LAHORE
MEDICAL & DENTAL
COLLEGE

STUDY GUIDE

BLOCK 4

(GIT and Nutrition-1, Renal-1 module)

FOR

SECOND YEAR MBBS

2024

TABLE OF CONTENTS

I. LIST OF ABBREVIATIONS

A	Anatomy
Ag	Aging
B	Biochemistry
BhS	Behavioral sciences
CM	Community Medicine
C-FRC	Clinical-Foundation Rotation Clerkship
F	Foundation
HL	Hematopoietic & Lymphatic
M	Medicine
P	Physiology
Pa	Pathology
Pe	Pediatrics
PERLs	Professionalism, Ethics, Research, Leadership
Ph	Pharmacology
Psy	Psychiatry
QI	Quran and Islamiyat
R	Radiology
S	Surgery

II. CURRICULUM FRAME WORK FOR YEAR 2

YEAR	MODULES	
YEAR 2	• GIT and Nutrition-1 • Renal-1	**Block 4**
	• Endocrinology and Reproduction-1 • Head and Neck, Special senses	**Block 5**
	• Neurosciences-1 • Inflammation	**Block 6**
	• PERLs-2 • Quran-2 • Islamiyat, Civics & Pakistan Studies	**Spiral**
	• Clinical Skills Foundation C-FRC-2 (Clinical-foundation, Rotation, Clerkships)	

III. INTRODUCTION TO THE STUDY GUIDE

As UHS has introduced modular integrated MBBS curriculum 2k23 from the academic session 2022-2023, and version 2.0 is released in 2k24, the study guide for Block-4 is developed in order to introduce the second year MBBS students to various modules and blocks in year 2. The learning objectives of all the subjects included in block-4 are added to help learners focus on key areas. Time tables for both the modules in block-4 are added and total contact hours for each subject are given in a tabulated manner. The books and other reading resources are mentioned to facilitate the students. Assessment tools, policy and schedule is also included. Moreover, table of specifications (TOS) for block-4 examination is added to facilitate the learners.

IV. INTRODUCTION TO THE BLOCK-4

Course name:

- Block-4

Year:

- Year-2

Level of students:

- Second year MBBS

Duration of Block-4:

4th March 2024– 24th May 2024

- GIT and Nutrition-1: 4th March - 19th April
- Renal-1: 22th April - 24th May

V. BLOCK-4 COMMITTEES

A. GIT and Nutrition-1 Module committee:

Module coordinator

- Biochemistry (Prof. Rubina Bashir)

Module co-coordinator

- Prof. Sobia Imtiaz

Representatives

- Anatomy (Prof. Iffat Badar)
- Physiology (Dr. Sadia Nazir)
- Biochemistry (Prof. Sobia Imtiaz)
- Pharmacology (Prof. Ajaz Fatima, Dr. Amna Zubair)
- Pathology (Prof. Shazia, Dr. Maimoona)
- Medicine (Prof. Wasim Amer, Prof. Asad)
- Surgery (Prof Hasnat, Dr. Sidra Shoaib)
- Behavioral Science (Prof. Khalid Gill, Dr. Faraz Zafar, Miss Ramla)
- Community Medicine (Prof. Seema Daud, Dr. Humayun Mirza)
- Gynaecology & obstetrics (Prof. Nabeela Shami)
- Pediatrics (Prof. Rizwan, Dr. Madeeha)
- Deptt of Medical Education (Dr. Nighat Nadeem)

B. Renal-1 committee:

Module coordinator

- Biochemistry (Prof. Rubina Bashir)

Module co-coordinator

- Prof. Sobia Imtiaz

Representatives

- Anatomy (Prof. Iffat Badar)
- Physiology (Dr. Sadia Nazir)
- Biochemistry (Prof. Sobia Imtiaz)
- Pharmacology (Prof. Ajaz Fatima, Dr. Amna Zubair)
- Pathology (Prof. Shazia, Dr. Maimoona)
- Medicine (Prof. Wasim Amer, Prof. Asad)
- Surgery (Prof. Hasnat, Dr. Sidra Shoaib)
- Community Medicine (Prof. Seema Daud, Dr. Humayun Mirza)
- Gynaecology & obstetrics (Prof. Nabeela Shami)
- Pediatrics (Prof. Rizwan, Dr. Madeeha)
- Deptt of Medical Education (Dr. Nighat Nadeem)

TOR & Duties of Module Committees:

- Module committee was headed by module coordinator
- Module coordinator was nominated from the subject with the maximum content in the respective module
- Module coordinator developed module team for collaboration and consultation with all the relevant subjects
- Module committee assisted in implementation of the curricular guidelines provided by UHS
- Module committee coordinated with the assessment cell in medical education department.
- Module coordinator helped in developing the study guide in collaboration with medical education deptt

PBL COMMITTEE FOR BLOCK-4

Head of PBL committee (Module coordinator Block-4):

Prof. Iffat Badar, HOD Anatomy

Advisory members:

Prof. Anser Asrar, HOD Physiology
Prof. Rubina Bashir, HOD Biochemistry
Prof. Sobia Imtiaz, Biochemistry
Dr. Nighat Nadeem, Associate Prof. DME

Other members:

Dr. Shumaila Shakoor, Associate Prof. Anatomy
Dr. Mahwish Shahzad, Assistant Prof. Biochemistry
Dr. Sadia Nazir, Associate Prof. Physiology

Duties of PBL committee:

1. Organize PBL committee meetings
2. Select tutors for PBL sessions
3. Train tutors for PBL sessions
4. Share learning resources with students
5. Design the PBL vignettes and get approval from DME
6. Ensure the availability of resources for effective delivery of PBL
7. Visit the PBL venues for quality assurance

VI. TIME TABLES

GIT AND NUTRITION-1: 4th March - 19th April (6 weeks)

<table>
<tr><th>Days & time</th><th>8:00 am
-8:50 am</th><th>8:50 am
-9:40 am</th><th>9:40 am
- 11:00 am</th><th>11:00 am
-11:30 am</th><th>11:30 am -
12:15 pm</th><th>12:15 pm -
1:00 pm</th><th colspan="2">*1:00 pm - 3:00 pm</th></tr>
<tr><td>Monday</td><td>Biochemistry lecture</td><td>Anatomy lecture</td><td>Anatomy Dissection</td><td rowspan="5">BREAK</td><td>Biochemistry lecture</td><td>** Pharma/ Pathology lecture</td><td colspan="2">Histo Practical A+ B + C
Biochem Practical D+ E + F
*** Physio practical/CSF G+ H + I + J</td></tr>
<tr><td>Tuesday</td><td>Biochemistry lecture</td><td>Physiology lecture</td><td>Anatomy Dissection</td><td>Anatomy lecture</td><td>Biochemistry lecture</td><td colspan="2">Histo Practical G+ H + I + J
Biochem Practical A+ B + C
*** Physio practical/CSF D + E + F</td></tr>
<tr><td>Wednesday</td><td>Physiology lecture</td><td>Biochemistry lecture</td><td>Anatomy Dissection</td><td>Behav. Sci lecture</td><td>Biochemistry lecture</td><td colspan="2">Histo Practical D + E + F
Biochem Practical G+ H + I + J
*** Physio practical/CSF A+ B + C</td></tr>
<tr><td>Thursday</td><td>Physiology lecture</td><td>Biochemistry lecture</td><td>Anatomy Dissection</td><td rowspan="2">Comm. Med lecture</td><td rowspan="2">Biochemistry lecture</td><td>1:00 pm - 2:15 pm</td><td>2:15 pm -3:00 pm</td></tr>
<tr><td>Friday</td><td>Anatomy lecture</td><td>Physiology lecture</td><td>Anatomy Dissection</td><td>**** SDL</td><td>***** PERL/ Behav. Sci lecture</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">11:30 am-12:15 pm</td><td colspan="2">12:15 am- 1:00 pm</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">******Isl (Quran) & Pak.St/Comm. Med/Anatomy Lecture</td><td colspan="2">Biochemistry lecture</td></tr>
</table>

