemic examination was otherwise unremarkable. On investigations plasma osmolarity was >300mOsm/L and Na+ levels were 150mEq/L. His CT scan showed mild cerebral edema. After complete workup and detailed history, he was found to have DIABETES INSIPIDUS.

Learning Outcomes: By the end of the session, student should be able to:

1. Name the site of ADH secretion and locate the site of action.
2. Explain the mechanism of action of ADH.
3. Measure the plasma osmolarity.
4. Explain obligatory urine volume
5. Describe formation of dilute urine.
6. Summarize the mechanisms involved in urine concentration.
7. Explain Osmoreceptor ADH feedback.
8. Discuss the types of diabetes insipidus.
9. Outline the Desmopressin test.
10. Describe free water clearance

CBL – 4: MENOPAUSE

A 50-year-old woman presented to gynae OPD with complaints of hyperpigmentation, hot flashes, night sweats, fatigue, irritability, decreased vaginal secretions and history of osteoporosis. Her investigations revealed decreased estrogen & decreased progesterone levels.The gynecologist diagnosed her as a case of menopause.

Learning Outcomes:

1. Discuss the given case scenario.
2. Explain the monthly ovarian cycle.

3. Summarize the functions of female hormones.
4. Explain the phases of the menstrual cycle.
5. Comment on the regulation of female monthly rhythm.

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Learning Resources: Human Physiology 9th Edition by Sherwood

- Ganong's Review of Medical Physiology, 25th Edition
- BRS Physiology ,5th edition by Linda S.Costanzo
- A text book of practical physiology,8th edition by CL Ghai
- Guyton and hall review ,3rd edition

2.Online resources

- Google class room
- Understandingphysiology.wordpress.com

3.Library resources:

- Guyton and Hall Textbook of Medical Physiology (14th Edition)
- Human Physiology 9th Edition by Sherwood
- Ganong's Review of Medical Physiology, 25th Edition
- BRS Physiology ,5th edition by Linda S.Costanzo 50
- A text book of practical physiology,8th edition by CL Ghai
- Guyton and hall review ,3rd edition

Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
CBL Case Discussion CBL Quiz Class Discussion Flipped Class Format Reflective writing	MCQs SEQs OSPE VIVA

Biochemistry

Block Learning Outcomes (SLO 1 & 2):

- Understand biochemical significance of water, fluids homeostasis, electrolyte balance in human body
- Understand biochemical significance of Acid Base homeostasis, in human body
- Describe Handerson- Hasselbach equation and Anion Gap with their clinical application.
- Appraise the basic principles of sex hormones along with the biochemical basis and related abnormalities

Sr. No.	Topic	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
10	Acid Base Balance, Water and Electrolytes	LGIS/ CBL	Dr. Anas Khalil	Must Know

Learning Outcomes:

- Discuss biochemistry of water, fluid haemostasis, electrolyte balance and acid base.
- Comprehend Acid base disorders and blood pressure.
- Describe ionization of water and weak acids, bases, pH pK values, pH scale, Dissociation constant & titration curve of weak acids.
- Apply Henderson-Hasselbalch Equation
- Explain the mechanism of Buffering and pH homeostasis.
- Enumerate various types of particles and solutions in relation to the importance of selectively permeable membranes
- Describe the importance of selectively permeable membranes, osmosis, osmotic pressure, surface tension, viscosity and their importance related to body fluids
- Explain the Distribution of body water in various compartments.
- Enlist different functions of water in the human body.
- Explain Regulation of water balance in the body.
- Describe the role of the buffer system, lungs & kidney in PH maintenance in the human body.
- Explain clinical conditions of Hyper and hyponatremia, hypo/hyperkalemia and hypo/hypermagnesemia
- Discuss various Disorders of acid base balance.
- Describe Anion Gap and its clinical significance.

24	Biochemistry of Reproductive System	LGIS/CBL	Prof Dr. Syed Touqeer Abbas	Must Know

Learning Outcomes:

- Explain the Site of synthesis, stimulus for secretion, mechanism of action, receptors, intracellular effects, target cells, tissues and biochemical role & hypo/hypersecretion Androgens & Estrogens.

