INDEPENDENT MEDICAL COLLEGE, FSD

BLOCK-4

GIT & NUTRITION – (MODULE – 06)
CURRICULUM 2K23
(Study Guide)

MODULAR INTEGRATED
UNDERGRADUATE CURRICULUM

TABLE OF CONTENTS

LIST OF ABBREVIATION

ABBREVIATION	SUBJECTS
A	Anatomy
Ag	Aging
B	Biochemistry
BhS	Behavioral Sciences
C	Civics
CM	Community Medicine
C-FRC	Clinical-Foundation Rotation Clerkship
CV	Cardiovascular
ENT	Ear Nose Throat
F	Foundation
FM	Forensic Medicine
GO	Gynecology and Obstetrics
HL	Hematopoietic & Lymphatic
M	Medicine
MS	Musculoskeletal
O	Ophthalmology
P	Physiology
PA	Pathology
PE	Pediatrics
PERLs	Pediatrics
Ph	Pharmacology
Psy	Psychiatry
QI	Quran and Islamiyat
R	Radiology
Re	Respiratory
S	Surgery
SGD	Small Group Discussion

CURRICULUM FRAME WORK

The framework of Curriculum 2K23 has 44 modules spanning 05 years. The horizontal integration is evident in the modular configuration where different basic disciplines approach the themes simultaneously. Modules have been structured where all the basic disciplines are represented based on their respective weightage of content. All module objectives are preceded by the recommended themes and clinical relevance. Spiral placement of the modules within the framework ensures a revisit of the basic sciences. Clinical Skills follow a spiral which is entirely skills dominant. This spiral is the core of psychomotor training. Affective training has been formally inculcated in the curricular framework. The model of PERLs has been introduced so that the yield of doctors has a strong, resilient, ethically driven character. PERLs stands for Professionalism, Ethics, Research and Leadership skills.

INTRODUCTION O THE STUDY GUIDE

The purpose of the study guide is to organize lecture notes and text book material so that students can increase their comprehension and memory of large amount of information. It will provide a teaching aid to assist the students in developing reading skills.

INTRODUCTION TO MODULE

Gastrointestinal system is an integral part of human body which is primarily related to consumption, digestion and assimilation of food to provide nutrition and calories on regular basis to human body which are essential for basic functioning of each organ of human beings. We will study in detail regarding different parts of gastrointestinal system, their functional, embryological and histological anatomy, physiological and biochemical aspects of its functioning. Students will also be briefly introduced to clinical and pathological aspects, pharmacological interventions and preventive measures of common diseases related to the system. We have assigned six (6) weeks in academic calendar of 2nd year curriculum of MBBS to Gastrointestinal Module. We have divided our module into eight (8) themes. For every theme, anatomy, physiology, biochemistry, pathology, pharmacology, community medicine, behavioral sciences, general medicine and surgery will need to plan for integrated teaching of students for better comprehension and understanding of subject. We have outlined learning outcomes for each discipline along with allocated time to be taught.

MODULE COMMITTEE

Prof. Dr. Irfan Ahmad Mughal	Anatomy (Module coordinator)
Prof. Dr. Razia Rizwan	Physiology
Dr. Rizwan Ahmad	Biochemistry
Dr. Awais Shuja	Surgery
Dr. Baddar Bashir	Medicine
Dr. Sirda Mushtaq	Pharmacology
Dr. Shahbaz Ahmad	Community Medicine
Dr. Salma Naz	Pathology
Dr. Aslam Lodhi	Psychiatry
Dr. Taimur-ul-Hassan	Medical Education

INDEPENDENT MEDICAL COLLEGE, FAISALABAD
2ND YEAR MBBS 2025
TIME TABLE

4TH BLOCK – 6TH MODULE (GIT & NUTRITION)
6 Weeks

DAY	08:00 - 09:00	09:00 - 10:30	10:30 - 11:00	11:00 - 01:00	01:00 - 02:00	02:00 - 02:30
Mon	Physiology	Biochemistry	**BREAK**	Anatomy	Pathology	**Self Directed Learning (SDL)**
Tue	Physiology	Biochemistry		Anatomy	Community Medicine	
Wed	Physiology	Biochemistry		Anatomy	Holy Quran / Pak Study	
Thu	Physiology	Biochemistry		Anatomy	Physiology	
Fri	Biochemistry 8:00 - 09:00	CFRC / Pharmacology 09:00 - 10:00	Anatomy 10:00 - 11:00	Behavioral Sciences 11:00 - 12:00		
Sat	Physiology 08:00 - 09:00	Biochemistry 09:00 - 10:30	**BREAK** 10:30 - 11:00	Anatomy 11:00 - 01:00	PERL 01:00 - 02:00	SDL 02:00 - 02:30

DISTRIBUTION OF TEACHING HOURS

Modules weeks	08
Recommended Minimum Hours	205 hr
Anatomy	64 hr
Physiology	50 hr
Biochemistry	50 hr
Pathology	12 hr
Community Medicine	08 hr
Pharmacology	04hr
Behavioral Sciences	08 hr
CFRC	08 hr
PERL	08 hr

MODULE OUTCOMES

- To describe gross and microscopic anatomy of different parts of gastrointestinal system and associated organs.
- To describe the embryological development of different parts of gastrointestinal system and associated organs.
- To describe the functional anatomy and physiology of different parts of gastrointestinal system and associated organs.
- To describe the motility, secretary and digestive function of gastrointestinal system.
- To describe the biochemical aspects of carbohydrate metabolism.
- To discuss pathological aspect and management of gastrointestinal related diseases.
- To discuss the pharmacological treatment of diarrhea.
- To discuss the psychosocial impact of gastrointestinal diseases in society.
- To discuss the preventive measures related to gastrointestinal diseases.
- To comprehend concept of balanced diet and malnutrition.

LEARNING OBJECTS
BLOCK 04– GIT & NUTRITION (MODULE -06)

GROSS ANATOMY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	TEACHING STRATEGIES
Describe the gross anatomical features of oral cavity with its neurovascular supply and lymphatic drainage	SGD
Discuss the location, anatomical features, relations and vascular supply of tonsils: nasopharyngeal, palatine and lingual.	SGD
Discuss the skeletal framework of hard palate with its neurovascular supply and lymphatic drainage	SGD
Describe the gross anatomical features of soft palate with its neurovascular supply and lymphatic drainage	SGD
Describe the attachments, nerve supply and actions of muscles of soft palate	SGD
Describe the structure of tongue with attachments of muscles, blood supply, nerve supply and lymphatic drainage Discuss the anatomical basis of injury to hypoglossal nerve	SGD
Describe anatomical features, relations and neurovascular supply of parotid gland and its duct, mentioning the structures entering and exiting the gland.	SGD
Discuss the clinical correlates of parotid gland: parotiditis, Mumps, Frey's syndrome, parotid duct injury and parotid tumor surgery with its complications.	SGD
Describe the Waldeyer's ring.	SGD
Describe anatomical features, relations and neurovascular supply of submandibular and sublingual glands with their ducts.	SGD
Name the parts of pharynx giving their extent, anatomical features, structure, neurovascular supply and Lymphatic drainage	SGD
Name the pharyngeal constrictor muscles defining their attachments, innervation and structure traversing the gaps between adjacent muscles.	SGD
Describe the planes and quadrants of abdomen	SGD
Draw and label the cutaneous innervation and dermatomes of anterior abdominal wall and anterolateral Abdominal wall and describe the clinical correlates (Abdominal pain, Muscle rigidity, Referred pain, anterior abdominal nerve block)	SGD
Describe the fascia of anterior abdominal wall with its clinical significance Describe anterolateral Abdominal wall arteries, Veins and Lymphatics and related clinical correlates—Caput Medusae	SGD
Describe the attachments, nerve supply and actions of muscles of	SGD