*** SDL for 1-hour practical time**

**** Ist three weeks pharmacology & last three weeks Pathology**

***** Ist four weeks physiology practical and last two weeks CSF**

****** SDL will be managed by Anatomy/Physiology/Biochemistry**

******* Ist four weeks PERL and last two weeks Behav. Sci**

******** Ist four weeks Isl (Quran) & Pak. St, 5th week comm. Med, 6th week Anatomy**

RENAL-1: 22th April - 24th May (4 weeks)

Days & time	8:00 am -8:50 am	8:50 am -9:40 am	9:40 am - 10:30 am	10:30 am -10:45 am	10:45 am 11:30 am	11:30 am - 12:15 pm	12:15 pm -1:00 pm	1:00 pm - 3:00 pm
Monday	Biochem lecture	Physio lecture	Disease prevention [1]	BREAK	Anatomy lecture	Physiology lecture	SDL[2]	Histo Practical/CSF [3] A+ B + C Biochem Practical D+ E + F Physio tutorial/ Physio practical [4] G+ H + I + J
Tuesday	Anatomy lecture	Physio lecture	9:40 am - 10:50 am	10:50 am- 11:20 am	11:20 am – 12:10 pm	12:10 pm - 1:00 pm	1:00 pm - 3:00 pm	
			Anatomy Dissection	BREAK	Physiology/ Pathology lecture [5]	Biochemistry lecture	Histo Practical/CSF [3] G+ H + I + J Biochem Practical A+ B + C Physio tutorial/ Physio practical [4] D + E + F	
Wednesday	Physio lecture	Biochem lecture	Anatomy Dissection		PERL lecture	Physiology/ Pathology lecture [5]	Histo Practical/ CSF [3] D + E + F Biochem Practical G+ H + I + J Physio tutorial/ Physio practical [4] A+ B + C	
Thursday	Physio lecture	Biochem lecture	Anatomy Dissection		Pharmacology lecture	Physiology/ Pathology lecture [5]	1:00 pm - 2:00 pm	2:00 pm -3:00 pm
							Biochemistry/ Aging lecture [6]	Isl (Quran) & Pak studies lecture
Friday	Anatomy lecture	Biochem lecture	9:40 am - 10:30 am	10:30 am - 11:20 am		11:20 am - 12:10 pm	12:10 am- 1:00 pm	
			Physiology lecture	SDL [2]		Biochemistry lecture	Physiology/ Pathology lecture [5]	

1. **Disease prevention will be managed by Behav. Sci and Comm. Medicine**
2. **SDL will be managed by Anatomy/Physiology/Biochemistry**
3. **Ist two weeks Histology practical and last two weeks CSF**
4. **Ist three weeks Physiology tutorial and last week physiology practical**
5. **Ist two weeks Physiology and last two weeks Pathology**
6. **Ist two weeks Biochemistry and last two weeks Aging**

- **SDL for 1-hour practical time**
- **SDL on every Friday from 1:00 -3:00 pm.**

VII. DISTRIBUTION AND DURATION OF TEACHING ACTIVITIES AMONGST DIFFERENT DISCIPLINES

GIT AND NUTRITION-1:

- Anatomy (70 hours)
- Physiology (30.5 hours)
- Biochemistry (57 hours)
- Pharmacology (2.5 hours)
- Pathology (2.5 hours)
- Medicine & Surgery (CSF: 4 hours)
- PERL (3 hours)
- Community medicine (5.5 hours)
- Holy Quran (3 hours)

S. No	Subject	Lecture	Dissection	Practical	Tutorial	SDL/PBL	Grand Total
1	Anatomy	15.5 hours	40 hours	12 hours	----------	2.5 hours	70 hours
2	Physiology	20 hours	--------	8 hours	--------	2.5 hours	30.5 hours
3	Biochemistry	42.5 hours	--------	12 hours	--------	2.5 hours	57 hours
4	Pharmacology	2.5 hours	--------	--------	--------	--------	2.5 hours
5	Pathology	2.5 hours	--------	--------	--------	--------	2.5 hours
6	CSF	--------	--------	4 hours	--------	--------	4 hours
7	PERL	3 hours	--------	--------	--------	--------	3 hours
8	Community medicine	5.5 hours	--------	--------	--------	--------	5.5 hours
9	Holy Quran	03 hours	--------	--------	--------	--------	03 hours

RENAL-1:

- Anatomy (29.5 hours)
- Physiology (36 hours)
- Biochemistry and Aging (32 hours)
- Pharmacology (3 hours)
- Pathology (6.5 hours)
- Medicine & Surgery (CSF: 04 hours)
- PERL (3 hours)
- Preventive/Community medicine/ Behavioral Sciences (3.5 hours)
- Holy Quran /Isl & Pak studies (3 hours)

- Aging (0.75 hour)

S. No	Subject	Lecture	Dissection	Practical	Tutorial	SDL/PBL	Grand Total
1	Anatomy	10 hours	14 hours	4 hours	----------	1.5 hours	29.5 hours
2	Physiology	26 hours	--------	2 hours	6 hours	2 hours	36 hours
3	Biochemistry / Aging	22 hours	--------	8 hours	--------	2 hours	32 hours
4	Pharmacology	03 hours	--------	--------	--------	--------	03 hours
5	Pathology	6.5 hours	--------	--------	--------	--------	6.5 hours
6	Medicine & Surgery (CSF)	--------	--------	4 hours	--------	--------	04 hours
7	PERL	03 hours	--------	--------	--------	--------	03 hours
8	Preventive/C. med/ Behav. Sci.	3.5 hours	--------	--------	--------	--------	3.5 hours
9	Holy Quran/Isl & Pak studies	03 hours	--------	--------	--------	--------	03 hours

VIII. LEARNING OUTCOMES AND THEMES OF BLOCK-4

GIT & NUTRITION-I MODULE

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

Module themes:

- Oral cavity & Esophagus (O &E)
- Walls of Abdomen & Peritoneum
- Stomach
- Small intestine
- Large intestine (Cecum, Appendix, Colon, Rectum & Anal Canal)
- Liver & Biliary tree
- Pancreas & Spleen
- Nutrition

Clinical relevance:

- Diseases of oral cavity, esophagus and stomach
- Diseases of small and large intestine
- Diseases of hepatobiliary system
- Diseases related to malnutrition

RENAL-I MODULE

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.

Module themes:

- Kidney
- Ureter
- Bladder
- Acid/base balance

Clinical relevance

- Protein in urine.
- Kidney stones.
- Kidney pain.
- Blood in urine (hematuria)
- Kidney infection.
- Acute kidney injury (AKI)
- Kidney cancer.