Reference Books:

i. Harper's Biochemistry
ii. Lippincott's Biochemistry
iii. Principles of Biochemistry by Mushtaq Ahmed
iv. Medical Biochemistry by Chatter Jea
v. Hashmi's Textbook of Medical Biochemistry by Mukhtar Ahmed Hashmi
vi. Mark's Biochemistry

CBLs

CBL 1: **Topic: Cholera (Water & Electrolytes)**

A21-years-old female law student working in a developing country suddenly began to pass profuse watery stools almost continuously. She soon started to vomit. Her general condition declined abruptly, and she was rushed to the local village hospital. On admission, she was cyanotic, skin turgor was poor, blood pressure was 70/50mmHg (normal120/80mmHg), and her pulse was rapid and weak. The doctor on duty diagnosed cholera, took a stool sample, and started treatment immediately. Patient was isolated and given normal saline with 20mmol/L K+ added (ringers lactate was not administered). Doxycycline 500mg every 6hours was started and plenty of ORS was advised after initial IV fluids. The relatives were called for counseling. As cholera can become epidemic or pandemic, relatives were given following advice

1. Drink only boiled or treated water.
2. Cook well and eat hot.
3. Avoid shellfish.
4. Peel all vegetables and fruits.

Related Lab Investigations:

Test Name	Result	Normal Values
Stool Microscopy	Vibrio cholera Seen	Nil
Stool culture	Yielded growth of Vibrio cholera	Nil/ normal flora
Serum electrolytes	Low Na+ ,K+, Cl-andHCO3-	Normal

Vibrio Cholera is a gram negative rod, comma shaped bacterium transmitted through faecal-oral route. Its incubation period is a few hours' to 5 days and it causes profuse watery stools, fever, vomiting and rapid dehydration which may cause death. One may lose up to1L/hour water

in stools. Heat killed vaccines are not that effective and are not required for international travel. Prevention of epidemic spread is important. The key to effective treatment
And prevention of death is meticulous and timely water and electrolyte replacement.

Learning Objectives:

1. Describe Mechanisms of water regulation and Mechanisms of electrolyte regulation
2. Comprehend Disturbances in water and electrolyte regulation and their correction
3. Describe biochemical Role of ORS in rehydration

CBL 2: **Topic: CO poisoning and Metabolic Acidosis (DKA)**

A 50-year-old chowkidar of boy's high school was brought to emergency in semi-comatose state at 6am. He was a known diabetic for the last 10 years and had a similar episode two months back but that time he was conscious and walked in himself. His capillary sugar level was high, blood pressure was 100/70 mm Hg, pulse 100/min and respiratory rate was 30/min. He was moderately dehydrated, no other significant finding was there and laboratory investigations revealed following.

Related Lab Investigations:

As the compensation of the primary acidosis was not appropriate so he was diagnosed as a case of mixed acid base disorder (Metabolic acidosis and respiratory acidosis). A careful history revealed that he used a stove for heating in the room which used wood fire.This led the physician to suspect CO poisoning as well. CO inhibits ETC and hampers ATP synthesis; moreover it reduces the availability of active Hb for normal tissue oxygenation and CO2 removal. The treatment included oxygen support, HCO3 administration slow iv,sc insulin for hyperglycemia and iv fluids.

Test Name	**Result**	**Normal Values**
Plasma Glucoselevels	16mmol/L	Max 11.1 random
pH	7.30	7.35to7.45
HCO 3	16	24mEq/ L
pCO 2	35	40mmH g
Ketone bodies in urine	Positive	Negativ e

LEARNING OBJECTIVES:

1. Describe biochemical cause and mechanism behind CO poisoning and its clinical consequences

2. Diagnose acid base disorders

Practicals

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Perform Physical Examination of Urine and interpret the Urine RE Report				
2	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Perform Chemical Examination of Urine and interpret the Urine RE Report				
3	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Describe techniques and instrumentation of pH metery				
4		Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Interpret level of sex hormones in blood				
5	Practical	Demonstration/ Practical	Dr. Kinza Talat , Dr. Sehrish Baber	Must Know
Learning Outcomes: ● Interpret ABGs				

Learning Resources:

1. Reference Books:
   - GIT- Medical Biochemistry By Mushtaq, Vol I, Lippincott's Biochemistry
   - Bioenergetics-Lippincott's Biochemistry

- Acid/Base Balance- Medical Biochemistry By ChatterJee
- Chemistry of Carbohydrates- Medical Biochemistry By Mushtaq, Vol I
- Metabolism of Carbohydrates-Lippincott's Biochemistry

2. Online resources
3. Library resources:
    - Mark's Biochemistry
    - Hashmi's biochemistry
    - Biochemistry By Lehninger

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Assessment formats:

Assessment Strategies (Formative)	Assessment Strategies (Summative)
CBLs, SGDs, Quizzes, Viva	**Class Tests** **End of Block Exams**