anterior abdominal wall	
Identify the muscles of anterolateral abdominal wall on anatomical model and/or cadaver	SGD
Describe the extent, formation and contents of rectus sheath	SGD
Give the formation and extent of inguinal ligament	SGD
Describe the formation of superficial and deep inguinal rings and conjoint tendon	SGD
Locate the position of superficial and deep inguinal rings on simulated subject or Cadaver	SGD
Describe the extent, boundaries and contents of inguinal canal	SGD
Define the following hernias: umbilical, epigastric, incisional, Spigelian, lumbar, femoral, internal and inguinal	SGD
Differentiate between direct and indirect inguinal hernias	SGD
Describe the location of abdominal surgical incisions	SGD
Mark the abdominal incisions on simulated patient/subject and explain their anatomical basis	SGD
List the structures and coverings of spermatic cord	SGD
Trace the horizontal and vertical peritoneal reflections	SGD
Describe the relationship of viscera to the peritoneum	SGD
Describe the gross anatomical features of the following: 1. Mesentery 2. Omentum 3. Peritoneal ligaments 4. Peritoneal fold 5. Peritoneal sac 6. Recesses 7. Spaces and 8. Gutters	SGD
Describe the nerve supply of Peritoneum	SGD
Describe the anatomical basis and manifestations of the following: 1. Peritonitis and ascites 2. Peritoneal adhesions (and adhesiostomy) 3. Abdominal paracentesis	SGD
Describe the extent of esophagus, its constrictions, neurovascular supply and lymphatic drainage Discuss the anatomical basis of esophageal varices, achalasia and Gastro Esophageal Reflux Disease (GERD)	SGD
Describe the location, position, parts, external and internal structure, relations, vascular and nerve supply and lymphatic drainage of stomach	SGD
Draw and label a diagram illustrating the lymphatic drainage of Stomach	SGD
Describe the clinical presentation and the anatomical basis and manifestations of the following conditions: Carcinoma of stomach and peptic ulcers	SGD
Identify and demonstrate the parts, external and internal features of stomach on anatomical model and cadaver	SGD

Describe the location, position, parts, relations, neurovascular supply and lymphatic drainage of duodenum	SGD
Describe the anatomical basis and manifestations of the following conditions: 1. Duodenal Ulcers 2. Ileal diverticulum 3. Diverticulosis 4. Large bowel cancer 5. Appendicitis 6. Volvulus 7. Intussusception	SGD
Demonstrate the various positions of appendix	SGD
Identify and demonstrate the Parts and external features of small and large intestines on anatomical model and cadaver	SGD
Describe the origin, course, branches (tributaries in case of veins) and distribution of the blood vessels of GIT	SGD
Describe the formation, tributaries and drainage of hepatic-portal vein	SGD
Discuss the sites and vessels contributing in portosystemic anastomosis	SGD
Describe the clinical picture and anatomical basis for the blockage of porto-systemic anastomosis	SGD
Identify the blood vessels supplying GIT on anatomical model and cadaver	SGD
Describe location, lobes, important relations, peritoneal ligaments, blood supply, lymphatic drainage, nerve supply, related clinical correlates of liver and subphrenic spaces.	SGD
Describe components of Biliary tree- hepatic duct and bile duct	SGD
Describe relations, functions, blood supply, lymphatic drainage and nerve supply of Gallbladder	SGD
Describe related clinical correlates-gall stones, biliary colic, cholecystectomy, gallbladder gangrene	SGD
Describe the location, surfaces, peritoneal reflections, relations, neurovascular supply and lymphatic drainage of pancreas	SGD
Describe the anatomical basis and manifestations of pancreatitis and pancreatic cancer	SGD
Identify the parts of the pancreas	SGD
Describe the location, surfaces, peritoneal reflections, relations, neurovascular supply and lymphatic drainage of spleen	SGD
Describe the anatomical basis and manifestations of splenic trauma and splenomegaly	SGD
Identify the borders, surfaces and Impressions of spleen	SGD
Demonstrate the correct anatomical positioning of spleen	SGD
Describe the gross anatomical features, peritoneal relations, blood supply, nerve supply and lymphatic drainage of sigmoid colon, rectum and anal canal	SGD
Describe the anatomical basis for Sigmoidoscopy, rectal prolapse, rectal examination, rectal cancer and hemorrhoids	SGD

Outline the anatomical basis and surgical treatment plan for the following diseases: 1. Esophageal Injuries 2. Gastric Carcinoma 3. Intestinal Obstruction 4. Pancreatic Carcinoma 5. Obstructive Jaundice 6. Gall Stones	SGD
EMBRYOLOGY & POST-NATAL DEVELOPMENT SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe the development of tongue	Interactive Lectures
Describe the embryological basis of tongue tie	Interactive Lectures
Describe the development of palate	Interactive Lectures
Describe the embryological basis of various facial clefts	Interactive Lectures
Identify the parts of the developing tongue and palate	Interactive Lectures
Describe the formation and divisions of gut tube	Interactive Lectures
Describe the development of mesenteries	Interactive Lectures
Describe the development of esophagus	Interactive Lectures
Describe the embryological basis of esophageal atresia and/or tracheoesophageal fistula	Interactive Lectures
Describe the development and rotation of stomach	Interactive Lectures
Describe the embryological basis of pyloric stenosis	Interactive Lectures
Describe the development of duodenum, liver and gall bladder	Interactive Lectures
Describe the embryological basis of intrahepatic and extrahepatic biliary atresia	Interactive Lectures
Describe the development of pancreas	Interactive Lectures
Describe the embryological basis of annular pancreas	Interactive Lectures
Describe the development of midgut especially mentioning physiological herniation, rotation, retraction of herniated loops and mesenteries of the intestinal loops	Interactive Lectures
Describe the embryological basis of the following 1. mobile cecum	Interactive Lectures

2. volvulus 3. retro colic hernia 4. Omphalocele 5. gastroschisis	
Describe the embryological basis of Meckel's diverticulum	Interactive Lectures
Describe the embryological basis of; 1. Gut rotation defects 2. Gut atresia and stenosis	Interactive Lectures
Describe the development of hindgut	Interactive Lectures
Describe the embryological basis of; 1. Rectourethral and rectovaginal fistulas 2. Recto anal fistulas and atresia 3. Imperforate anus 4. Congenital megacolon	Interactive Lectures
Identify the parts of the developing foregut, midgut and hindgut originating from the endoderm	Interactive Lectures
MICROSCOPIC ANATOMY (HISTOLOGY & PATHOLOGY) SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe the light microscopic structure of; 1. Lips 2. Tongue including lingual papillae and taste buds 3. Oral Cavity (Cheeks, Teeth gums, hard & Soft palate) Describe the histological structure of parotid, submandibular and sublingual glands. Compare and contrast the histological structures of parotid, submandibular and sublingual glands. Describe the serous and mucous acini and give histological differences between the two. Describe the structure and location of serous demilunes. Describe histology of oropharynx	Interactive Lectures
Relate the characteristics of various layers of GIT with their function	Interactive Lectures
Describe the light microscopic structure of esophagus	Interactive Lectures
Tabulate the histological differences between different parts of esophagus	Interactive Lectures
Describe the histological changes associated with reflux esophagitis and Barrett's esophagus	Interactive Lectures
Describe the light microscopic structure of stomach	Interactive Lectures
Describe the role of parietal cells in pernicious anemia	Interactive Lectures
Describe the light microscopic structure of	Interactive