- Dialysis
- Control of blood pressure

IX. LEARNING OBJECTIVES (UHS SYLLABUS) OF BLOCK-4

GIT & NUTRITION-I MODULE LOS

NORMAL STRUCTURE

GROSS ANATOMY

Human Anatomy

GIT-A-001: Oral cavity and Oropharynx**su**

- Describe the gross anatomical features of oral cavity with its neurovascular supply and lymphatic drainage
- Discuss the location, anatomical features, relations and vascular supply of tonsils: nasopharyngeal, palatine and lingual. **An**
- Discuss the skeletal framework of hard palate with its neurovascular supply and lymphatic drainage
- Describe the gross anatomical features of soft palate with its neurovascular supply and lymphatic drainage
- Describe the attachments, nerve supply and actions of muscles of soft palate
- 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
- Describe anatomical features, relations and neurovascular supply of parotid gland and its duct, mentioning the structures entering and exiting the gland
- Discuss the clinical correlates of parotid gland: parotiditis, Mumps, Frey's syndrome, parotid duct injury and parotid tumor surgery with its complications.
- Describe the Waldeyer's ring
- Describe anatomical features, relations and neurovascular supply of submandibular and sublingual glands with their ducts
- Name the parts of pharynx giving their extent, anatomical features, structure, neurovascular supply and lymphatic drainage
- Name the pharyngeal constrictor muscles defining their attachments, innervation and structure traversing the gaps between adjacent muscles.

GIT-A-002: Anterior abdomen wall

- Describe the planes and quadrants of abdomen
- 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)
- 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

- Describe the attachments, nerve supply and actions of muscles of anterior abdominal wall
- Identify the muscles of anterolateral abdominal wall on anatomical model and/or cadaver
- Describe the extent, formation and contents of rectus sheath
- Give the formation and extent of inguinal ligament
- Describe the formation of superficial and deep inguinal rings and conjoint tendon
- Locate the position of superficial and deep inguinal rings on simulated subject or Cadaver
- Describe the extent, boundaries and contents of inguinal canal
- Define the following hernias: umbilical, epigastric, incisional, Spigelian, lumbar, femoral, internal and inguinal
- Differentiate between direct and indirect inguinal hernias
- Describe the location of abdominal surgical incisions
- Mark the abdominal incisions on simulated patient/subject and explain their anatomical basis
- List the structures and coverings of spermatic cord

GIT-A-004: Peritoneum

- Trace the horizontal and vertical peritoneal reflections
- Describe the relationship of viscera to the peritoneum
- 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 Gutters

- Describe the nerve supply of peritoneum
- Describe the anatomical basis and manifestations of the following:
  - Peritonitis and ascites
  - Peritoneal adhesions (and adhesiostomy)
  - Abdominal paracentesis

GIT-A-005: Esophagus

- 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)

GIT-A-006: Stomach

- Describe the location, position, parts, external and internal structure, relations, vascular and nerve supply and lymphatic drainage of stomach
- Draw and label a diagram illustrating the lymphatic drainage of stomach
- Describe the clinical presentation and the anatomical basis and manifestations of the following conditions: Carcinoma of stomach and peptic ulcers
- Identify and demonstrate the parts, external and internal features of stomach on anatomical model and cadaver

GIT-A-007: Small & large Intestine

- Describe the location, position, parts, relations, neurovascular supply and lymphatic drainage of duodenum
- Describe the anatomical basis and manifestations of the following conditions:
  - Duodenal Ulcers
  - Ileal diverticulum
  - Diverticulosis
  - Large bowel cancer
  - Appendicitis
  - Volvulus
  - Intussusception
- Demonstrate the various positions of appendix
- Identify and demonstrate the parts and external features of small and large intestines on anatomical model and cadaver

GIT-A-008: Liver

- Describe the origin, course, branches (tributaries in case of veins) and distribution of the blood vessels of GIT
- Describe the formation, tributaries and drainage of hepatic-portal vein
- Discuss the sites and vessels contributing in portosystemic anastomosis
- Describe the clinical picture and anatomical basis for the blockage of porto-systemic anastomosis
- Identify the blood vessels supplying GIT on anatomical model and cadaver
- Describe location, lobes, important relations, peritoneal ligaments, blood supply, lymphatic drainage, nerve supply, related clinical correlates of liver and subphrenic spaces.

GIT-A-009: Biliary System

- Describe components of Biliary tree, hepatic-duct and bile duct
- Describe relations, functions, blood supply, lymphatic drainage and nerve supply of gallbladder
- Describe related clinical correlates- gall stones, biliary colic, cholecystectomy, gallbladder gangrene

GIT-A-010: Pancreas

- Describe the location, surfaces, peritoneal reflections, relations, neurovascular supply and lymphatic drainage of pancreas
- Describe the anatomical basis and manifestations of pancreatitis and pancreatic cancer
- Identify the parts of the pancreas

GIT-A-011: Spleen

- Describe the location, surfaces, peritoneal reflections, relations, neurovascular supply and lymphatic drainage of spleen
- Describe the anatomical basis and manifestations of splenic trauma and splenomegaly
- Identify the borders, surfaces and Impressions of spleen
- Demonstrate the correct anatomical positioning of spleen

GIT-A-012: Sigmoid colon, rectum & anal Canal

- Describe the gross anatomical features, peritoneal relations, blood supply, nerve supply and lymphatic drainage of sigmoid colon, rectum and anal canal
- Describe the anatomical basis for Sigmoidoscopy, rectal prolapse, rectal examination, rectal cancer and hemorrhoids

GIT-A-013: Surgical Intervention

- Outline the anatomical basis and surgical treatment plan for the following diseases:
    - Esophageal Injuries
    - Gastric Carcinoma
    - Intestinal Obstruction
    - Pancreatic Carcinoma
    - Obstructive Jaundice
    - Gall Stones

EMBRYOLOGY & POST-NATAL DEVELOPMENT

Embryology

GIT-A-014: Oral Cavity

- Describe the development of tongue
- Describe the embryological basis of tongue tie
- Describe the development of palate
- Describe the embryological basis of various facial clefts
- Identify the parts of the developing tongue and palate

GIT-A-015: Foregut

- Describe the formation and divisions of gut tube
- Describe the development of mesenteries
- Describe the development of esophagus
- Describe the embryological basis of esophageal atresia and/or tracheoesophageal fistula
- Describe the development and rotation of stomach
- Describe the embryological basis of pyloric stenosis

- Describe the development of duodenum, liver and gall bladder
- Describe the embryological basis of intrahepatic and extrahepatic biliary atresia
- Describe the development of pancreas
- Describe the embryological basis of annular pancreas

GIT-A-016: Midgut

- Describe the embryological basis of the following
  - mobile cecum
  - volvulus
  - retro colic hernia
  - omphalocele
  - gastroschisis
- Describe the embryological basis of Meckel's diverticulum
- Describe the embryological basis of;
  - Gut rotation defects
  - Gut atresia and stenosis

GIT-A-017: Hindgut

- Describe the development of hindgut
- Describe the embryological basis of;
  - Rectourethral and rectovaginal fistulas
  - Recto anal fistulas and atresia
  - Imperforate anus
  - Congenital megacolon
- Identify the parts of the developing foregut, midgut and hindgut originating from the endoderm

MICROSCOPIC ANATOMY (HISTOLOGY & PATHOLOGY)

Histology

GIT-A-018: Oral Cavity & Esophagus

- Describe the light microscopic structure of;
  - Lips
  - Tongue including lingual papillae and taste buds
  - 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
- Relate the characteristics of various layers of GIT with their function
- Describe the light microscopic structure of esophagus

- Tabulate the histological differences between different parts of esophagus
- Describe the histological changes associated with reflux esophagitis and Barrett's esophagus

GIT-A-019: Stomach

- Describe the light microscopic structure of stomach
- Describe the role of parietal cells in pernicious anemia

