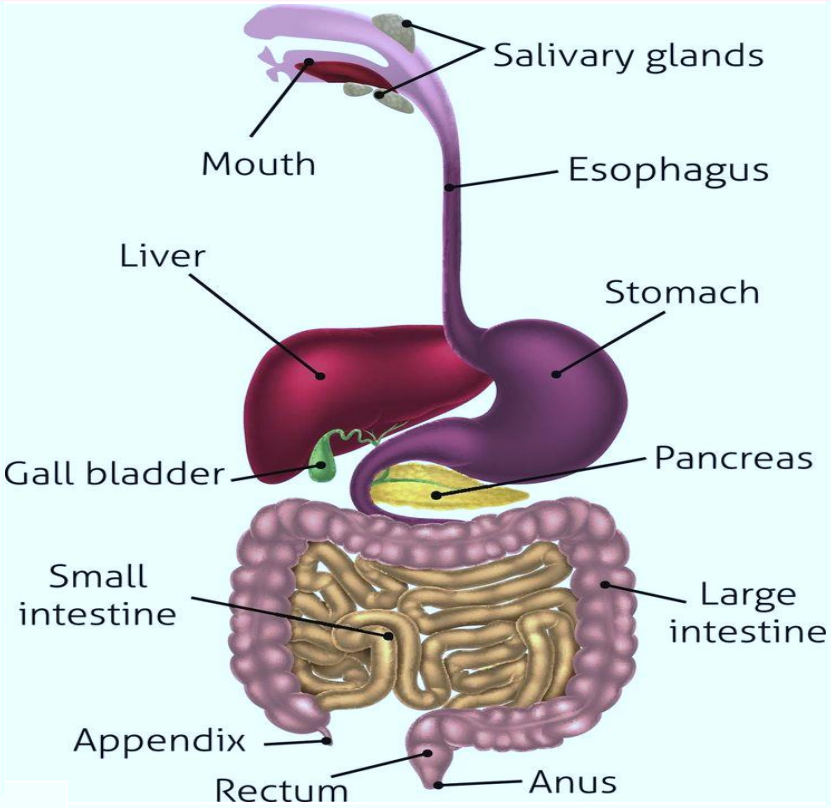
Study Guide- Second Year MBBS

- 28th Feb – 31st March 2022
- Duration 5 weeks

GASTROINTESTINAL TRACT & LIVER



Balanced Diet Health and Nutrition

STUDY GUIDE FOR GASTROINTESTINAL TRACT & LIVER MODULE-I

Module name: **Gastro-Intestinal Tract (GIT) & Liver-I**

Year: ***Two*** *Duration:* ***5 weeks (February – April 2022)***

Timetable hours: **Interactive Lectures, Case-Based Learning (CBL), Self-Study, Practicals, Skills, Demonstrations**

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	• Prof. S. Hafeezul Hassan (Physiology)
CO-COORDINATORS:	• Dr. Sadia Qayyum (Forensic)

DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING

BASIC HEALTH SCIENCES	CLINICAL AND ANCILLARY DEPARTMENTS
ANATOMY • Professor Zia-ul-Islam	***RESEARCH & SKILLS DEVELOPMENT CENTER*** • Dr. Kahkashan Tahir
BIOCHEMISTRY • Professor Kashif Nisar	
COMMUNITY MEDICINE • Dr. Saima Zainab	
PHARMACOLOGY • Professor Tabassum Zehra	
PHYSIOLOGY • Professor Syed Hafeezul Hassan	
DEPARTMENT of HEALTH PROFESSIONS EDUCATION • Professor Nighat Huda • Professor Sobia Ali • Dr. Afifa Tabassum • Dr. Sana Shah	
LNH&MC MANAGEMENT Professor Karimullah Makki, Principal LNH&MC Dr. Shaheena Akbani, Director A.A & R.T LNH&MC	
STUDY GUIDE COMPILED BY: Department of Health Professions Education	

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

- Inform students how student learning program of the module has been organized
- Help students organize and manage their studies throughout the module
- Guide students on assessment methods, rules and regulations

THE STUDY GUIDE:

- Communicates information on organization and management of the module.
  This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as Interactive Lectures, small group teachings, clinical skills, demonstration, tutorial and case based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources such as books, computer assisted learning programs, web- links, journals, for students to consult in order to maximize their learning.
- Highlights information on the contribution of continuous and examinations on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's achievement of objectives.
- Focuses on information pertaining to examination policy, rules and regulations.