1. Duodenum 2. Jejunum 3. Ileum	Lectures
Discuss the histological basis of celiac disease	Interactive Lectures
Discuss the histological basis of Crohn's disease	Interactive Lectures
Describe the light microscopic structure of 1. Colon 2. Appendix 3. Rectum Define colorectal cancer, anal abscess, hemorrhoids	Interactive Lectures
PRACTICAL HISTOLOGY SPECIFIC LEARNING OBJECTIVES	**TEACHING STRATEGIES**
Identify, draw and label the histological sections of Tongue and Lips and enumerate points of identification	Practical
Identify, draw and label the histological sections of Salivary glands (Submandibular, Sublingual and Parotid)	Practical
Identify, draw and label the histological structure of the esophagus and enumerate points of identification Identify, draw and label the histological structure of stomach and enumerate points of identification	Practical
Identify, draw and label the histological structure of small intestine (Duodenum, Jejunum, and Ileum) and enumerate points of identification	Practical
Identify, draw and label the histological structure of large intestine and enumerate points of identification	Practical
Identify, draw and label the histological sections of Gall bladder, liver and enumerate points of identification	Practical
Identify, draw and label the histological sections of pancreas and enumerate points of identification	Practical
Identify, draw and label the histological sections of Palatine tonsil, appendix, peyer's patches and enumerate points of identification	Practical

MEDICAL PHYSIOLOGY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Classify the components of enteric nervous system	Interactive Lectures / SGD
Discuss the location and significance of myenteric plexus	Interactive Lectures / SGD
Describe the Meissner's plexus	Interactive Lectures / SGD
Differentiate between myenteric and Meissner's plexuses	Interactive Lectures / SGD
Explain the mechanism of developing slow wave	Interactive Lectures / SGD

Explain the mechanism of developing spike potential	Interactive Lectures / SGD
Enlist the factors that depolarize & hyperpolarize the GIT membrane	Interactive Lectures / SGD
Enlist the excitatory & inhibitory neurotransmitters of enteric nervous system	Interactive Lectures / SGD
Explain the role of sympathetic & parasympathetic nervous system in controlling GIT function.	Interactive Lectures / SGD
Enlist the gastrointestinal reflexes & explain the functions of these reflexes	Interactive Lectures / SGD
Enlist the hormones acting on GIT, their stimuli, site of release and actions	Interactive Lectures / SGD
Enumerate different types of movements that occur in GIT	Interactive Lectures / SGD
Discuss the functions and control of GIT movements	Interactive Lectures / SGD
Discuss the effect of gut activity and metabolic factors on GIT blood flow	Interactive Lectures / SGD
Explain the nervous control of GIT blood flow	Interactive Lectures / SGD
Trace the reflex arc of mastication	Interactive Lectures / SGD
Explain the process and importance of chewing reflex	Interactive Lectures / SGD
Enlist the stages of swallowing	Interactive Lectures / SGD
Describe the mechanism of voluntary stage of swallowing	Interactive Lectures / SGD
Trace the reflex arc of involuntary stage of swallowing	Interactive Lectures / SGD
Enlist the stepsinvolved in involuntarystage of swallowing	Interactive Lectures / SGD
Explain the effect of swallowing on respiration	Interactive Lectures / SGD
Discuss the mechanism of esophageal stage of swallowing	Interactive Lectures / SGD
Enlist causes of dysphagia	Interactive Lectures / SGD
Explain the types and role of different peristalsis originating in esophagus	Interactive Lectures / SGD
Discuss the role of Lower Esophageal Sphincter (Gastroesophageal)	Interactive Lectures / SGD
Discuss the pathophysiology of achalasia & Megaesophagus	Interactive Lectures / SGD
Enlist the features and treatment of achalasia	Interactive

	Lectures / SGD
Explain storage function of stomach	Interactive Lectures / SGD
Describe the basic electrical rhythm of stomach wall	Interactive Lectures / SGD
Explain the role of pyloric pump and pyloric sphincter in gastric emptying	Interactive Lectures / SGD
Explain the factors that promote Stomach Emptying	Interactive Lectures / SGD
Discuss the duodenal (nervous & hormonal) factors that inhibit Stomach emptying	Interactive Lectures / SGD
Enlist the factors that initiate enterogastric inhibitory reflexes	Interactive Lectures / SGD
Enumerate the causes, features, and pathophysiology of gastritis	Interactive Lectures / SGD
Explain the physiological basis of each feature of gastritis	Interactive Lectures / SGD
Recommend treatment of gastritis	Interactive Lectures / SGD
Enumerate the causes, features, and pathophysiology of peptic ulcer	Interactive Lectures / SGD
Explain the physiological basis of each feature of peptic ulcer	Interactive Lectures / SGD
Enumerate and explain the hormones and movements of small intestine	Interactive Lectures / SGD
Explain the term “peristaltic rush”	Interactive Lectures / SGD
Explain the functions of ileocecal valve and sphincter	Interactive Lectures / SGD
Enumerate the types of intestinal sprue	Interactive Lectures / SGD
Enlist the features of intestinal sprue	Interactive Lectures / SGD
Explain the consequences of sprue on the body	Interactive Lectures / SGD
Enumerate the types of movements taking place in colon	Interactive Lectures / SGD
Explain the mechanism of developing movements of colon and their control through Gastrocolic and Duodenocolic Reflexes	Interactive Lectures / SGD
Enlist the defecation reflexes	Interactive Lectures / SGD
Explain the mechanism of defecation reflex	Interactive Lectures / SGD
Trace the reflex arc of defecation	Interactive Lectures / SGD

Name the other autonomic reflexes that affect bowel activity	Interactive Lectures / SGD
Explain the pathophysiology of constipation	Interactive Lectures / SGD
Discuss the causes of diarrhea Describe the cause of Hirschsprung's disease integrate with Medicine	Interactive Lectures / SGD
Explain the functions of liver	Interactive Lectures / SGD
Differentiate between liver and gall bladder bile and the hormones acting on them	Interactive Lectures / SGD
Enumerate the causes and composition of developing gall stones	Interactive Lectures / SGD
Explain function and secretions of pancreas	Interactive Lectures / SGD
Enlist the causes and pathophysiology of acute and chronic pancreatitis	Interactive Lectures / SGD
Enumerate the features of acute pancreatitis and explain the physiological basis of each feature of pancreatitis	Interactive Lectures / SGD
Describe the stages of vomiting act	Interactive Lectures / SGD
Trace the reflex arc of vomiting	Interactive Lectures / SGD
Explain the role of chemoreceptor trigger zone for initiation of vomiting by drugs or by motion sickness	Interactive Lectures / SGD
Define Malnutrition	Interactive Lectures / SGD
Identify various causes of malnutrition	Interactive Lectures / SGD
Identify the risk factors of malnutrition	Interactive Lectures / SGD
Outline treatment strategies	Interactive Lectures / SGD
Define Acute Diarrhea	Interactive Lectures / SGD
Define Chronic Diarrhea	Interactive Lectures / SGD
Enlist various causes for acute and chronic diarrhea	Interactive Lectures / SGD
PHYSIOLOGY - PRACTICAL COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Demonstrate Cranial nerve V, IX & X testing	Practical