GIT-A-020: Small Intestine

- Describe the light microscopic structure of
    - Duodenum
    - Jejunum
    - Ileum
- Discuss the histological basis of celiac disease
- Discuss the histological basis of Crohn's disease

GIT-A-021: Large Intestine

- Describe the light microscopic structure of
    - Colon
    - Appendix
    - Rectum
- Define colorectal cancer, anal abscess, hemorrhoids

PRACTICAL:

Histology Practical

iGIT-A-022: Oral Cavity

- Identify, draw and label the histological sections of tongue and lips and enumerate points of identification

GIT-A-023: Salivary Gland

- Identify, draw and label the histological sections of salivary glands (Submandibular, Sublingual and Parotid)

GIT-A-024: Upper GIT

- 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

GIT-A-025: Small Intestine

- Identify, draw and label the histological structure of small intestine (Duodenum, Jejunum, and Ileum) and enumerate points of identification

GIT-A-026: Large Intestine

- Identify, draw and label the histological structure of large intestine and enumerate points of identification

GIT-A-027: Organs associated with GIT

- Identify, draw and label the histological sections of Gall bladder, liver and enumerate points of identification

- Identify, draw and label the histological sections of pancreas and enumerate points of identification

GIT-A-028: Lymphatic tissue associated with GIT

- Identify, draw and label the histological sections of Palatine tonsil, appendix, peyer's patches and enumerate points of identification

NORMAL FUNCTION

MEDICAL PHYSIOLOGY

GIT-P-001: General Principles of GIT Function- Motility, Nervous Control & Blood Flow

- Classify the components of enteric nervous system
- Discuss the location and significance of myenteric plexus
- Describe the Meissner's plexus
- Differentiate between myenteric and Meissner's plexuses
- Explain the mechanism of developing slow wave
- Explain the mechanism of developing spike potential
- Enlist the factors that depolarize & hyperpolarize the GIT membrane
- Enlist the excitatory & inhibitory neurotransmitters of enteric nervous system
- Explain the role of sympathetic & parasympathetic nervous system in controlling GIT function.
- Enlist the gastrointestinal reflexes & explain the functions of these reflexes
- Enlist the hormones acting on GIT, their stimuli, site of release and actions
- Enumerate different types of movements that occur in GIT
- Discuss the functions and control of GIT movements
- Discuss the effect of gut activity and metabolic factors on GIT blood flow
- Explain the nervous control of GIT blood flow

GIT-P-002: Oral Cavity & Esophagus

- Trace the reflex arc of mastication Oral Cavity & Esophagus
- Explain the process and importance of chewing reflex
- Enlist the stages of swallowing
- Describe the mechanism of voluntary stage of swallowing
- Trace the reflex arc of involuntary stage of swallowing
- Enlist the steps involved in involuntary stage of swallowing
- Explain the effect of swallowing on respiration
- Discuss the mechanism of esophageal stage of swallowing
- Enlist causes of dysphagia integrates with Surgery
- Explain the types and role of different peristalsis originating in esophagus
- Discuss the role of Lower Esophageal Sphincter (Gastroesophageal)
- Discuss the pathophysiology of achalasia & Mega esophagus
- Enlist the features and treatment of achalasia

GIT-P-003: Stomach

- Explain storage function of stomach
- Describe the basic electrical rhythm of stomach wall
- Explain the role of pyloric pump and pyloric sphincter in
- gastric emptying

GIT-P-004: Small Intestine

- Enumerate and explain the hormones and movements of small intestine
- Explain the term “peristaltic rush”
- Explain the functions of ileocecal valve and sphincter (integrates with Medicine)
- Enumerate the types of intestinal sprue (integrates with Medicine)
- Enlist the features of intestinal sprue (integrates with Medicine)
- Explain the consequences of sprue on the body (integrates with Medicine)

GIT-P-005: Large Intestine

- Enumerate the types of movements taking place in colon
- Explain the mechanism of developing movements of colon and their control through Gastrocolic and Duodenocolic Reflexes
- Enlist the defecation reflexes
- Explain the mechanism of defecation reflex
- Trace the reflex arc of defecation
- Name the other autonomic reflexes that affect bowel activity
- Explain the pathophysiology of constipation (integrates with Medicine)
- Discuss the causes of diarrhea
- Describe the cause of Hirschsprung’s disease (integrate with Medicine)

GIT-P-006: Liver

- Explain the functions of liver
- Differentiate between liver and gall bladder bile and the hormones acting on them
- Enumerate the causes and composition of developing gall stones (Integrate with Surgery)

GIT-P-007: Pancreas

- Explain function and secretions of pancreas
- Enlist the causes and pathophysiology of acute and chronic pancreatitis (Integrate with Medicine)
- Enumerate the features of acute pancreatitis and explain the physiological basis of each feature of pancreatitis (Integrate with Medicine)

GIT-P-008: Vomiting Reflex

- Describe the stages of vomiting act
- Trace the reflex arc of vomiting
- Explain the role of chemoreceptor trigger zone for initiation of vomiting by drugs or by motion sickness

GIT-P-009: Malnutrition (Integrated with Medicine and Gastroenterology)

- Define Malnutrition
- Identify various causes of malnutrition
- Identify the risk factors of malnutrition
- Outline treatment strategies

GIT-P-010: Acute & Chronic Diarrhea

- Define Acute Diarrhea
- Define Chronic Diarrhea
- Enlist various causes for acute and chronic diarrhea

PRACTICALS

PHYSIOLOGY

GIT-P-011: Cranial nerve

- Demonstrate Cranial nerves V, IX & X testing

BIOCHEMISTRY

GIT-B-001: Biochemistry of GIT/GIT secretions & digestion and absorption of dietary Carbohydrates

- Give the composition and importance of saliva and related clinical disorder (xerostomia)
- Give the composition and importance of gastric juice with special reference to mechanism of HCl secretion and related clinical disorders (achlorhydria, gastric ulcer)
- Give the composition and importance of pancreatic juice, bile and succus entericus and related clinical disorders (pancreatitis, cystic fibrosis, cholelithiasis).
- Describe digestion and absorption of dietary carbohydrates along with inherited and acquired disorders (lactose intolerance, sucrase-isomaltase deficiency).

GIT-B-002: Carbohydrate metabolism/Entry of glucose into cells

- Elaborate key features of various transport systems for
- entry of glucose into cells.

GIT-B-003: Carbohydrate metabolism/Hormonal control of BSL**s**

- Enlist the hormones that play important roles in regulating carbohydrate metabolism.
- Elaborate the metabolic effects of these hormones.
- Infer the consequences of deficiency and excess of these
- Hormones

GIT-B-004: Carbohydrate metabolism/Glycolysis

- Describe the glycolytic pathway along with its regulation and significance.
- Compare key features of aerobic and anaerobic glycolysis.
- Calculate the number of ATP produced during aerobic and anaerobic glycolysis.
- Explain hemolytic anemia in subjects with pyruvate kinase deficiency based on your biochemical knowledge.
- Clearly differentiate between substrate level phosphorylation and oxidative phosphorylation

GIT-B-005: Carbohydrate metabolism/Metabolic fates of pyruvate

- Discuss the metabolic fates of pyruvate.
- Describe the transport of pyruvate from cytosol to mitochondria.
- Elaborate the reaction catalyzed by pyruvate dehydrogenase complex (PDH) along with regulation and significance.
- Enlist inherited and acquired causes of lactic acidosis and give biochemical explanation for lactic acidosis in each condition.