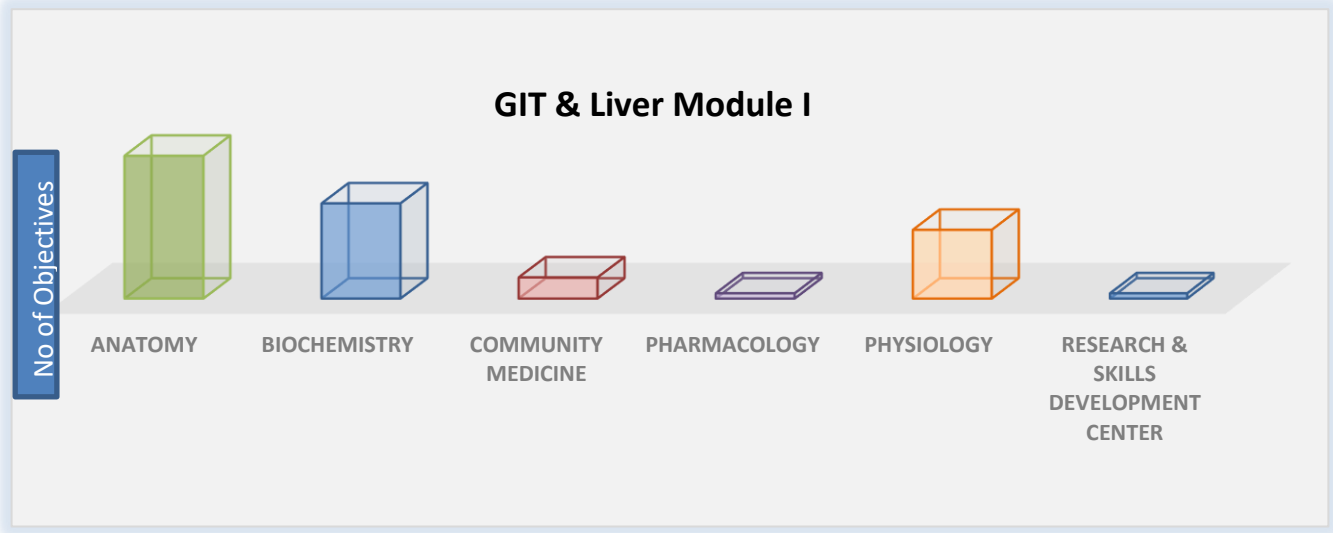
CURRICULUM FRAMEWORK

Students will experience *integrated curriculum* in the module at LNMC in accordance with the JSMU guidelines and most recent developments that have an impact on individual health.

INTEGRATED CURRICULUM comprises of system-based modules such as Neuroscience, Head & Neck Renal & Excretory System-I and Reproduction-I which links basic science knowledge to clinical problems. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have better understanding of basic sciences when they repeatedly learn in relation to clinical examples.

Case-based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab and physiotherapy department are characteristics of integrated teaching program.

INTEGRATING DISCIPLINES OF GIT & LIVER MODULE I



LEARNING METHODOLOGIES

The following teaching / learning methods are used to promote better understanding:

- Interactive Lectures
- Small Group Discussion
- Case- Based Learning
- Practicals
- Skills session
- Self Study
- E-Learning

INTERACTIVE LECTURES

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

SMALL GROUP DISCUSSION (SGD): This format helps students to clarify concepts acquire skills or attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews or discussion topics. Students exchange opinions and apply knowledge gained from Interactive Lectures, tutorials and self study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

CASE- BASED LEARNING: A small group discussion format where learning is focused around a series of questions based on a clinical scenario. Students' discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences during the module.