BIOCHEMISTRY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**

Give the composition and importance of saliva and related clinical disorder (xerostomia)	Interactive Lectures / SGD
Give the composition and importance of gastric juice with special reference to mechanism of HCl secretion and related clinical disorders (achlorhydria, gastric ulcer	Interactive Lectures / SGD
Give the composition and importance of pancreatic juice, bile and succus entericus and related clinical disorders (pancreatitis, cystic fibrosis, cholelithiasis).	Interactive Lectures / SGD
Describe digestion and absorption of dietary carbohydrates along with inherited and acquired disorders (lactose intolerance, sucrase-isomaltase deficiency).	Interactive Lectures / SGD
Elaborate key features of various transport systems for entry of glucose into cells.	Interactive Lectures / SGD
Enlist the hormones that play important roles in regulating carbohydrate metabolism.	Interactive Lectures / SGD
Elaborate the metabolic effects of these hormones.	Interactive Lectures / SGD
Infer the consequences of deficiency and excess of these hormones	Interactive Lectures / SGD
Describe the glycolytic pathway along with its regulation and significance.	Interactive Lectures / SGD
Compare keyfeatures of aerobic and anaerobic glycolysis.	Interactive Lectures / SGD
Calculate the number of ATP produced during aerobic and anaerobic glycolysis.	Interactive Lectures / SGD
Explain hemolytic anemia in subjects with pyruvate kinase deficiency based on your biochemical knowledge.	Interactive Lectures / SGD
Clearly differentiate between substrate level phosphorylation and oxidative phosphorylation.	Interactive Lectures / SGD
Discuss the metabolic fates of pyruvate.	Interactive Lectures / SGD
Describe the transport of pyruvate from cytosol to mitochondria.	Interactive Lectures / SGD
Elaborate the reaction catalyzed by pyruvate dehydrogenase complex (PDH) along with regulation and significance.	Interactive Lectures / SGD
Enlist inherited and acquired causes of lactic acidosis and give biochemical explanation for lactic acidosis in each condition.	Interactive Lectures / SGD
Describe the TCA cycle along with regulation & significance. Calculate the energy yield of TCA	Interactive Lectures / SGD
Define gluconeogenesis and enumerate gluconeogenic substrates (precursors)	Interactive Lectures / SGD
Delineate the reactions involved in synthesis of glucose from various gluconeogenic substrates.	Interactive Lectures / SGD
Elaborate the regulation and importance of gluconeogenesis.	Interactive Lectures / SGD

Explain the significance of Cori cycle and glucosealanine cycle	Interactive Lectures / SGD
Illustrate the reactions of glycogenesis, glycogenolysis along with their regulation and significance	Interactive Lectures / SGD
Enlist various types of glycogen storage diseases (GSDs)	Interactive Lectures / SGD
Infer the key biochemical and clinical features of various GSDs from the respective enzyme deficiencies.	Interactive Lectures / SGD
Describe the reactions and regulation of Hexose Mono Phosphate Pathway (HMP).	Interactive Lectures / SGD
Discuss the importance of HMP shunt	Interactive Lectures / SGD
Explain hemolytic anemia in subjects suffering from G6PD deficiency.	Interactive Lectures / SGD
Diagnose G6PD (glucose-6-phosphate dehydrogenase) deficiency based on given data.	Interactive Lectures / SGD
Describe the reactions, regulation, and biomedical importance of uronic acid pathway and sorbitol pathway	Interactive Lectures / SGD
Outline the reactions involved in metabolism of galactose and fructose.	Interactive Lectures / SGD
Infer the key biochemical and clinical features of galactosemia, essential fructosuria, and hereditary fructose intolerance (HFI) from the respective enzyme deficiencies.	Interactive Lectures / SGD
Explain hypertriacylglycerolemia, hypercholesterolemia, and hyperuricemia associated with fructose loading of liver.	Interactive Lectures / SGD
Outline the reactions involved in ethanol metabolism.	Interactive Lectures / SGD
Explain how ethanol consumption causes hypoglycemia and fatty liver.	Interactive Lectures / SGD
Diagrammatically illustrate the organization of electron transport chain (ETC) depicting the flow of electrons	Interactive Lectures / SGD
Enlist the components of complex I, II, III, and IV	Interactive Lectures / SGD
Enumerate clinically important inhibitors of electron transport chain and mention their site of action.	Interactive Lectures / SGD
Elaborate the structure of ATP synthase (complex V).	Interactive Lectures / SGD
Explain how the free energy generated by the transport of electrons by ETC is used to produce ATP from ADP + Pi (i.e. chemiosmotic hypothesis)	Interactive Lectures / SGD
Elaborate the effect of oligomycin and uncouplers on ATP production.	Interactive Lectures / SGD
Describe the effect of arsenic poisoning on carbohydrate metabolism and ATP production.	Interactive Lectures / SGD
Elaborate the glycerol 3-P shuttle and malate-aspartate shuttle for the transfer of reducing equivalents from cytosol into the mitochondria.	Interactive Lectures / SGD

Define and classify nutrients into macro and micronutrients.	Interactive Lectures / SGD
Elaborate the concept and importance of Balanced Diet	Interactive Lectures / SGD
Enlist the components of balanced diet and elaborate the importance of each component.	Interactive Lectures / SGD
Delineate special nutritional requirements during pregnancy, lactation, growth, and old age.	Interactive Lectures / SGD
Suggest dietary advice for patients suffering from diabetes mellitus, hypertension, obesity, renal disease, lactose intolerance, gluten enteropathy, hypercholesterolemia, and hemorrhoids.	Interactive Lectures / SGD
Enlist causes and types of Protein Energy Malnutrition (PEM).	Interactive Lectures / SGD
Differentiate between Kwashiorkor and Marasmus based on the given data Enlist symptoms and signs Outline treatment strategies	Interactive Lectures / SGD
Define energy balance.	Interactive Lectures / SGD
Compare the energy content of macro nutrients and alcohol.	Interactive Lectures / SGD
Suggest a simple method for estimation of caloric requirements of sedentary adults, moderately active adults, and very active adults	Interactive Lectures / SGD
Define basal metabolic rate (BMR)	Interactive Lectures / SGD
Elaborate the effect of various physiological and pathological factors on BMR.	Interactive Lectures / SGD
Define body mass index (BMI).	Interactive Lectures / SGD
Categorize individuals into underweight, normal, overweight, obese, and morbidly obese based on theirs BMI values.	Interactive Lectures / SGD
Elaborate the role of genetic, environmental, and behavioral factors in determining body weight.	Interactive Lectures / SGD
Clearly differentiate between upper body obesity and lower body obesity.	Interactive Lectures / SGD
Enlist health risks associated with obesity.	Interactive Lectures / SGD
Describe sources, Recommended Dietary Allowance (RDA), biochemical functions, deficiency, and toxicity of vitamin B1, B2, B3, B5 and B7.	Interactive Lectures / SGD
Describe sources, RDA, biochemical functions, deficiency, and toxicity of vitamin E and vitamin K.	Interactive Lectures / SGD
Define and classify minerals according to their daily requirements.	Interactive Lectures / SGD
Give sources, functions and biomedical importance of Na, K and Cl.	Interactive Lectures / SGD