GIT-B-006: Carbohydrate metabolism/Kreb's Cycle

- Describe the TCA cycle along with regulation & significance. Calculate the energy yield of TCA

GIT-B-007: Carbohydrate metabolism/Gluconeogenesis

- Define gluconeogenesis and enumerate gluconeogenic substrates (precursors)
- Delineate the reactions involved in synthesis of glucose from various gluconeogenic substrates.
- Elaborate the regulation and importance of gluconeogenesis.
- Explain the significance of Cori cycle and glucose alanine cycle

GIT-B-008: Carbohydrate metabolism/Glycogen metabolism

- Illustrate the reactions of glycogenesis, glycogenolysis along with their regulation and significance
- Enlist various types of glycogen storage diseases (GSDs)
- Infer the key biochemical and clinical features of various GSDs from the respective enzyme deficiencies.

GIT-B-009: Carbohydrate metabolism/HMP Hexose Monophosphate Pathway

- Describe the reactions and regulation of Hexose Mono Phosphate Pathway (HMP).
- Discuss the importance of HMP shunt
- Explain hemolytic anemia in subjects suffering from G6PD deficiency.
- Diagnose G6PD (glucose-6-phosphate dehydrogenase) deficiency based on given data

GIT-B-010: Carbohydrate metabolism/Uronic acid pathway & sorbitol pathway

- Describe the reactions, regulation, and biomedical importance of uronic acid pathway and sorbitol pathway

GIT-B-011: Carbohydrate metabolism/Metabolism of galactose & fructose

- Outline the reactions involved in metabolism of galactose and fructose.
- Infer the key biochemical and clinical features of galactosemia, essential fructosuria, and hereditary fructose intolerance (HFI) from the respective enzyme deficiencies.
- Explain hypertriacylglycerolemia, hypercholesterolemia, and hyperuricemia associated with fructose loading of liver.

GIT-B-012: Carbohydrate metabolism/Ethanol metabolism

- Outline the reactions involved in ethanol metabolism.
- Explain how ethanol consumption causes hypoglycemia and fatty liver.

GIT-B-013: Respiratory chain & oxidative phosphorylation/ETC

- Diagrammatically illustrate the organization of electron transport chain (ETC) depicting the flow of electrons
- Enlist the components of complex I, II, III, and IV
- Enumerate clinically important inhibitors of electron transport chain and mention their site of action.

GIT-B-014: Respiratory chain & oxidative phosphorylation/ATP synthesis

- Elaborate the structure of ATP synthase (complex V).
- 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)
- Elaborate the effect of Oligomycin and uncouplers on ATP production.
- Describe the effect of arsenic poisoning on carbohydrate metabolism and ATP production.
- Elaborate the glycerol 3-P shuttle and malate-aspartate shuttle for the transfer of reducing equivalents from cytosol into the mitochondria.

GIT-B-015: Nutrition/Balanced diet:

- Define and classify nutrients into macro and micronutrients.
- Elaborate the concept and importance of Balanced Diet
- Enlist the components of balanced diet and elaborate the importance of each component.

GIT-B-016: Nutrition/Special nutritional requirements (Integrate with Community Medicine)

- Delineate special nutritional requirements during pregnancy, lactation, growth, and old age
- Suggest dietary advice for patients suffering from diabetes mellitus, hypertension, obesity, renal disease, lactose intolerance, gluten enteropathy, hypercholesterolemia, and hemorrhoids**.**

GIT-B-017: Nutrition/PEM (Integrate with Community Medicine/Pediatrics)

- Enlist causes and types of Protein Energy Malnutrition (PEM).
- Differentiate between Kwashiorkor and Marasmus based on the given data
- Enlist symptoms and signs
- Outline treatment strategies

GIT-B-018: Nutrition/Caloric requirements

- Define energy balance.
- Compare the energy content of macro nutrients and alcohol.
- Suggest a simple method for estimation of caloric requirements of sedentary adults, moderately active adults, and very active adults

GIT-B-019: Nutrition/BMR

- Define basal metabolic rate (BMR)
- Elaborate the effect of various physiological and pathological factors on BMR.

GIT-B-020: Nutrition/BMI & Obesity (Integrate with Community medicine)

- Define body mass index (BMI).
- Categorize individuals into underweight, normal, overweight, obese, and morbidly obese based on theirs BMI values.
- Elaborate the role of genetic, environmental, and behavioral factors in determining body weight.
- Clearly differentiate between upper body obesity and lower body obesity.
- Enlist health risks associated with obesity

GIT-B-021: Vitamins/Energy releasing vitamins & vitamin E and K

- Describe sources, Recommended Dietary Allowance (RDA), biochemical functions, deficiency, and toxicity of vitamin B1, B2, B3, B5 and B7.
- Describe sources, RDA, biochemical functions, deficiency, and toxicity of vitamin E and vitamin K.

GIT-B-022: Minerals

- Define and classify minerals according to their daily requirements.
- Give sources, functions and biomedical importance of Na, K and Cl.
- Describe sources, functions and biomedical importance of Mg, Se, I, F, Cu, Cr, Mn, Mo, Zn and Co.

GIT-B-023: Malnutrition (Integrated with Pediatrics)

- Define Marasmus and Kwashiorkor

GIT-B-024: Acute & Chronic Hepatitis (Integrated with Medicine & Gastroenterology)

- Define Acute Hepatitis
- Define Chronic Hepatitis
- Enlist various causes for acute and chronic hepatitis
- Describe various symptoms and signs of chronic hepatitis
- Outline treatment strategies

PRACTICAL

BIOCHEMISTRY

GIT-B-025: Estimations of blood/urine analytes

- Estimate blood glucose level by glucose oxidase method and interpret the results
- Determine blood glucose level by glucometer and interpret the result.
- Perform Glucose tolerance test (GTT) and interpret the results.
- Determine urine glucose by dipstick method and interpret the result.
- Estimate serum amylase and interpret the result.

GIT-B-026: Interpretation of results

- Interpret the results of Lactose tolerance test.

GIT-B-027: Determination & interpretation of results

- Determine BMI of given subject and interpret the results

AGING

COMMUNITY MEDICINE

GIT-CM-001: Preventive Medicine in Geriatrics

- Identify causes and risk factors for malnutrition in elderly
- Outline treatment strategies

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS

PHARMACOLOGY

GIT-Ph-001: Anti Diarrheal Drugs

- Classify anti diarrheal drugs and describe the pharmacokinetics, mechanism of action, pharmacological effects, uses and adverse effects

GIT-Pa-001: Peptic Ulcer

- Describe the etiology, pathogenesis, morphology and clinical features of peptic ulcer disease

GIT-Pa-002: Infectious agents causing diarrhea

- Enumerate common infectious agents of diarrheal diseases
- Discuss pathogenesis and clinical features of common pathogens

DISEASE PREVENTION & IMPACT

BEHAVIORAL SCIENCES

GIT-BhS-001: Health related behaviors

- Identify health related behaviors and apply principles of learning to modify eating and addictive patterns

GIT-BhS-002: Health related believes

- Discuss health belief model and its application in managing common presentations related to gastrointestinal system
- Explain the transtheoretical model of changing behaviors to modify the diseases pattern

GIT-BhS-003: Management of Obesity

- Describe motivational interviewing and outline a management plan to help the individuals with obesity and diabetes to lose weight

GIT-BhS-004: Medically Un described Symptoms

- 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)

GIT-BhS-005: Role of nutritional deficiencies in mental development

- To identify effect on mental development of nutritional deficiencies

COMMUNITY MEDICINE

GIT-CM-001: Epidemiology of communicable diseases (Intestinal infection)