PRACTICAL: Basic science practicals related to anatomy, biochemistry, pathology, pharmacology and physiology are scheduled for student learning.

SKILLS SESSION: Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Department of Physiotherapy.

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

E-LEARNING: E-Learning is a strategy by which learning occurs through the utilization of electronic media, typically the Internet. The basic aspects of medical professionalism and ethics will be addressed through an e-learning course.

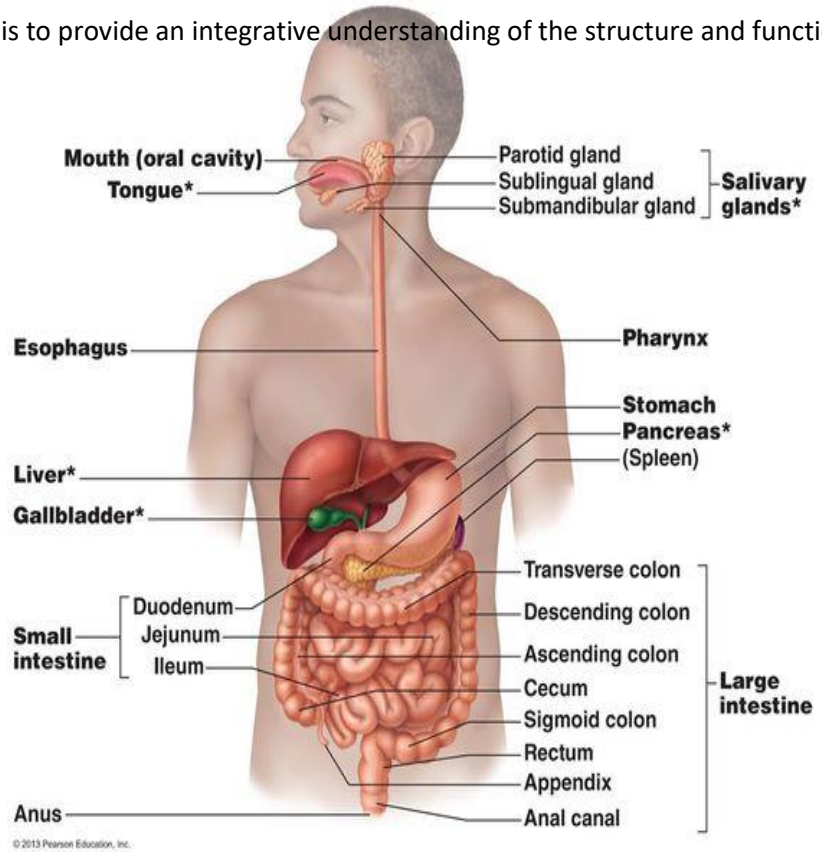
MODULE 1: GIT & LIVER

INTRODUCTION

In this module, medical students will learn in detail the normal structure, function and diseases GI Tract and hepatobiliary system. From Pakistan's context, the prevalence and significance of GIT and liver illnesses can be judged from the total days that adults and children are affected and remain absent from schools or work; number of admissions to hospitals ; and in numbers of surgical procedures performed.

Children and adults present to general practice, or hospitals with signs and symptoms of some of very common illnesses related to GIT & Liver including vomiting, chronic diarrhea, constipation, peptic ulcers, enteric fever, malnutrition, jaundice etc. This module will provide students opportunities to understand the basis of these illnesses including the mechanism involved in the development of these pathologies and integrate basic medical science knowledge to clinical problem-solving.

Students will identify how GI structure (Embryology, Microscopic Anatomy and Gross Anatomy) integrates with function (physiologic mechanisms of GI motility, digestion and absorption, and liver and pancreatic function). During the module, students will acquire a wider, more generally applicable knowledge of immunology, metabolism, infectious disease and pathology related to the GI system. Therefore, the overall objective of this course is to provide an integrative understanding of the structure and functions of the gastrointestinal tract.