Medicine

Gastro Rotation				
S.No.	**Topic/Theme**	**Educational Strategies**	**Name of instructor**	**Importance (Must know Should know Could know)**
Week01	**Dyspepsia and acid peptic disease . and observation of endoscopies**	Bedside teaching	Dr. Jamila Khan / PGT Gastro	Should Know
Learning Outcomes: ● Orientation of Gastroenterology ward and observation of endoscopies. ● Taking informed consent for endoscopic procedures (Via Roleplay Identify clinical presentation of GERD and Acid peptic disease ● Identify clinical presentation of peptic ulcer.				
Week02	**Abdominal Examination in a patient of liver cirrhosis**	Bedside teaching and videos	PGT Gastro	Should Know
Learning Outcomes: ● Identify clinical features of portal hypertension.				
Week03	**Case discussion on malabsorption and chronic diarrhea**	Bedside teaching and videos	Dr. Noreen Adil / PGT Gastro	Should Know
Learning Outcomes: ● Describe clinical presentation of celiac disease/chronic pancreatitis and other causes of malabsorption and chronic diarrhea. ● Identify manifestations of malabsorption.				
Medicine Unit – I Rotation				
Week01	**introduction to history taking and orientation**	BedSide Teaching	Dr. Farhat Ul Ain / PGT Medicine	Should Know
Week 02	**Discussion and counseling of a patient of Diabetes Mellitus**	BedSide Teaching	Dr. Sadia Babu / PGT Medicine	Should Know

Week 03	Cranial nerve examination and 7th cranial nerve palsy	BedSide Teaching	Dr. Farhat Ul Ain / PGT Medicine	Should Know
Medicine Unit – II Rotation				
Week 01	**General physical examination and orientation**	BedSide Teaching	Dr. Ayesha Rani / PGT Medicine	Should Know
Week02	Ethics in bedside communication and taking informed consent via role play	SGD	Dr Elaine paulus	Should Know
Learning Outcomes: ● Greeting the patient. ● Empathic listening confidentiality counseling. ● Taking informed consent via roleplay activity for common procedures. (NG / Folley's/ OGD etc). ● To improve the problem solving skills in everyday ward scenarios				
Week 03	**Motor system examination**	Bedside Teaching	Dr. Sadia Fatima / PGT Medicine	Should Know
Long Group interactive sessions				
01	**Approach to patient with jaundice**	Flipped Classroom	Dr. Jamila Khan	Should Know
Learning Outcomes: ● Differentiate between hemolytic, hepatocellular and obstructive jaundice with lab investigations and clinical presentation				
02	**Pituitary abnormalities**	CBL	Dr. Wajhat Sultan	Should Know
Learning Outcomes: ● Identify clinical presentations of hyper and hypopituitarism				
03	**Common thyroid gland abnormalities**	Flipped Classroom	Dr. Farhat Ul Ain	Should Know
Learning Outcomes: ● Identify clinical presentations of hyper and hypothyroidism				

04	**Calcium disorder**	Flipped Classroom	Dr. Ayesha Rani	Should Know
Learning Outcomes: ● Identify clinical presentations of hyper and hypocalcemia				
05	**Adrenal Disorder**	Flipped Classroom	Dr. Sadia Fatima	Should Know
Learning Outcomes: ● Identify clinical presentations of Cushing's syndrome and Addison's disease				
06	**Upper and Lower motor neuron lesions**	LGIS	Dr. Ayesha Rani	Should Know
Learning Outcomes: ● Differentiate between clinical features of upper and Lower motor neuron lesions				

Learning Resources:

- Davidson's Principles and Practice of Medicine 23rd Edition

Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
Class Discussion CBL Case Discussion CBL Quiz	MCQs SEQs

Surgery

Learning Outcomes:

- For learning outcomes please see NUMS curriculum.