- Describe prevention and control of polio, viral hepatitis A, cholera, typhoid and food poisoning

- Describe prevention and control of amoebiasis, ascariasis, hook worm infestation

GIT-CM-002: Preventive medicine in pediatrics

- Describe the advice to be given for breast feeding, weaning and childhood
- Discuss risk factors, prevention and management of pediatrics protein energy malnutrition (PEM)

GIT-CM-003: Nutrition & Health

- 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

CFRC-2

GIT and Nutrition-1

- Demonstrate steps of abdominal examination
- Demonstrate the procedure of shifting dullness
- Identify organs on X-ray abdomen
- Assess dehydration in infant/young child and explain procedure of making home made ORS

Renal Module:

NORMAL STRUCTURE

GROSS ANATOMY

Human Anatomy

R-A-001: Kidney

- Describe gross features and facial coverings of kidneys.
- Compare and contrast the relations of right and left kidneys.
- Describe blood supply, lymphatics and nerve supply of kidney
- Discuss the clinical aspects of kidneys
- Demonstrate the surface marking and radiographic anatomy of kidney.
- Identify the side of kidney

R-A-002: Ureter

- Compare and contrast the relations of right and left ureter
- Give the constrictions of ureter
- Describe the blood supply nerve supply and lymphatics of ureter
- Identify the ureter

R-A-003: Urinary bladder

- Describe the gross anatomical features, relations, surfaces, blood supply, nerve supply and lymphatics of urinary bladder
- Give the clinical correlates of urinary bladder
- Identify the gross features and surfaces of urinary bladder

R-A-004: Sign/symptom investigations (Integrate with Urology)

- Interpret basic urological signs/symptoms & investigations**.**

R-A-005: Urinary retention (Integrate with Urology)

- Describe the etiology, and management of urinary retention.

R-A-006: Radiograph (Integrate with Radiology)

- Identify and describe the various anatomic landmarks of the renal system on radiographs.

R-A-007: Urethra

- Describe the parts of urethra

EMBRYOLOGY & POST-NATAL DEVELOPMENT

Embryology

R-A-008: Development of urinary system

- Describe development of intermediate mesoderm and its derivatives
- Describe the development of pronephros, mesonephros and metanephros
- Describe positional changes during descent of kidney with correlation to its blood supply
- Describe the development of urinary bladder and urethra
- List and describe the common congenital anomalies of kidney, urinary bladder and urethra.

MICROSCOPIC STRUCTURE

Histology

R-A-009: Structure of kidney

- Describe the histological, structural organization and functions of kidney with clinicals

R-A-010: Juxtaglomerular apparatus

- Describe the light and ultrastructure of Juxtaglomerular apparatus and glomerular filtration barrier

R-A-011: Structure of ureter

- Describe the histological structure of ureter

R-A-012: Structure of urinary bladder

- Describe the histological structure of urinary bladder
- Discuss clinical correlates (Cystitis, Urinary bladder cancer, Urinary Tract Infections (UTIs))

PRACTICAL

HISTOLOGY

R-A-013: Kidney

- Identify and draw and label the histological structure of kidney and enumerate points of identification

R-A-014: Ureter

- Identify, draw and label the histological structure of ureter and enumerate its points of identification

R-A-015: Urinary bladder

- Identify, draw and label the histological structure of urinary bladder and enumerate its points of identification

NORMAL FUNCTION

MEDICAL PHYSIOLOGY

R-P-001: Body fluid compartment

- Describe major composition of intracellular and extracellular fluids
- Define Hypo and hypernatremia
- Explain the causes of hypo & hypernatremia and their effects on Composition of body fluid compartments
- Describe difference between iso-osmotic, hyperosmotic, hypo-osmotic fluids

R-P-002: Edema (Integrate with Medicine)

- Enumerate causes of Intracellular and extracellular edema
- Describe safety factors that prevent edema

R-P-003: Function

- Explain the functions of the kidney

R-P-004: Micturition reflex

- Describe the mechanism of micturition and its control
- Explain the role of higher center on micturition
- Explain the physiological anatomy and innervation of bladder
- Discuss the voluntary control of micturition

R-P-005: Abnormalities of micturition (Integrate with Pathology)

- 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

R-P-006: Urine formation

- Enlist the steps of urine formation
- Explain the physiological anatomy and functions of glomerular capillary membrane
- Discuss the composition of filtrate
- Explain the minimal change nephropathy and increase permeability to plasma protein

R-P-007: Glomerular filtration

- Define Glomerular Filtration Rate (GFR).
- Describe the determinants of GFR
- Explain the factors affecting GFR
- Discuss the hormones and autocoids that affect GFR
- Explain mechanisms of autoregulation of GFR
- Enlist the physiological and pathological factors that decrease GFR
- Explain the effects of angiotensin II blocker on GFR during renal hypoperfusion

R-P-008: Reabsorption

- Enumerate different types of transport along the kidney tubules for reabsorption

- Explain the reabsorption and secretion along different parts of the Nephron
- Explain the regulation of tubular reabsorption
- Discuss the forces / pressure and hormones that determine renal tubular reabsorption
- Explain the reabsorption of water along different parts of nephron
- Define obligatory and facultative reabsorption
- Discuss the characteristics of late distal tubules and cortical collecting ducts
- Discuss the characteristics of medullary collecting ducts

R-P-009: Clearance method

- Explain the use of clearance method to quantify kidney function

R-P-010: Transport maximum

- Describe mechanism of re-absorption of sodium along different parts nephrons
- Define and explain the term Transport maximum for the substances
- Define filtered load for the substance
- Justify the difference of transport maximum and renal threshold of glucose in renal tubules

R-P-011: Urine concentration and dilution

- Explain the renal mechanisms for excreting dilute urine
- Explain the mechanism for forming a concentrated urine
- Discuss the role of urea in the process of counter current multiplier mechanism
- Describe the countercurrent exchange in vasa recta to preserve hyperosmolarity of renal medulla

R-P-012: Obligatory urine volume

- Define and explain the term obligatory urine volume.
- Define and explain free water clearance.
- Define Urine specific gravity.

R-P-013: Disorders of urine concentrating ability

- Enumerate different abnormalities of urinary concentrating ability

R-P-014: Diabetes (Integrate with Medicine)

- Enumerate the types of Diabetes insipidus
- Enlist the features of diabetes insipidus
- Explain the pathophysiology and treatment of central diabetes insipidus
- Discuss the pathophysiology of nephrogenic diabetes insipidus

R-P-015: Osmoreceptor-ADH Feedback System

- Make the flow chart to show the osmoreceptor antidiuretic hormone (ADH) feedback mechanism for regulating extracellular fluid osmolarity in response to a water deficit.
- Enlist the factors which increase and decrease the release of ADH

R-P-016: Thirst

- Explain the mechanism of thirst

R-P-017: Renal regulation of potassium

- Enumerate the factors that can alter potassium distribution between intracellular and extracellular fluids
- Discuss the process of secretion of potassium by renal tubules
- Explain the regulation of internal potassium distribution and potassium secretion

R-P-018: Control of ECF osmolarity

- Explain the control of extracellular fluid osmolarity and sodium concentration

R-P-019: Control of ECF

- Explain the integration of renal mechanism for control of extracellular fluid (ECF)
- Explain the importance of pressure natriuresis and diuresis in maintaining body sodium and fluid balance

R-P-020: Renal regulation of calcium and renal regulation of phosphate

- Explain the renal handling of calcium concentration to regulate plasma calcium concentration
- Enumerate the factors that alter renal calcium
- Enlist the factors that alter renal phosphate excretion

R-P-021: Renal body fluid feedback control

- Explain the nervous and hormonal factors that increase the effectiveness of renal body fluid feedback control

R-P-022: ECF and blood volume

- 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

R-P-023: Acid base balance

- Explain the renal handling of H^+ ion.