COURSE OBJECTIVES AND STRATEGIES

At the end of the module the students will be able to:

ANATOMY

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
1. Introduction & divisions of GIT & abdominal quadrants	Interactive Lecture/ Tutorial
• Describe the divisions and parts of digestive tract	
• List the abdominal quadrants & regions of GIT	
2. Esophagus (Abdominal Part), Stomach {GROSS ANATOMY}	
• Explain gross features of abdominal part of esophagus & stomach	
• List their peritoneal & visceral relations	
• Explain their blood supply, lymphatic drainage & nerve supply	
3. General Plan of G.I.T and Esophagus (HISTOLOGY)	
• List the divisions of digestive tract	
• Describe the general histological features of GIT, specially of esophagus	
4. Development of GIT -I (derivatives of fore gut) {EMBRYOLOGY}	Interactive Lecture/ Case-Based Learning
• Describe the divisions of primitive gut	
• Enumerate the derivatives of foregut	
• Describe the development of foregut	
• Describe the clinical aspect of derivatives of foregut	
• Enumerate the congenital anomalies of foregut	
• Discuss the features of the following congenital anomalies of foregut:	
i. Hernias	
ii. Esophageal atresia, esophageal stenosis, congenital hypertropic pyloric stenosis, duodenal stenosis & atresia, anomalies of liver, extrahepatic, biliary artesia, annular pancreas, accessory pancreatic tissue, & accessory spleen	
5. Stomach {HISTOLOGY}	Interactive Lecture
• Describe the functions of the layers, component and cells in the wall of the digestive tract	
• Explain how they differ in the pharynx, esophagus and stomach.	
• Describe the microscopic features of gastric glands, their constituent cells and secretory product.	
• Differentiate cardiac, fundic and pyloric glands	
6. Peritoneum {GROSS ANATOMY}	
• Describe the extent of peritoneum horizontally	
• Define peritoneal layers, cavity, folds/mesenteries, omentum & ligaments	
• Explain the attachment and reflection of peritoneum	
• Explain the attachment of peritoneum on liver	
• Describe the boundaries of lesser sac	

7. Small Intestine & large intestine {GROSS ANATOMY}	Interactive Lecture/ Tutorial
• Explain different parts of small and large intestine	
• Describe the blood supply and nerve supply of intestine	
• List the structural differences between small and large intestine	
• Discuss the lymphatic drainage of small and large intestine	
• Discuss the relevant clinical conditions like volvulus & intussusceptions etc.	
8. Development Anatomy of GIT- II (derivatives of mid and hind gut) {EMBRYOLOGY}	Interactive Lecture/ Case-Based Learning
• List the development derivatives of primitive gut tube (pharynx. esophagus stomach, intestine)	
• Describe the derivatives of midgut and hindgut	
• Describe rotation of gut	
• Describe the formation of greater, lesser omentum and omental bursae	
• Describe the congenital anomalies of gut	
• List the special features associated with common anomalies related to gut including Congenital omphalocele, umbilical hernia, gastroschisis, anomalies of midgut, internal hernia, stenosis, atresia of intestine, Mal-rotation of gut, Ileal diverticulum, duplication of intestine, anomalies of hindgut, Hirschsprung disease, imperforate anus, anal stenosis, rectal atresia	
9. Small intestine {HISTOLOGY}	Interactive Lecture/ Tutorial
• Explain the different layers of small intestine	
• Discuss the cells present in the small intestine	
• Describe the different glands present in the small intestine	
• Define and explain Payers patches	
• Differentiate the parts of small intestine histologically	
10. Large intestine {HISTOLOGY}	
• Enumerate the different layers of large intestine	
• Describe the cells and glands present in large intestine	
• Explain the difference between small and large intestine	
11. Liver and Gall bladder {GROSS ANATOMY}	Interactive Lecture
• Describe liver with its anatomical positions	
• Identify lobes and surfaces of liver and visceral relations and impression.	
• Identify the segments of liver	
• Discuss the different components of biliary tract	
12. Hepatic Portal System	
• Identify the venous drainage of the organs of GI tract, and veins of hepatic portal system	
• Describe the venous drainage of the organs of GI trac,t and the veins of hepatic portal system	
• Describe the clinical importance of the hepatic portal system and its connections	
13. Development of liver, Gall bladder and Pancreas {EMBRYOLOGY}	
• Describe the development of liver	
• Discuss the formation of bile & hepatic cells	
• Discuss the molecular regulation of liver induction	
• Explain the formation of gallbladder & cystic duct	
• Enumerate the anomalies of Liver & gallbladder	