Describe sources, functions and biomedical importance of Mg, Se, I, F, Cu, Cr, Mn, Mo, Zn and Co.	Interactive Lectures / SGD
Define Marasmus and Kwashiorkor	Interactive Lectures / SGD
Define Acute Hepatitis	Interactive Lectures / SGD
Define Chronic Hepatitis	Interactive Lectures / SGD
Enlist various causes for acute and chronic hepatitis	Interactive Lectures / SGD
Describe various symptoms and signs of chronic hepatitis	Interactive Lectures / SGD
Outline treatment strategies	Interactive Lectures / SGD
BIOCHEMISTRY - PRACTICAL COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Estimate blood glucose level by glucose oxidase method and interpret the results	Practical
Determine blood glucose level by glucometer and interpret the result.	Practical
Perform Glucose tolerance test (GTT) and interpret the results.	Practical
Determine urine glucose by dipstick method and interpret the result.	Practical
Estimate serum amylase and interpret the result.	Practical
Interpret the results of Lactose tolerance test.	Practical
Determine BMI of given subject and interpret the results.	Practical

AGING – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Identify causes and risk factors for malnutrition in elderly	Lecture Community Medicine
Outline treatment strategies	

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Classify anti diarrheal drugs and describe the pharmacokinetics, mechanism of action, pharmacological effects, uses and adverse effects	Lecture Pharmacology
Describe the etiology, pathogenesis, morphology and clinical features of peptic ulcer disease	Lecture Pathology
Enumerate common infectious agents of diarrheal diseases Discuss pathogenesis and clinical features of common pathogens	

DISEASE PREVENTION & IMPACT THEORY COURSE OBJECTIVES	**TEACHING STRATEGIES**

SPECIFIC LEARNING OUTCOMES	
Identify health related behaviors and apply principles of learning to modify eating and addictive patterns	Lecture Behavioral Science
Discuss health belief model and its application in managing common presentations related to gastro- intestinal system	
Explain the transtheoretical model of changing behaviors to modify the diseases pattern	
Describe motivational interviewing and outline a management plan to help the individuals with obesity and diabetes to lose weight	
Describe and distinguish Medically Un described Symptoms (MUS)	
Describe the association of psychosocial factors with MUS	
Outline the principles of management plan according to biopsychosocial model	
Describe role of Cognitive Behavioral Therapy (CBT)	
To identify effect on mental development of nutritional deficiencies	
Describe prevention and control of polio, viral hepatitis A, cholera, typhoid and food poisoning	Lecture Community Medicine
Describe prevention and control ofamoebiasis, ascariasis, hook worm infestation	
Describe the advice to be given for breast feeding, weaning and childhood	
Discuss risk factors, prevention and management of protein energy malnutrition (PEM)	
Describe balanced diet for adult and obesity	
Plot and interpret growth chart for children under 5 years of age	
Describe prevention and control of deficiency of Vitamin A and D	

ASSESSMENT

INTERNAL ASSESSMENT

BLOCK - 4

(Total 70 Marks)

THEORY		
S. No	**Scoring Parameter**	**Marks out of 35**
1.	Attendance >91% = 2 Marks 85-90% = 1 Mark	02 Marks
2.	Block Exam 71-onwards = 7 Marks 66-70 = 7 Marks 61-65 = 7 Marks 55-60 = 6 Marks	27 Marks
3.	Portfolio, Professional Behavior, Leadership Trait	03 Marks
4.	Continuous Assessment (Formative) – 3 Modules (only Pass)	03 Marks

PRACTICAL AND BEHAVIORAL ASSESSMENT		
S. No	**Scoring Parameter**	**Marks out of 35**
1.	Attendance >91% = 2 Marks 85-90% = 1 Mark	02 Marks
2.	Summative Assessment (Block Exam) OSPE / Practical 71-onwards = 7 Marks 66-70 = 7 Marks 61-65 = 6 Marks 55-60 = 6 Marks	26 Marks
3.	Practical books / Clinical Logbooks	07 Marks

PROPOSED DATE SHEET FOR 4TH BLOCK EXAMINATION		
SUBJECT	**WRITTEN**	
Following is the schedule of 6th Module Test		
Anatomy	(14-April-2025)	
Physiology	(15-April-2025)	
Biochemistry	(16-April-2025)	
Following is the schedule of 4TH Block Examination.		
WRITTEN	**OSPE**	**VIVA**
22-May-2025	23-May-2025	Anatomy 24-May-2025 Physiology 26-May-2025 Biochemistry 27-May-2025

ASSESSMENT TOOLS

MCQS

SEQS

OSPE

OSCE

VIVA

(MARKS DISTRIBUTION)
MBBS 2ND PROFESSIONAL
BLOCK – 4

Theme	Subject	Written Exam			Oral/Practical/Clinical Exam			
		MCQ (1 mark)	SEQ (5 mark each)	Marks	OSPE (08 marks each) Observed	OSCE (05 marks each) Observed	OSVE (14 marks each Observed)	Marks
Normal Structure	Anatomy applied/clinical	23	03	38	04	-	01	46
Normal Function	Physiology applied/clinical	18	02	28	03	-	01	38
	Biochemistry applied/clinical	22	03	37	02	-	01	30
Disease Burden & Prevention	Community Medicine & Public Health	06	-	06	-	-	-	-
	Behavioral Sciences	05	-	05	-	-	-	-
Pathophysiology and Pharmacotherapeutics	Pathology	11	01	16	01	-	-	08
	Pharmacology	05	01	10	01	-	-	08
CFRC	CF -2	-	-	-		01	-	05
PERLs	PERLs -2	-	-	-		01	-	05
Total		**90**	**10 x 5 = 50**	**140**	**11 Stations x 08 = 88**	**02 Stations x 05 = 10**	**03 Stations x 14 = 42**	**140**

INDEPENDENT MEDICAL COLLEGE, FSD

BLOCK-4

RENAL-I (MODULE – 7)
CURRICULUM 2K23
(Study Guide)

MODULAR INTEGRATED
UNDERGRADUATE CURRICULUM

INTRODUCTION TO THE MODULE

The renal module for second-year MBBS (Bachelor of Medicine, Bachelor of Surgery) students is a crucial component of the medical curriculum. This module is designed to provide students with a comprehensive understanding of the structure, function, and pathology of the kidneys, as well as the principles of renal physiology and the clinical management of and electrolyte balance, acid-base balance, and blood pressure. Understanding renal physiology is essential for comprehending various disease renal disorders. Here are some key rationales for including a renal module in the curriculum:

MODULE COMMITTEE

Prof. Dr. Irfan Ahmad Mughal	Anatomy (Coordinator Integrated Curriculum)
Prof. Dr. Razia Rizwan	Physiology (Module Coordinator)
Dr. Rizwan Ahmad	Biochemistry
Dr. Awais Shuja	Surgery
Dr. Baddar Bashir	Medicine
Dr. Sirda Mushtaq	Pharmacology
Dr. Shahbaz Ahmad	Community Medicine
Dr. Salma Naz	Pathology
Dr. Aslam Lodhi	Psychiatry
Dr. Taimur-ul-Hassan	Medical Education