S.No	Topics	Educational Strategies	Name of Instructor	Importance (Must Know Should Know Could Know)
1.	Orientation (Wards, OT, ITC)	Ward round	Dr. Sadia Farhan	Must Know
2.	Patient & Doctor Safety (BST)	BST	Dr. Sadia Farhan	Must Know
Learning outcomes: • To identify the threats and extent to patient safety while providing healthcare services				
3.	Communication skills interview skills	SGD	Dr. Sadia Farhan	Must Know
Learning outcomes: • To describe the principles & components of effective communication				
4.	Head Injury + Skull fractures	BST	Dr. Mehboob Alam	Nice to know
5.	Ureteric Colic	BST	Dr. Abdullah	Nice to know
6.	Introduction of Electromedical equipment installed in radiology department		Dr. Nadia Gul	Nice to know
7.	Conflict resolution and problem solving	SGD	Prof. Naeem Ashraf	Should Know
Learning outcomes: • To describe the factors affecting team dynamics and strategies to solve problems that arise during team work. • To identify the opportunity of enhancing team performance by identifying the conflict when it arises and selecting the correct method for its resolution.				
8.	History Taking	BST	Dr. Sadia	Should Know
9.	Spinal Trauma	BST/SGD	Prof. Mehboob Alam	Nice to know
10.	Benign prostatic hyperplasia BPH	SGD	Dr. Abdullah	Nice to know
11.	Redaiation Hazards		Dr. Nadia	Should Know

12.	Abdominal Incisions/ Splenic Ruptures	BST	Dr. Sadia	Nice to know
13.	Localized Abdominal Pain (Ac Appendicitis Ac Cholecystitis Ac Pancreatitis)	BST	Dr. Sadia	Should Know
14.	Spinal Nerve Compression	BST	Prof. Mehboob Alam	Nice to know
15.	Maxillofacial Trauma	(BST)	Dr. Usman ul Haq	Nice to know
16.	Radiation Protection		Dr. Nadia	Should Know
17.	Acute Abdomen (Perforated Duodenal ulcer/Tuberculous Perforation)	BST	Dr. Sadia	Nice to know
18.	Generalized Abdominal Pain (Mesenteric ischemia Intestinal Obstruction Intessusception)	SGD	Dr. Sadia	Should Know
19.	Brain Tumors	SGD	Prof. Mehboob Alam	Nice to know
20.	Oral Malignancies	SGD	Dr. Usman ul Haq	Nice to know
21.	Chest X ray		Dr. Nadia	Should Know
22.	Inguinoscrotal Swellings / Abdominal Wall Hernias	BST	Dr. Naeem Ashraf	Nice to know
23.	Dysphagia + TPN	SGD	Dr. Naeem Ashraf	Nice to know
24.	Vascular lesions and hemorrhage	SGD	Prof. Mehboob Alam	Nice to know
25.	Epistaxis	BST	Lt. Col. (R) Prof. Asad Chughtai	Nice to know
26.	Errors of refraction	SGD/BST	Prof. Dr. Akmal Khan	Nice to know
27.	Developmental anomalies of GIT	SGD	Dr. Naeem Ashraf	Should Know
28.	Cervical lymphadenopathy Salivary Gland diseases	BST	Dr. Naeem Ashraf	Nice to know
29.	Developmental anomalies of brain Neural tube defect	SGD	Prof. Mehboob Alam	Nice to know

30.	Vertigo	SGD	Lt. Col. (R) Prof. Asad Chughtai	Nice to know
31.	Errors of refraction	SGD/BST	Prof. Dr. Akmal Khan	Nice to know

Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
Integrated CBL	Same

Research Methodology

Block Learning Outcomes:

By the end of 1st Block the 2nd Year MBBS students will be able to:

- Differentiate research designs based on the type of knowledge they aim to produce.
- Select appropriate study samples
- Identify ethical issues related to health research

Sr no.	Topic	Educational Strategies'	Name of instructor	Importance
1.	Quantitative and Qualitative research	LGIS	Dr. S. Sabah	Need to know
Class Learning Outcomes : • Differentiate between qualitative and quantitative research • Identify the use of qualitative and quantitative designs				
2.	Study designs I	LGIS	Dr. Khola	Need to know
Class Learning Outcomes: • Classify the different types of epidemiological studies. • Identify the given epidemiological designs.				
3.	Study designs II	LGIS	Dr. Khola	Need to know
Class Learning Outcomes: • Classify the different types of epidemiological studies. • Identify the given epidemiological designs.				
4.	Ethical issues in research	LGIS	Dr. Ambreen	Nice to know
Class Learning Outcomes: • Elucidate the need to follow ethics in research • Explain ethical issues in research • Differentiate areas of scientific dishonesty in research • Recapitulate ethical issues related to various research strategies • Summarize the rights of research participants				
5.	Presentations on Research ethics	LGIS	Dr. Ambreen	Nice to know
Class Learning Outcomes: • Discuss different codes of research ethics • Identify the importance of research ethics • Anticipate ethical issues in research in the light of principles of research ethics				
6.	Game based activity on Research Ethics	Group Activity	Dr. Ambreen	Need to know
Class Learning Outcomes: • Elucidate the need to follow ethics in research • Explain ethical issues in research • Differentiate areas of scientific dishonesty in research • Recapitulate ethical issues related to various research strategies • Summarize the rights of research participants • Discuss different codes of research ethics • Identify the importance of research ethics				