• Discuss the formation of pancreatic bud and islet of Langerhan	Interactive Lecture
• Discuss molecular regulation of pancreas development	
• Describe Pancreatic abnormalities	
14. Liver and gall bladder {HISTOLOGY}	Interactive Lecture /Tutorial
• Explain the histology of liver	
• Explain the arrangement of liver parenchyma	
• Describe the general concepts underlying classical hepatic lobule, portal lobule and hepatic acinus	
• Describe the microscopic structure of gall bladder	
15. Pancreas {GROSS ANATOMY}	Interactive Lecture
• Discuss the gross features of different parts of pancreas	
• Describe the location, relations, and morphological and secretory parts of Pancreas	
• Describe the arterial supply, venous drainage and nerve supply of pancreas	
• Discuss the clinical relevance of pancreas	
16. Pancreas {HISTOLOGY}	
• Explain the histology of Pancreas	
• Explain the arrangement of Pancreatic parenchyma	
17. Posterior abdominal wall (boundaries, lumbar vertebrae, muscles, fascia)	Interactive Lecture/ Tutorial
• Identify the level of vertebrae with respect to the three major orifices in the diaphragm	
• Identify the location of these orifices with respect to vertebral level	
• Enumerate the structures forming the posterior abdominal wall	
• Identify the boundaries of posterior abdominal wall	
• Discuss the general characteristics of lumbar vertebrae	
• Describe the muscles and fasciae of posterior abdominal wall	
• Discuss the clinical conditions associated with the posterior abdominal wall	
18. Anal Canal	Interactive Lecture
• Describe the Ano-rectal junction	
• Describe the Nerve supply and blood supply of anal canal	
• Describe Ano-rectal fistula, Polyps and diverticulum	
NOTE: Anal sphincters (External and internal) will be discussed with pelvis & perineum	
19. Anterior Abdominal wall	Tutorial
• Enumerate the structures forming anterior abdominal wall	
• Identify the boundaries of anterior abdominal wall	
• Describe the muscles and fasciae of anterior abdominal wall	
• Discuss the clinical conditions associated with the anterior abdominal wall	
20. Inguinal Canal	Interactive Lecture
• Describe the boundaries and content of the inguinal canal	
• Discuss clinical correlation of the inguinal canal	
21. Abdominal Aorta & blood supply of abdomen	
• Describe the course of abdominal aorta	
• Enumerate the paired and unpaired branches of abdominal aorta	
• Discuss the arteries which supply the abdominal walls	

22. Inferior vena cavae & venous drainage of abdomen	
• Describe the formation of inferior vena cava	
• List the tributaries of inferior vena cava	
• Explain the relations of inferior vena cava	
• Discuss the clinical conditions associated with inferior vena cava	
23. Lymphatic drainage and innervation of abdomen	
• Explain the groups of lymph nodes draining the abdomen	
• Describe the lymphatic trunks, cistern chili, the thoracic duct and nerves supply of abdomen	
• Discuss the sympathetic trunk, splanchnic nerves, prevertebral plexus & ganglia supplying the abdomen	
24. Surface anatomy of Abdomen	Interactive Lecture
• Identify the bony landmarks of the abdomen	
• Discuss the abdominal regions and quadrants	
• List the abdominal organs in each quadrant	
• Discuss the surface anatomy of stomach and spleen in relation to anterior abdominal wall	
• Discuss the surface anatomy of kidneys, ureters and spleen in relation to posterior abdominal wall	
• Identify the surface anatomy of liver	
• Discuss the surface anatomy of diaphragm	
25. Radiological Anatomy	Practical
• Identify various parts of normal GIT on a plain X ray	
26. Esophagus and stomach	
• Identify the slides of esophagus and stomach under microscope	
• Discuss the structure of the gastrointestinal tract, Histological features of layers of GIT	
• Describe the microscopic features of esophagus	
• Discuss the histological structure of each layer of esophagus	
• Discuss the distribution of esophageal glands and muscles	
• Elaborate the different regions of stomach, grossly and histologically	
• Discuss the various layers of the wall of stomach	
• Discuss the different glands and the various kind of cells present in esophagus and stomach	
27. Large Intestine	
• Identify large intestine under microscope	
• Describe the important histological features of large intestine.	
• Identify the appendix on the basis of its distinguished features	
• Identify the histological features of anorectal region	
• Differentiate between basic histological features of small and large intestines	