INDEPENDENT MEDICAL COLLEGE, FAISALABAD
2ND YEAR MBBS 2025

TIME TABLE
4TH BLOCK – 7TH MODULE (RENAL – I)
4 Weeks

DAY	08:00 - 10:00	10:00 - 11:30	11:30 - 12:00	12:00 - 01:00	01:00 - 02:00	02:00 - 02:30
Mon	Physiology	Biochemistry	**BREAK**	Anatomy	Pathology	**Self Directed Learning (SDL)**
Tues	Physiology	Biochemistry		Anatomy	Community Medicine / Behavioral Sciences	
Wed	Physiology	Biochemistry		Anatomy	Holy Quran / Pak Study	
Thu	Physiology	Biochemistry		Anatomy	Biochemistry	
Fri	Medicine 8:00 - 09:00	CFRC / Pharmacology 09:00 - 10:00	Anatomy 10:00 - 12:00			
Sat	Physiology 08:00 - 10:00	Biochemistry 10:00 - 11:30	**BREAK** 11:30 - 12:00	Anatomy 12:00 - 01:00	PERL 01:00 - 02:00	SDL 02:00 - 02:30

DISTRIBUTION OF TEACHING HOURS

Modules weeks	03
Recommended Minimum Hours	71 hr
Anatomy	05 hr
Physiology	26 hr
Biochemistry	28 hr
Pathology	05 hr
Community Medicine	04 hr
Pharmacology	02 hr
Behavioral Sciences	01 hr
CFRC	03 hr
PERL	03 hr

MODULE OUTCOMES

- Discuss the gross and microscopic anatomy of kidney and urinary system.
- Explain the embryological development of kidney and urinary tract.
- Explain common developmental abnormalities of renal system.
- Identify role of renal system in maintaining blood pressure and acid base balance.
- Enlist functions of kidney and pathologies related to them.
- Explain method of electrolyte balance and pathologies related to it.
- Highlight pathologies related to kidneys and their distinctive clinical features.
- Interpret investigations done to diagnose abnormal structural and functional presentations.

LEARNING OBJECTS
BLOCK 4 – (RENAL – I) MODULE – 7

GROSS ANATOMY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	TEACHING STRATEGIES
Describe gross features and facial coverings of kidneys.	SGD
Compare and contrast the relations of right and left kidneys.	SGD
Describe blood supply, lymphatics and nerve supply of kidney	SGD
Discuss the clinical aspects of kidneys	SGD
Demonstrate the surface marking and radiographic anatomy of kidney. Identify the side of kidney	SGD
Compare and contrast the relations of right and left ureter	SGD
Give the constrictions of ureter	SGD
Describe the blood supply nerve supply and lymphatics of ureter	SGD
Identify the ureter.	SGD
Describe the gross anatomical features, relations, surfaces, blood supply, nerve supply and lymphatics of urinary bladder	SGD
Give the clinical corelates of urinary bladder	SGD
Identify the gross features and surfaces of urinary bladder	SGD
Interpret basic urological signs/symptoms & investigations.	SGD
Describe the etiology, and management of urinary retention.	SGD
Identify and describe the various anatomic landmarks of the renal system on radiographs.	SGD
Describe the parts of urethra.	SGD
EMBRYOLOGY & POST-NATAL DEVELOPMENT SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe development of intermediate mesoderm and its derivatives	Interactive Lectures
Describe the development of pronephros, mesonephros and metanephros	Interactive Lectures
Describe positional changes during descent of kidney with correlation to its blood supply	Interactive Lectures
Describe the development of urinary bladder and urethra	Interactive Lectures
List and describe the common congenital anomalies of kidney, urinary bladder and urethra.	Interactive Lectures
MICROSCOPIC STRUCTURE SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe the histological, structural organization and functions of kidney with clinicals.	Interactive Lectures
Describe the light and ultrastructure of Juxtaglomerular apparatus and	Interactive

glomerular filtration barrier	Lectures
Describe the histological structure of ureter	Interactive Lectures
Describe the histological structure of urinary bladder Discuss clinical correlates (Cystitis, Urinary bladder cancer, Urinary Tract Infections (UTIs))	Interactive Lectures
PRACTICAL HISTOLOGY SPECIFIC LEARNING OBJECTIVES	**TEACHING STRATEGIES**
Identify and draw and label the histological structure of kidney and enumerate points of identification	Practical
Identify, draw and label the histological structure of ureter and numerate its points of identification	Practical
Identify, draw and label the histological structure of urinary bladder and enumerate its points of identification	Practical

MEDICAL PHYSIOLOGY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe major composition of intracellular and extracellular fluids	Interactive Lectures / SGD
Define Hypo and hypernatremia	Interactive Lectures / SGD
Explain the causes of hypo & hypernatremia and their effects on Composition of body fluid compartments	Interactive Lectures / SGD
Describe difference between iso-osmotic, hyper- osmotic, hypo-osmotic fluids	Interactive Lectures / SGD
Enumerate causes of Intracellular and extracellular edema	Interactive Lectures / SGD
Describe safety factors that prevent edema	Interactive Lectures / SGD
Explain the functions of the kidney	Interactive Lectures / SGD
Describe the mechanism of micturition and its control	Interactive Lectures / SGD
Explain the role of higher center on micturition	Interactive Lectures / SGD
Explain the physiological anatomy and innervations of bladder	Interactive Lectures / SGD
Discuss the voluntary control of micturition	Interactive Lectures / SGD
Explain the causes, pathophysiology, and features of atonic bladder. Discuss the causes, pathophysiology, and features of automatic bladder. Write the causes, pathophysiology, and features of uninhibited neurogenic bladder	Interactive Lectures / SGD
Enlist the steps of urine formation	Interactive Lectures / SGD

Explain the physiological anatomy and functions of glomerular capillary membrane	Interactive Lectures / SGD
Discuss the composition of filtrate	Interactive Lectures / SGD
Explain the minimal change nephropathy and increase permeability to plasma protein	Interactive Lectures / SGD
Define Glomerular Filtration Rate (GFR).	Interactive Lectures / SGD
Describe the determinants of GFR	Interactive Lectures / SGD
Explain the factors affecting GFR	Interactive Lectures / SGD
Discuss the hormones and autocoids that affect GFR	Interactive Lectures / SGD
Explain mechanisms of autoregulation of GFR	Interactive Lectures / SGD
Enlist the physiological and pathological factors that decrease GFR	Interactive Lectures / SGD
Explain the effects of angiotensin II blocker on GFR during renal hypoperfusion	Interactive Lectures / SGD
Enumerate different types of transport along the kidney tubules for reabsorption	Interactive Lectures / SGD
Explain the reabsorption and secretion along different parts of the Nephron	Interactive Lectures / SGD
Explain the regulation of tubular reabsorption	Interactive Lectures / SGD
Discuss the forces / pressure and hormones that determine renal tubular reabsorption	Interactive Lectures / SGD
Explain the reabsorption of water along different parts of nephron	Interactive Lectures / SGD
Define obligatory and facultative reabsorption	Interactive Lectures / SGD
Discuss the characteristics of late distal tubules and cortical collecting ducts	Interactive Lectures / SGD
Discuss the characteristics of medullary collecting ducts	Interactive Lectures / SGD
Explain the use of clearance method to quantify kidney function	Interactive Lectures / SGD
Describe mechanism of re-absorption of sodium along different parts nephrons	Interactive Lectures / SGD
Define and explain the term Transport maximum for the substances	Interactive Lectures / SGD
Define filtered load for the substance	Interactive Lectures / SGD
Justify the difference of transport maximum and renal threshold of	Interactive