● Anticipate ethical issues in research in the light of principles of research ethics				
7.	Study population and its selection	LGIS	Dr. Robina	Need to know
Class Learning Outcomes: ● Define study population ● Explain inclusion and exclusion criteria for sample selection				
8.	Sampling techniques	LGIS/ group assignments	Dr. Robina	Need to know
Class Learning Outcomes: ● Classify and explain various sampling techniques ● Choose appropriate sampling technique in the given scenario				
9.	Sampling errors	LGIS/ group assignments	Dr. Robina	Need to know
Class Learning Outcomes: ● Identify sampling errors ● Suggest the method to rectify identified error				

Learning Resources:

1. **Text Books**
   - Park's Textbook of Preventive and Social Medicine
   - Public Health and Community Medicine (Shah, Ilyas, Ansari, Irfan's)
2. **Reference Books/ Library resources**
   - Basic Statistics for the Health Sciences (Jan W. Kuzma)
   - Basic Methods of Medical Research (Indrayan)
   - New qualitative Methodologies in Health and Social Care Research (Frances Rapport)
   - Handouts/SDL prepared by faculty
3. **Online resources**
   - Medical ethics
   - **Types-of-research**

Teaching faculty & contact address

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Assessment formats

Assessment Strategies (Formative)	Assessment Strategies (Summative)
MCQs, SEQs, Group Activity and Assignments	MCQs and SEQs

Behavioral Sciences

Subject Class Learning Outcomes:

1. Develop an understanding of influence and potential implications of culture and community on health behaviors, perceptions and beliefs.
2. A physician will be able to integrate this knowledge into patient care
3. Take detailed, accurate and relevant patient history by taking into account self-awareness and reflective writing using social and behavioral sciences approach
4. Provide patient centered behavioral guidance and interventions
5. Comprehend how social determinants of health influence health outcomes and how physician can use this knowledge in patient care
6. Practice professionalism and leadership qualities
7. Integrate their knowledge and skills gained throughout five years into clinical practice

Learning outcomes:

1. Discuss significance of Behavioral Sciences in Medical practice (SLO 1, SLO 5)
2. List of psychological, sociological and anthropological as well as biological determinants of health and disease in clinical practice (SLO1, SLO 5)
3. Analyze human behavior and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill (SLO 4)
4. Assess types of human personality and phases of personality development along with intelligence (SLO 4)
5. Integrate the principles of medical ethics in professional life (SLO 6)

Sr. No.	Topics	Educational Strategies	Name of instructor	Importance (Must Know Should Know Could Know)
1.	Significance of behavioural Sciences in clinical practice	LGIS/ Seminar	All Faculty	Should Know
Learning Outcomes: ● Discuss significance of Behavioural Sciences in Medical practice (BLO 1)				
2.	Differentiate: Holistic Vs. Traditional Allopathic Medicine	Lectures/ Presentations	All Faculty	Must Know
Learning Outcomes: ● Demonstrate understanding of holistic and bio medicine model in clinical practice along with understanding of culture and medical practice (BLO 1)				
3.	Culture & Medical Practice	Lectures/ Presentations	All Faculty	Should know
Learning Outcomes: ● Discuss the culture and medical practice in Pakistan. (BLO 1)				
4.	Discuss Health Care Models and their Clinical Applications	Lectures/ Presentations	All Faculty	Must Know

	1. Bio-Psycho- Social Model of health and disease			
Learning Outcomes: ● List the psychological, sociological and anthropological as well as biological determinants of health and disease in clinical practice, along with a public health approach of primary and secondary prevention of disease/disorder and promotion of health. (BLO 1)				
5.	The Integrated Model of Health Care: Correlation of Body, Brain, Mind, Spirit and Behavioral Sciences	Lectures/Presentations/ (SGD)/ seminars	All Faculty	Should Know
Learning Outcomes: ● List the psychological, sociological and anthropological as well as biological determinants of health and disease in clinical practice (BLO 2)				
6.	The Public HealthCare Model	Lectures/Presentations/ (SGD)/ seminars	Zunaira Naveed	Should Know
Learning Outcomes: ● List the psychological, sociological and anthropological as well as biological determinants of health and disease in clinical practice (BLO 2)				
7.	Understand human behavior through Principles of Psychology 1. Sensation and sense organs	Lectures/ Presentations/ Interactive Video ignites/ (LGIS)	Zunaira Naveed	Must Know
Learning Outcomes: ● Analyze human behavior and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill (BLO 3)				
8.	Perception & factors affecting perception	Lectures/ Presentations/ Interactive Video/ (LGIS)	Zunaira Naveed	Must Know
Learning Outcomes: ● Analyze human behavior and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill (BLO 3)				
9.	Principles of Psychology: Attention and concentration	Lectures/ Presentations /Interactive Video/ (LGIS)	Zunaira Naveed	Must Know
Learning Outcomes: ● Analyze human behavior and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill (BLO 4)				