BIOCHEMISTRY

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
DIGESTION & ABSORPTION	
1. Digestion & Absorption of Carbohydrates	Interactive Lecture/ Tutorial/Practical
• Classify dietary carbohydrates with examples	
• Explain the significance of the glycemic index	
• Describe the importance of dietary fiber	
• List the main digestive enzymes and describe their action on carbohydrate	
• Discuss the abnormalities due to digestive enzyme deficiency	
• Explain the absorption of monosaccharaides by the intestinal mucosal cells	
• Discuss the clinical significance of abnormalities of digestion and absorption (e.g. lactose intolerance)	
• Correlate the interpretation of laboratory investigations with relevant clinical conditions	
2. Digestion & Absorption of Proteins	
• List the various sources of dietary protein	
• Discuss the digestion of protein	
• List and explain the functions of the proteolytic enzymes	
• Explain the mechanism of absorption of amino acids	
• Discuss the significance of amino acid pool	
• Explain the significance of nitrogen balance.	
• Discuss the clinical significance of protein allergy, celiac sprue and cystinuria	
3. Digestion & Absorption of Lipids	
• List the constituents of dietary lipids	
• Discuss the digestion of lipids	
• Explain the role of lipases in lipid digestion	
• Discuss the digestion of dietary cholesterol and phospholipisd	
• Explain the hormonal regulation of lipid digestion	
• Discuss the absorption of lipids by the intestinal mucosal cells	
• Discuss the re-synthesis and secretion of lipids by the enterocytes	
• Discuss the secretion of chylomicrons by the enterocytes	
• Define Steatorrhoea	
• List causes of Steatorrhoea	
• Discuss the abnormalities of lipid digestion and absorption with especial reference to cystic fibrosis	
4. Serum Glucose Estimation	
• List and explain the biochemical investigations done for Diabetes Mellitus	
• Outline the method for serum glucose estimation by spectrophotometer	
• Estimate the serum glucose levels and give its interpretation	
• Correlate the interpretation of laboratory investigations with relevant clinical conditions	