glucose in renal tubules	Lectures / SGD
Explain the renal mechanisms for excreting Dilute urine	Interactive Lectures / SGD
Explain the mechanism for forming a concentrated urine	Interactive Lectures / SGD
Discuss the role of urea in the process of counter current multiplier mechanism	Interactive Lectures / SGD
Describe the countercurrent exchange in vasa Recta to preserve hyperosmolarity of renal medulla	Interactive Lectures / SGD
Define and explain the term obligatory urine volume. Define and explain free water clearance. Define Urine specific gravity.	Interactive Lectures / SGD
Enumerate different abnormalities of urinary concentrating ability	Interactive Lectures / SGD
Enumerate the types of Diabetes insipidus	Interactive Lectures / SGD
Enlist the features of diabetes insipidus	Interactive Lectures / SGD
Explain the pathophysiology and treatment of central diabetes insipidus	Interactive Lectures / SGD
Discuss the pathophysiology of nephrogenic diabetes insipidus	Interactive Lectures / SGD
Make the flow chart to show the Osmoreceptor- antidiuretic hormone (*ADH*) feedback mechanism for regulating extracellular fluid osmolarity in response to a water deficit.	Interactive Lectures / SGD
Enlist the factors which increase and decrease the release of ADH	Interactive Lectures / SGD
Explain the mechanism of thirst	Interactive Lectures / SGD
Enumerate the factors that can alter potassium distribution between intracellular and extracellular fluids	Interactive Lectures / SGD
Discuss the process of secretion of potassium by renal tubules Explain the regulation of internal potassium distribution and potassium secretion	Interactive Lectures / SGD
Explain the control of extracellular fluid osmolarity and sodium concentration	Interactive Lectures / SGD
Explain the integration of renal mechanism for control of Extracellular Fluid (ECF)	Interactive Lectures / SGD
Explain the importance of pressure natriuresis and dieresis in maintaining body sodium and fluid balance	Interactive Lectures / SGD
Explain the renal handling of calcium concentration to regulate plasma calcium concentration	Interactive Lectures / SGD
Enumerate the factors that alter renal calcium	Interactive Lectures / SGD
Enlist the factors that alter renal phosphate excretion	Interactive

	Lectures / SGD
Explain the nervous and hormonal factors that increase the effectiveness of renal body fluid feedback control	Interactive Lectures / SGD
Explain the conditions that cause large increase in blood volume and ECF volume Explain the conditions that cause large increase ECF volume but with normal blood volume	Interactive Lectures / SGD
Explain the renal handling of H^+ ion.	Interactive Lectures / SGD
Analyze the acid base disturbances on the basis of pH, HCO3 and CO2	Interactive Lectures / SGD
Explain the causes and compensation of metabolic acidosis	Interactive Lectures / SGD
Explain the causes and compensation of metabolic alkalosis	Interactive Lectures / SGD
Explain the causes and compensation of respiratory acidosis	Interactive Lectures / SGD
Explain the causes and compensation of respiratory alkalosis	Interactive Lectures / SGD
Explain the causes and compensation of mixed acid base disorder	Interactive Lectures / SGD
Define and explain anion gap	Interactive Lectures / SGD
BIOCHEMISTRY – PRACTICAL COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Perform a complete examination of the urine sample URS-10 (using urine reagent-10) and interpret its report	Physiology Practical
Determine the specific gravity of urine	

BIOCHEMISTRY – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Describe digestion and absorption of dietary proteins along with the inherited and acquired disorders (peptic ulcer, Hartnup disease, gluten enteropathy and cystic fibrosis). Elaborate the mechanisms involved in renal reabsorption of amino acids and discuss related disorders (Hartnup disease and cystinuria)	Interactive Lectures / SGD
Clearly differentiate between protein digestion and degradation.	Interactive Lectures / SGD
Compare the salient feature of the two major mechanisms for degradation of body proteins. Elaborate the concept of protein turnover and quote examples of short lived and long-lived proteins.	Interactive Lectures / SGD
Define amino acid pool. Delineate the sources and fates of amino acids. Give definition of nitrogen balance and its three states. Give physiological and/or pathological conditions associated with each state of nitrogen	Interactive Lectures / SGD

balance.	
Enlist 7 important reactions involved in amino acid metabolism and give a brief introduction of each. (Deamination, Transamination, Trans-deamination, Deamidation, Decarboxylation, Transmethylation & Transpeptidation)	Interactive Lectures / SGD
Define transamination. Describe the reactions catalyzed by ALT (alanine transaminase) and AST (aspartate aminotransferase) with special reference to the role of pyridoxal phosphate in the transfer of amino group. Give diagnostic and prognostic importance of serum ALT and AST. Elaborate the importance of transamination reaction in amino acid metabolism.	Interactive Lectures / SGD
Define trans deamination.	Interactive Lectures / SGD
Define deamidation. Describe deamidation reaction catalyzed by glutaminase and asparaginase along with their significance. Explain how does L-asparaginase help in the management of certain types of leukemia. Elaborate the mechanism for shunting of glutamine from liver to kidneys during acidosis. Give advantage of shunting.	Interactive Lectures / SGD
Define decarboxylation. Describe important decarboxylation reactions along with their significance	Interactive Lectures / SGD
Give sources of ammonia in human body. Describe how ammonia is transported to liver with special reference to the role of glutamine and alanine in this transport mechanism.	Interactive Lectures / SGD
Elaborate the reactions and regulation of urea cycle. Enlist the inherited and acquired causes of hyperammonemia in each condition. Give the biochemical mechanisms underlying ammonia intoxication. Discuss dietary and therapeutic measures for the management of patients with hyperammonemia (phenylbutyrate, lactulose, antibiotics).	Interactive Lectures / SGD
Trace the pathways for synthesis of non-essential amino acids (NEAA) (alanine, aspartate, glutamate, glutamine, asparagine, proline, serine, glycine, cysteine, and tyrosine)	Interactive Lectures / SGD
Discuss the fate of carbon skeletons of amino acids. Categorize amino acids into glucogenic, ketogenic or both depending upon the intermediates produced during their catabolism. Outline the catabolic pathways of amino acids that yield oxaloacetate. Outline the catabolic pathways of amino acids that yield α-ketoglutarate. Outline the catabolic pathways of amino acids that yield pyruvate. Outline the catabolic pathways of amino acids that yield fumarate. Outline the catabolic pathways of amino acids that yield succinyl CoA. Outline the catabolic pathways of amino acids that yield acetyl CoA or acetoacetyl CoA.	Interactive Lectures / SGD
Describe the metabolism of methionine. Discuss cause, Key diagnostics features and management of	Interactive Lectures / SGD