10.	Memory & Thinking	LGIS/ Presentations /Interactive Video/	Zunaira Naveed	Must Know
Learning Outcomes: ● Analyze human behavior and other factors affecting health and disease by Enhancing doctor's own learning and clinical skill (BLO 4)				
11.	Individual human differences 1. Intelligence	LGIS/ Presentations/ Interactive Video/	Zunaira Naveed	Should Know
Learning Outcomes: ● Assess types of human personality and phases of personality development along with intelligence (BLO 4)				
12.	Individual human differences-Personality Development	LGIS/ Presentations/ Interactive Video/	Zunaira Naveed	Should Know
Learning Outcomes: ● Assess types of human personality and phases of personality development along with intelligence (BLO 4)				
13.	Personality Development	LGIS/ Presentations /Interactive Video/	Zunaira Naveed	Should know
Learning Outcomes: ● Assess types of human personality and phases of personality development along with intelligence (BLO 4)				
14.	Personality Development (II)	LGIS/ Presentations /Interactive Video/	Zunaira Naveed	Should know
Learning Outcomes: ● Assess types of human personality and phases of personality development along with intelligence (BLO 4)				
15.	Describe Neurobiological and Psychological Basis of Behavior 1. Emotions 2. Motivation/need/drive	LGIS	Zunaira Naveed	Must know
Learning Outcomes: ● Demonstrate understanding of the complex interplay of Brain and Behavior. (BLO 3, 4)				
16.	Learning	LGIS	Zunaira Naveed	Should know
Learning Outcomes:				

● Demonstrate understanding of the complex interplay of Brain and Behavior				
17.	Class Test		All Faculty	Should know
Learning Outcomes: ● Assess the students' own knowledge and learning (BLO 3, 4)				
18.	Medical Ethics and Professionalism	Lectures/ Presentations/ Small Group Discussion	Hassan Ali	Should Know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
19.	Describe and Demonstrate relevance of Ethics in the Life of a Doctor	Lectures /Presentations/ Small Group Discussion	Hassan Ali	Could Know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
20.	Scope and Meaning of Medical Ethics	Lectures/ Presentations/ Small Group Discussion	Hassan Ali	Could Know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
21.	Guiding Principles of Medical Ethics	Lectures/Presentations/ Small Group Discussion	Hassan Ali	Must Know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
22.	Common Ethical Issues in Medical Practice	Lectures/ Presentations/ Small Group Discussion	Hassan Ali	Could know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
23.	Common Ethical Dilemmas in a Health Professional's Life	Lectures/ Presentations/ Small Group Discussion	Hassan Ali	Could know
Learning Outcomes: ● Integrate the principles of medical ethics in professional life (BLO 5)				
24.	Doctor-Patient Relationship	Lectures/ Presentations/ Small Group Discussion	Hassan Ali	Should know
Learning Outcomes:				

● Integrate the principles of medical ethics in professional life (BLO 5)				
25.	Presentation/ seminar	Presentations/ Small Group Discussion	All Faculty	Should know
Learning Outcomes: ● Assessing Students' own understanding of the topic				

Learning Resources:

- Handouts prepared by faculty
- Online resources
- Lecture notes

Teaching Faculty:

Name	Email address
Zunaira Naveed	naveedzunie@gmail.com
Hassan Ali	Ha55an.qau5@gmail.com
Hafsa Naeem	Hafsanaeem176@gmail.com

Assessment formats:

Assessment Strategies (Formative)	Assessment Strategies (Summative)
● Directly observed behaviors, ● Small group discussions, ● Reflective writing Portfolios ● MCQs, Home assignments, SAQs/SEQs	● Assignments, ● Case studies, ● Quiz, Presentations ● MCQs, SAQs/SEQs, OSPE, Viva

10. Rules & regulations:

i. Student's code of conduct

The Student Code of Conduct sets out the standards of conduct expected of students. It holds individuals and groups responsible for the consequences of their actions. Failure to fulfill these responsibilities may result in the withdrawal of privileges or the imposition of sanctions.