R-P-024: Acid base disturbance

- Analyze the acid base disturbances on the basis of pH, HCO_3^- and CO_2
- Explain the causes and compensation of metabolic acidosis
- Explain the causes and compensation of metabolic alkalosis
- Explain the causes and compensation of respiratory acidosis
- Explain the causes and compensation of respiratory alkalosis
- Explain the causes and compensation of mixed acid base disorder

R-P-025: Anion gap

- Define and explain anion gap

MEDICAL BIOCHEMISTRY

R-B-001: Protein digestion and absorption, reabsorption, and related disorders

- 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)

R-B-002 Protein Metabolism/Protein degradation and turnover

- Clearly differentiate between protein digestion and degradation.
- 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.

R-B-003: Protein Metabolism/Amino acid pool and nitrogen balance

- 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 balance.

R-B-004: Protein Metabolism/Introduction to Reactions involved in catabolism

- Enlist 7 important reactions involved in amino acid metabolism and give a brief introduction of each (Deamination, Transamination, Trans-deamination, Deamidation, Decarboxylation, Transmethylation & Transpeptidation)

R-B-005: Protein Metabolism/Transamination

- 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.

R-B-006: Protein Metabolism/Trans deamination

- Define oxidative deamination. Describe the reaction catalyzed by glutamate dehydrogenase (GDH) along with its significance.
- Define trans-deamination.

R-B-007: Protein Metabolism/Deamidation

- Define deamidation.
- Describe deamidation reaction catalyzed by glutaminase and asparaginase along with their significance.
- Explain how does L-asparaginase helps 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.

R-B-008: Protein Metabolism/Decarboxylation

- Define decarboxylation. Describe important decarboxylation reactions along with their significance.

R-B-009: Protein Metabolism/Sources and transport of ammonia

- 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.

R-B-010: Protein Metabolism/Urea cycle, ammonia intoxication and its management

- 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 (phenyl butyrate, lactulose, antibiotics).

R-B-011: Protein Metabolism/Biosynthesis of NEAA

- Trace the pathways for synthesis of non-essential amino acids (NEAA) (alanine, aspartate, glutamate, glutamine, asparagine, proline, serine, glycine, cysteine, and tyrosine)

R-B-012: Protein Metabolism/Degradation of carbon skeleton of amino acids

- 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.

R-B-013: Protein Metabolism/Inborn errors of amino acid metabolism (integrate with Pediatrics)

- Describe the metabolism of methionine.
- Discuss cause, Key diagnostics features and management of homocystinuria.
- Describe the catabolism of branched chain amino acids.
- Discuss cause, key diagnostic features, and management of Maple Syrup Urine disease (MSUD).
- Describe the metabolism of tyrosine.
- Discuss the cause, key diagnostic features, and management of alkaptonuria, albinism, and type 1 tyrosinemia.
- Give cause, key diagnostic features, and management of phenylketonuria (PKU)
- Elaborate special roles of glycine, tryptophan, phenylalanine, tyrosine, and methionine

R-B-014: Water, pH, Buffers/ Ionization of water

- Describe ionization of water and elaborate its significance. Discuss water and electrolyte balance. in health and disease.

R-B-015: Water, pH, Buffers/pH and pH scale

- Define pH and describe the concept of pH scale.

R-B-016: Water, pH, Buffers/weak acids, and their significance

- Define weak acids and conjugate base.

R-B-017: Water, pH, Buffers/Ka and pKa

- Define Ka and pKa and give their significance.

R-B-018: Water, pH, Buffers/HH equation and its applications

- Describe Henderson-Hassel Bach (HH) equation. (no derivation required) along with its application/use.

R-B-019: Water, pH, Buffers/HH equation and its applications

- 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.

R-B-020: Acid Base balance and imbalance/Renal mechanisms for pH regulation

- Elaborate the role of kidneys in the regulation of acid base balance.

R-B-021: Defense mechanisms against changes in H+ concentration

- Elaborate the concept of 1st, 2nd and 3rd line of defense against changes in H+ ion concentration.

R-B-022: Acid Base imbalance/Types of acid base disorders (Integrate with Medicine)

- 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.

R-B-023: Acid Base imbalance/Tetany in alkalosis

- Interpret 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.

PRACTICAL

R-B-024: Interpretation of results

- 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**.**

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS

PHARMACOLOGY & THERAPEUTICS

R-Ph-001: Diuretics

- Classify diuretics & carbonic anhydrase inhibitor MOA, clinical uses, and adverse effects
- 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.

PATHOLOGY

R-Pa-001: Renal Stones

- Discuss the etiology and pathogenesis of different types of stones

R-Pa-002: Hydronephrosis

- Identify the causes, morphological aspect & outcome of hydronephrosis.

R-Pa-003: UTI causative agents

- Enlist common causative agents of urinary tract infections and describe pathogenesis and clinical features of common causative agents of UTI.

R-Pa-004: Glomerulonephritis

- Define various presentations of glomerulonephritis.
- Define nephrotic and nephritic syndrome.
- List various risk factors and outline management of glomerulonephritis.

R-Pa-005: Acute Kidney Injury (Integrate with Medicine)

- Define AKI (acute kidney injury)
- Identify various risk factors and causes for AKI.
- Outline management strategies

R-Pa-006: Urinary tract infection (Integrate with Medicine)

- Define UTI (Urinary Tract Infection)
- Identify various risk factors and causes of UTI.
- Describe signs and symptoms of UTI.
- Outline management strategies.

DISEASE PREVENTION AND IMPACT

COMMUNITY MEDICINE AND PUBLIC HEALTH

R-CM-001: Quality of life

- Discuss the significance of quality of life in disease and treatment settings.
- Measures of health status. Disability-Adjusted Life Year (DALY) and Quality-Adjusted Life Year (QALY)
- Life expectancy.

BEHAVIORAL SCIENCES

R-BhS-001: Dementia, uremic encephalopathy, delusion, muscle paralysis & Societal impact

- To identify the behavioral abnormalities caused by renal function.
- To identify the cognitive abnormality.
- To identify the dangers for the patient, his family, and society.

AGING

COMMUNITY

R-Ag-001: Disease prevention

- To define preventive care in diseases related to urinary system(adults).
- Primary, secondary, and tertiary prevention.