METABOLIC PATHWAYS OF CARBOHYDRATES	
5. Glycolytic pathway of Carbohydrates Metabolism	Interactive Lecture/ Tutorial/ Case-Based Learning
• Differentiate between aerobic and anaerobic glycolysis	
• Explain the role of insulin in transport of glucose inside the cells	
• List the reactions of the two stages of glycolysis viz energy investment and energy generation	
• Explain the hormonal regulation of glycolysis	
• Discuss the fate of pyruvate	
• Explain the process of glycolysis in RBC's	
• Discuss the abnormalities of glycolysis	
6. TCA cycle of Carbohydrate metabolism	
• Discuss the significance of TCA cycle as an amphibolic pathway	
• Discuss the reactions of the TCA cycle and its regulatory steps	
• Describe the energy produced from TCA cycle	
• Explain the disorders of TCA cycle	
7. Metabolism of Glycogen with its disorders	
• Explain the structure and functions of glycogen	
• Describe the mechanism of glycogen synthesis and its regulation	
• Describe the mechanism of glycognenolysis and its regulation	
• Discuss the maintenance of blood glucose level	
• Explain the various form of glycogen storage diseases	
8. Metabolic pathway of Gluconeogenesis	
• Describe the mechanism of gluconeogenesis	
• List the reactions which are unique to gluconeogenesis	
• Describe the regulation of gluconeogenesis	
• Explain the Cori cycle	
9. Metabolic pathway of HMP Shunt	
• Describe the significance of hexose monophosphate shunt	
• Describe the oxidative and non-oxidative stages of HMP shunt	
• Discuss the enzymes of the HMP shunt and its regulation.	
• Explain the abnormalities of the HMP shunt especially G6PD.	
• Discuss the significance of reactive oxygen species	
• Discuss the functions of NADPH and glutathione	
10. Metabolic pathways of Fructose, Galactose & Uronic Acid	
• List the sources of fructose	
• Discuss the alternative mechanism of monosaccharide metabolism	
• Discuss the important enzymes of fructose metabolism	
• Explain the metabolic pathway of fructose	
• Explain the disorders of fructose metabolism due to enzyme deficiencies	
• Discuss the important enzymes of Galactose metabolism	
• Explain the metabolic pathway of Galactose metabolism	
• Explain the disorders of Galactose metabolism due to enzyme deficiencies	
• Explain the uronic acid pathway and its biochemical significance.	
• Describe the importance of uronic acid pathway in liver detoxification	

Disturbances in Carbohydrate Metabolism	Tutorial
• Discuss the clinical importance of disturbances in carbohydrate metabolism (e.g. G6PD deficiency)	
• Correlate the interpretation of laboratory investigations with relevant clinical conditions	
BIOLOGICAL OXIDATION	Interactive Lecture/ Tutorial
11. Bioenergetics & Biological Oxidation	
• List high energy and low energy phosphate	
• List the oxido-reductase enzymes	
• Define bioenergetics and explain the general laws of thermodynamics	
• Define free energy and equilibrium constant	
• Describe the coupling of endergonic & exergonic reactions by high energy intermediates (e.g. ATP)	
• Describe the role of ATP as an energy carrier	
• Describe biologic oxidation and redox potential	
12. Oxidative Phosphorylation & Electron Transport Chain	
• List the ion transporters in the inner mitochondrial membrane	
• Describe the organization of the electron transport chain	
• Discuss the functions of each complex of ETC	
• Explain the energy currency of the body	
• Explain the site and mechanism of synthesis of ATP	
• Describe how proton are pumped from the matrix to the intermembrane space	
• Discuss the significance of co-enzyme Q and the Q-cycle	
• Discuss the inhibitors and uncouplers of ETC and their mechanism of action	
• Discuss how electron transport chain releases free energy	
• Discuss the generation of proton gradient	
• Explain the significance of P.O. Ratio	
• Explain Mitchell's chemiosmosis theory of electrochemical gradient	
• Explain the glycerophosphate and malate shuttle	
• List the genetic defects of oxidative phosphorylation	
• Explain the clinical conditions which inhibit the electron transport chain	
• Discuss the clinical importance of disturbances of electron transport chain (e.g. Carbon monoxide poisoning)	
• Correlate the interpretation of laboratory investigations with relevant clinical conditions	
BIOCHEMICAL FUNCTIONS OF LIVER	Interactive Lecture/ Tutorial/Practical
13. Metabolic role of Liver & its detoxification	
• Discuss the metabolic, synthetic, excretory, detoxification and storage functions of liver	
• List the liver function tests based on the five main functions of the liver	
• Explain the normal level of serum bilirubin (total, conjugated and unconjugated), urinaryurobilinogen, urinary bilirubin, fecal stercobilinogen in different types of Jaundice	
• Discuss the importance of serum enzymes in the differential diagnosis of Jaundice (ALT, AST, ALP, LDH, GGT, and 5'-Nucleotidase)	
• Discuss the importance of albumin, total protein and prothrombin time in diagnosingliver disease	