Wah Medical College is a community of students, faculty and staff involved in learning, teaching, research and other activities. All members of the WMC community are expected to conduct themselves in a manner that contributes positively to an environment in which respect, civility, diversity, opportunity and inclusiveness are valued, so as to assure the success of both the individual and the community. The Student Code of Conduct reflects a concern for these values and tries to ensure that members of the WMC can make use of and enjoy the activities, facilities and benefits of WMC without undue interference from others.

WMC STUDENT CODE OF CONDUCT

- Discipline
- Decent dress
- Good Manners
- Smart Turn Out
- Healthy Activities
- No smoking
- No Abusive Language
- Cooperative Attitude
- Respect for All

ii. **Attendance policy**

a. Students are required to mark attendance for every class.
b. The attendance is compiled by the respective department and submitted to student affairs by the 10th of each month.
c. The Students Affair Department will compile the absent report and a fine of Rs. 500/- for a lecture or for the whole day will be imposed on absent students. It is pertinent to mention here that a fine is imposed on students to compel them to attend classes regularly and not to generate the funds.
d. A compiled attendance state of all students along with those having attendance less than 75% duly highlighted will be submitted to the Students Affairs Department on monthly as well as quarterly basis by the concerned departments.
e. At the end of the academic year, a consolidated state of attendance of students will be submitted to the Students Affair Department.
f. Departments will submit the list of those students having attendance less than 75% at the end of academic year.
g. Admission forms of students having attendance less than 75% will NOT be submitted to NUMS for appearing in Annual University Exams.

11. Study Tips

Dear Students,

Becoming a doctor is a tough job, but you can make it easier for yourself by adopting some time-tested techniques or habits. It's never too early – or too late – to develop good study habits. The sooner you get into a good self-study pattern, the easier everything will be and the more your chances of getting good marks will improve. Here are our top tips for getting the most out of your self-directed study time. And remember **Perseverance is the Key to Success!**

12. Feedback on the study guide

We value your feedback and will use it for improvement of this Study guide. Kindly provide feedback for this study guide. At the email:

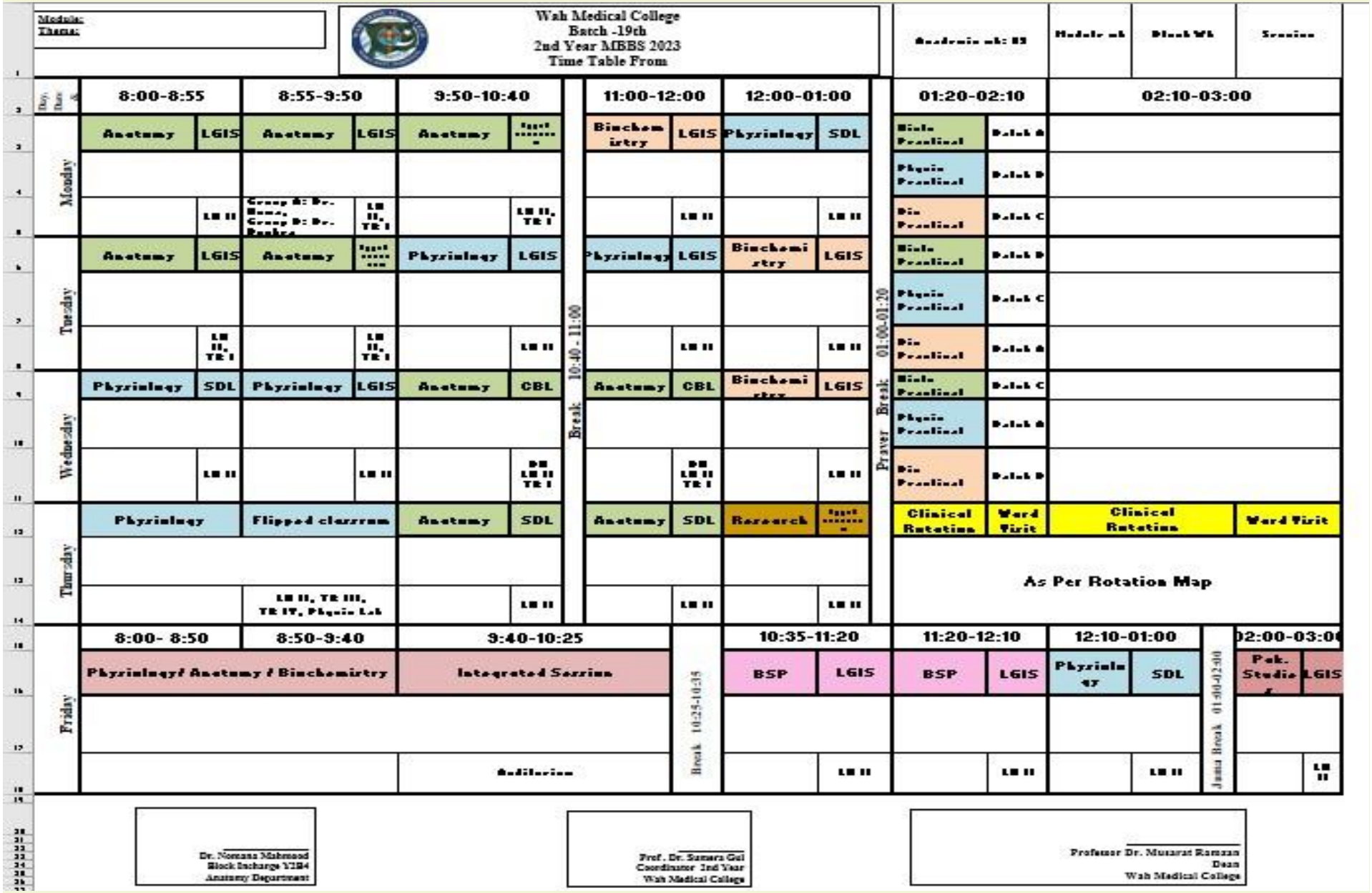
dme@wahmedicalcollege.edu.pk

dmewahmedicalcollege@gmail.com

13. References:

HARDEN, J.M. LAIDLAW, E.A. HESKETH, R. M. (1999). AMEE Medical Education Guide No 16: Study guides-their use and preparation. *Medical Teacher*, *21*(3), 248–265. https://doi.org/10.1080/01421599979491

14. Time table Template



Module:
Theme:

Wah Medical College
Batch -19th
2nd Year MBBS 2023
Time Table From

Day/ Date &	8:00-8:55		8:55-9:50		9:50-10:40		Break 10:40 - 11:00	11:00-12:00		12:00-01:00		Prayer Break 01:00-01:20	01:20-02:10		02:10-03:00	
Monday	Anatomy	LGIS	Anatomy	LGIS	Anatomy	[illegible]		Biochemistry	LGIS	Physiology	SDL		Histo Practical	Batch A		
													Physio Practical	Batch B		
		LH II	Group A: Dr. Rana, Group B: Dr. Pushpa	LH II, TR I		LH II, TR I			LH II		LH II		Bio Practical	Batch C		
Tuesday	Anatomy	LGIS	Anatomy	[illegible]	Physiology	LGIS		Physiology	LGIS	Biochemistry	LGIS		Histo Practical	Batch D		
													Physio Practical	Batch C		
		LH II, TR I		LH II, TR I		LH II			LH II		LH II		Bio Practical	Batch A		
Wednesday	Physiology	SDL	Physiology	LGIS	Anatomy	CBL		Anatomy	CBL	Biochemistry	LGIS		Histo Practical	Batch C		
													Physio Practical	Batch A		
		LH II		LH II		DR LH II TR I			DR LH II TR I		LH II		Bio Practical	Batch D		
Thursday	Physiology		Flipped classroom		Anatomy	SDL		Anatomy	SDL	Research	[illegible]		Clinical Rotation	Ward Visit	Clinical Rotation	Ward Visit
													As Per Rotation Map			
			LH II, TR III, TR IV, Physio Lab			LH II			LH II		LH II					
Friday	8:00- 8:50		8:50-9:40		9:40-10:25		Break 10:25-10:35	10:35-11:20		11:20-12:10		Jumma Break 01:00-02:00	12:10-01:00		02:00-03:0	
	Physiology/ Anatomy / Biochemistry				Integrated Session			BSP	LGIS	BSP	LGIS		Physiology	SDL	Pak. Studies	LGIS
					Auditorium				LH II		LH II			LH II		LH II

Dr. Nomana Mahmood
Block Incharge Y2B4
Anatomy Department

Prof. Dr. Sumera Gul
Coordinator 2nd Year
Wah Medical College

Professor Dr. Munarat Ramzan
Dean
Wah Medical College