MEDICINE

R-Ag-002: Urinary incontinence

- Define urinary incontinence.
- Outline management strategies**.**

CFRC-2

Renal-1

- Detail the steps of urinary catheterization in females
- Detail the steps of urinary catheterization in males

X. TEACHING AND LEARNING METHODOLOGIES (INSTRUCTIONAL STRATEGIES)

- Large Group Interactive Session (LGIS)
- Team based learning (TBL)
- Problem based learning (PBL) and Case based learning (CBL)
- Tutorials
- Reflective Writing
- Bedside Teaching
- Simulation
- Skill laboratories
- Clinical Case based Conference
- Laboratory Practical
- Ward Rounds
- Demonstrations
- Case Presentations

XI. LEARNING RESOURCES

Books, handouts, and log books:

Books:

Anatomy

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

Physiology

- Guyton AC and Hall JE. Textbook of Medical Physiology
- Essentials of Medical Physiology by Mushtaq Ahmad

Biochemistry

- Harper's Biochemistry
- Lippincott's Illustrated Reviews Biochemistry
- ABC of clinical genetics by H.M. Kingston

Pathology

- Vinay Kumar, Abul K. Abbas and Nelson Fausto. Robbins and Cotran, Pathologic basis of disease.
- Richard Mitchell, Vinay Kumar, Abul K. Abbas and Nelson Fausto. Robbins and Cotran, Pocket companion to Pathologic basis of disease
- Walter and Israel General Pathology

Pharmacology

- Basic and clinical Pharmacology by Katzung
- Pharmacology by Champe and Harvey, Lippincott

Behavioral Sciences

- Handbook of Behavioral Sciences by Prof. Mowadat
- Medical and Psychosocial Aspects of Chronic Illness and Disability

Community Medicine

- Parks Textbook of Preventive and Social Medicine
- Public Health and Community Medicine Ilyas

Surgery

- Bailey & Love' Short practice of Surgery

Medicine

- Davidson's Principles and Practice of Medicine

Islamiyat

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

XII: ASSESSMENT (TOOLS, POLICY, SCHEDULE, TOS)

- **Tools for formative and summative assessments:**
  - Written examination: MCQs and SEQs
  - Oral/Practical/Clinical: OSPE, OSCE, OSVE
- **Assessment policy:**
  - **Eligibility criteria for appearing in UHS annual examination:**
    a. Minimum 85% attendance (in each block and in the aggregate)
    b. Minimum 50% aggregate marks (i.e.,450/900)

- **Retake of institutional block examination/s will be allowed only under special circumstances.**
- Candidates falling short of attendance requirement shall not be admitted to the annual examination but may be permitted to appear at the supplementary examination if they make up the deficiency up to the commencement of next examination by remaining on rolls of a college as regular student, subject to fulfillment of all other mandatory requirements to appear at the examination.
- College may arrange remedial classes and one re-sit for each block examination, either with the subsequent block examination or before completion of the subsequent block, and before or during preparatory leave in case of terminal block of the professional year, before issuance of date sheet for the concerned professional examination.
    a. The students can appear in re-sit of a block examination, along with the subsequent block, and before or during preparatory leave for the terminal block of the professional year, once the requirement of attendance is met with. However, conduct of remedial classes shall be permitted only in the cases of students, who shall have attended at least 50% of the total attendance of the concerned block in the first instance.
    b. The valid reasons for short attendance in block or absence from a block examination may include major illness/accident/surgery of the student or death of an immediate relative/being afflicted by a natural calamity or disaster.

- **Assessments schedule:**
    - Formative assessments

GIT and Nutrition-1 module:

Anatomy department conducted 4 class tests containing content from gross Anatomy, Histology and Embryology in the GIT and nutrition-1 module. A total of 3 combined tests of Physiology and Biochemistry were conducted in GIT and Nutrition-1 module. The tests were jointly organized by Physiology and Biochemistry departments.

GIT and Nutrition-1 module combined tests

Test-1	18-03-24
Test-2	01-04-24
Test-3	15-04-24

Renal-1 module:

A total of 2 combined tests were held in Renal-1 module and included content from Anatomy, Physiology, Biochemistry and all other allied subjects. These tests were jointly arranged by all three basic departments led by Physiology dept.

Renal-1 module combined tests

Test-1	06-05-24
Test-2	20-05-24

TOS for Test-1 (06-05-24)

S. No	Subjects	PROPOSED TOS FOR TEST-1	
		MCQs (40)	SEQs (4)
1	Anatomy	11	**2**
2	Biochemistry	11	**1**
3	Physiology	10	**1**
4	Comm. Med & Public Health	3	-
5	Behavioral sciences	3	-
6	Pharmacology	2	-

TOS for Test-2 (20-5-24)

S. No	Subjects	PROPOSED TOS FOR TEST-2	
		MCQs (40)	SEQs (4)
1	Anatomy	10	**2**
2	Biochemistry	10	**1**
3	Physiology	10	**1**
4	Comm. Med & Public Health	3	-
5	Behavioral sciences	3	-
6	Pathology	4	-

PBL

Effective delivery of a curriculum needs incorporation of a variety of instructional strategies to cater for the different learning styles. In version 2.0 of modular integrated curriculum 2k23 for MBBS, UHS has pressed on the need for incorporation of at least three different methods of instruction including Problem Based Learning (PBL). PBL is a student-centered approach with active learning in small groups. For the current Second year MBBS, PBL was included in the instructional strategies and PBL committee was formulated. The committee included members from all basic departments and DME. It was decided that PBL sessions will be managed by basic departments under supervision of DME and with input from other allied subjects wherever required.

A total of three PBL sessions were conducted in block-4 and the topics were acute pancreatitis, renal colic, and peptic ulcer. Content areas from Anatomy, Physiology, Biochemistry, Pathology, Medicine and Surgery were covered in these sessions.

Each PBL was conducted in two sessions, the first session was reserved for brain-storming under supervision of facilitators. In the second session, selected students gave presentations on the same topic and were awarded with certificates. The current PBL sessions enhanced students' ability to work in teams, and critically evaluate the literature. Moreover, students were enthusiastic, and actively involved.

- **Block-4 examination schedule:**
  a. Written examination
  3-06-24 (MCQs & SEQs in a ratio of 70:30 %)
  b. Oral & practical examination
  4-06-24, 5-06-24, 6-06-24, 7-06-24

- **TOS for block-4 examination:**

THEME	SUBJECT	WRITTEN EXAM			ORAL/PRACTICAL/CLINICAL EXAM			
		MCQs (1 Mark)	SEQs (5 Marks each)	Marks	OSPE (8 Marks each) Observed	OSCE (8 Marks each) Observed	OSVE (16 Marks each) Observed	Marks
Normal structure	Anatomy & applied/clinical	23	3	38	3	-	1	40
Normal Function	Physiology & applied/clinical	16	2	26	2	-	1	32
	Biochemistry & applied/clinical	20	2	30	2	-	1	32
Disease Burden & Prevention	Community Medicine & Public Health	7	-	7	-	-	-	-
	Behavioral Sciences	6	-	6	-	-	-	-
Pathophysiology & Pharmacotherapeutics	Pathology	9	-	9	-	-	-	-
	Pharmacology	4	-	4	-	-	-	-
CFRC	CF - 2 - 1	-	-	-	-	1	-	8
PERLs	PERLs - 2 - 1	-	-	-	-	1	-	8
Total		85	7x5=35	120	7 stations x 8=56	2 stations x 8=16	3 stations X 16=48	120

<table>
<tr><td rowspan="4">Block 4
(GIT & Nutrition-1, Renal-1 module)</td><td colspan="2">Theory</td><td colspan="3">Practical</td><td>Total</td></tr>
<tr><td>Part I MCQs (85)
Part II SEQs (7)</td><td>85 Marks
35 Marks</td><td>Practical /Clinical Exam</td><td>07 OSPE
02 OSCE
03 OSVE</td><td>56
16
48</td><td rowspan="3">300</td></tr>
<tr><td>Internal Assessment 10%</td><td>30 Marks</td><td>Internal Assessment 10%</td><td colspan="2">30 Marks</td></tr>
<tr><td>Total</td><td>150</td><td>Total</td><td colspan="2">150</td></tr>
</table>

NOTE:

1. The continuous internal assessment through `Block Examination` conducted by the college of enrollment shall carry 60 marks, i.e., 20% of the total allocated marks for the block. The score shall be equally distributed to the Written and Oral/Practical/Clinical examination.
2. No grace marks should be allowed in any examination or practical under any guise or name.