homocystinuria.	
Describe the catabolism of branched chain amino acids. Discuss cause, key diagnostic features, and management of Maple Syrup Urine disease (MSUD).	Interactive Lectures / SGD
Describe the metabolism of tyrosine. Discuss the cause, key diagnostic features, and management of alkaptonuria, albinism, and type 1 tyrosinemia.	Interactive Lectures / SGD
Give cause, key diagnostic features, and management of phenylketonuria (PKU)	Interactive Lectures / SGD
Elaborate special roles of glycine, tryptophan, phenylalanine, tyrosine, and methionine	Interactive Lectures / SGD
Describe ionization of water and elaborate its significance. Discuss water and electrolyte balance in health and disease.	Interactive Lectures / SGD
Define pH and describe the concept of pH scale.	Interactive Lectures / SGD
Define weak acids and conjugate base.	Interactive Lectures / SGD
Define Ka and pKa and give their significance.	Interactive Lectures / SGD
Describe Henderson-Hasselbach (HH) equation. (no derivation required) along with its application/use.	Interactive Lectures / SGD
Define buffers. Enumerate the component of a buffers system and describe their mechanism of action. Enlist important buffers present in blood, plasma, ECF (Extra Cellular Fluid), ICF (Intra Cellular Fluid) and renal tubular fluid. Elaborate the working of bicarbonate buffer and phosphate buffer.	Interactive Lectures / SGD
Elaborate the role of kidneys in the regulation of acid base balance.	Interactive Lectures / SGD
Elaborate the concept of 1^{st}, 2^{nd} and 3^{rd} line of defense against changes in H^+ ion concentration.	Interactive Lectures / SGD
Define acidosis and alkalosis. Classify acid base disorders. Enlist causes of metabolic acidosis and give its compensation. Enlist causes of respiratory acidosis and give its compensation. Enlist causes of metabolic alkalosis and give its compensation. Enlist causes of respiratory alkalosis and give its compensation.	Interactive Lectures / SGD
Interpret disorders metabolic and respiratory disorders of acid base balance on basis of sign, symptoms and arterial blood gas (ABG) findings Give biochemical explanation for tetany associated with alkalosis	Interactive Lectures / SGD

BIOCHEMISTRY – PRACTICAL COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Estimate blood urea level and interpret your results.	Practical

Estimate serum creatinine level and interpret your results. Compare the usefulness of blood urea and serum creatinine in assessment of renal functions.	
Determination of proteins in urine by dipstick method and interpret your results.	
Estimate serum acid phosphatase level and interpret your results.	

AGING – THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
To define preventive care in diseases related to urinary system(adults). Primary, secondary, and tertiary prevention.	Lecture Community
Define urinary incontinence. Outline management strategies.	Lecture Medicine

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Classify diuretics & carbonic anhydrase inhibitor. MOA, clinical uses, and adverse effects	Lecture Pharmacology & Therapeutics
Describe Thiazide & loop diuretics their Mechanism of Action, clinical uses, and adverse effects.	
Describe Potassium sparing and osmotic diuretics their mechanism of action, clinical uses, and adverse effects.	
Discuss the etiology and pathogenesis of different types of stones.	Lecture Pathology
Identify the causes, morphological aspect & outcome of hydronephrosis.	
Enlist common causative agents of urinary tract infections and describe pathogenesis and clinical features of common causative agents of UTI.	
Define various presentations of glomerulonephritis. Define nephrotic and nephritic syndrome. List various risk factors and outline management of glomerulonephritis.	
Define AKI (acute kidney injury) Identify various risk factors and causes for AKI. Outline management strategies.	
Define UTI (Urinary Tract Infection)	
Identify various risk factors and causes of UTI.	
Describe signs and symptoms of UTI.	
Outline management strategies.	

DISEASE PREVENTION & IMPACT THEORY COURSE OBJECTIVES SPECIFIC LEARNING OUTCOMES	**TEACHING STRATEGIES**
Discuss the significance of quality of life in disease and treatment settings. Measures of health status. Disability-Adjusted Life Year (DALY) and	Lecture Community

Quality-Adjusted Life Year (QALY) Life expectancy.	Medicine and Public Health
To identify the behavioral abnormalities caused by renal function.	
To identify the cognitive abnormality.	Lecture Behavioral Sciences
To identify the dangers for the patient, his family, and society.	

ASSESSMENT
INTERNAL ASSESSMENT

BLOCK - 4
(Total 70 Marks)

THEORY		
S. No	**Scoring Parameter**	**Marks out of 35**
1.	Attendance >91% = 2 Marks 85-90% = 1 Mark	02 Marks
2.	Block Exam 71-onwards = 7 Marks 66-70 = 7 Marks 61-65 = 7 Marks 55-60 = 6 Marks	27 Marks
3.	Portfolio, Professional Behavior, Leadership Trait	03 Marks
4.	Continuous Assessment (Formative) – 3 Modules (only Pass)	03 Marks

PRACTICAL AND BEHAVIORAL ASSESSMENT		
S. No	**Scoring Parameter**	**Marks out of 35**
1.	Attendance >91% = 2 Marks 85-90% = 1 Mark	02 Marks
2.	Summative Assessment (Block Exam) OSPE / Practical 71-onwards = 7 Marks 66-70 = 7 Marks 61-65 = 6 Marks 55-60 = 6 Marks	26 Marks
3.	Practical books / Clinical Logbooks	07 Marks

ASSESSMENT TOOLS

MCQS

SEQS

OSPE

OSCE

VIVA

RESOURCE BOOKS

Anatomy

- Langman's Medical Embryology
- Snell's Clinical Anatomy
- Snell's Clinical Neuroanatomy. Walter Kluwer
- Laiq H.S. Medical Histology. Paramount Books.
- Laiq H.S. General Anatomy. Paramount Books.

Physiology

- Guyton AC and Hall JE. Textbook of Medical Physiology. W. B. Sunders & Co., Philadelphia.
- Essentials of Medical Physiology by Mushtaq Ahmad

Biochemistry

- Harper's Biochemistry by Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell. McGraw-Hill latest ed.
- Lippincott's Illustrated Reviews Biochemistry Champe, P.C. & Harvey, E.A latest ed. Published by Lippincott Williams and Wilkins.
- ABC of clinical genetics by H. M. Kingston

Pathology

- Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pathologic basis of disease. WB Saunders.
- Richard Mitchall, Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pocket Companion to Pathologic basis of diseases. Saunder Harcourt.
- Walter and Israel. General Pathology. Churchill Livingstone.

Pharmacology

- Basic and Clinical Pharmacology by Katzung, McGraw-Hill.
- Pharmacology by Champe and Harvey, Lippincott Williams & Wilkins

Behavioral Sciences

- Handbook of Behavioural Sciences by Prof. Mowadat H. Rana, 3rd Edition.
- Medical and Psychosocial Aspects of Chronic Illness and Disability SIXTH EDITION Donna R. Falvo, PhD Beverley E. Holland, PhD, RN,

Community medicine

- Parks Textbook of Preventive and Social Medicine. K. Park (Editor).
- Public Health and Community Medicine Ilyas, Ansari (Editors)

Surgery

- Bailey & Love' Short practice of Surgery

Medicine

- Davidson's Principles and Practice of Medicine

Islamiyat

- Standard Islamiyat (compulsory) for B.A, BSc, MA, MSc, MBBS by Prof. M. Sharif Islahi.
- Ilmi Islamiyat (compulsory) for BA, BSc, & equivalent.