14. Degradation of Hemoglobin and Bilirubin Metabolism	
• List the steps of heme degradation to bilirubin	
• Discuss the role of liver in bilirubin uptake and conjugation	
• Discuss the secretion of bilirubin in bile	
• Explain the fate of bilirubin in the intestine and its excretion in urine and stool	
15. Jaundice and its biochemical investigations	
• Describe the disorders of bilirubin metabolism	
• Explain the types of bilirubin in the blood	
• Classify jaundice	
• Explain the causes with examples and diagnostic investigations of pre-hepatic, hepatocellular & post-hepatic and obstructive jaundice	
• List the causes of each type	
• Correlate the interpretation of laboratory investigations with relevant clinical condition	
16. Serum LFT's (Liver function test) profile	
• List and explain the Liver function tests	
• Identify the chemical tests and bio-techniques used to perform Liver function tests	
• Interpret the serum Liver function test	
• Correlate the interpretation of laboratory investigations with relevant clinical condition	
17. Serum Aminotransferase (ALT)	
• Identify the chemical tests and bio-techniques used to perform serum Aminotransferase	
• Estimate the serum Aminotransferase level (ALT)	
• Interpret the serum Aminotransferase level (ALT)	
• Correlate the interpretation of laboratory investigations with relevant clinical condition	
18. Serum Bilirubin	
• Explain the method used to perform Serum Bilirubin by Spectrophotometer	
• Estimate serum Bilirubin level (Total, Direct & Indirect Bilirubin)	
• Interpret serum Bilirubin level	
• Correlate the interpretation of laboratory investigations with relevant clinical condition	

RESEARCH METHODOLOGY

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
1. Introduction to Research	Interactive Lecture
• Define research	
• Explain the importance of research	
• Identify the high priority areas for health research	
• List steps of research	
• Describe the ethics of research	
2. Introduction to search engines/ literature search & sources of data	Small Group Discussion
• Describe the importance of literature review	
• Identify different sources of literature	
• Use databases to search literature	

PHARMACOLOGY

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
• Classify anti-diarrhreal drugs with their pharmacokinetics and clinical uses	Case-Based interactive learning (CBIL)

PHYSIOLOGY

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
1. Introduction to the digestive system	Interactive Lecture/ Case-Based Learning/ Tutorial
• Describe characteristics of gastrointestinal wall	
• Explain functional types of movements in gastrointestinal tract	
• Briefly state the gastrointestinal blood flow	
2. Functions of the smooth muscle and their electrical properties	
• List the electrical properties of smooth muscle	
• Explain the mechanism of smooth muscle contraction	
• Differentiate smooth muscle from skeletal muscle	
• Describe genesis of BER and its role in GI motility	
3. Nervous and hormonal control of GIT	
• List hormones of GIT and their role in process of digestion	
• Describe autonomic nervous system Explain Myenteric and Meissner's plexus	
• Describe the Gastrointestinal reflexes (gastro-colic, entero-gastric, colono-ileal reflexes)	
4. Secretion of saliva (composition, function and regulation)	
• List the salivary glands, composition and their functions	
• Describe stimuli that increase salivary secretion	
• Explain control of salivary secretion	
5. Mastication & Deglutition reflex	
• Describe mechanism of mastication	
• Explain different phases of deglutition	
• Explain lower esophageal tone and motility defects in esophagus	
6. Functions of stomach	
• Describe motor functions of stomach	
• Explain regulation of stomach emptying	
7. Gastric secretion (composition, function and regulation)	
• List composition of secretions of gastric glands	
• Describe role of gastric secretions in digestion	

• Describe the regulation of gastric secretion	
8. Movements of small and large intestine	
• Explain the following functions: Segmentation, Peristalsis, Mass movement and Defecation reflex	
• Describe the effects of autonomic system in modulating intestinal motility	
9. Secretions of small and large intestine	
• List secretion of different enzymes in small and large intestines	
• Describe the regulation of small and large intestinal secretions	
10. Pancreatic secretions (composition, function and regulation)	Interactive Lecture/ Case-Based Learning/ Tutorial
• Describe composition & secretions of pancreatic juice	
• Explain phases of pancreatic secretion	
• Describe the regulation of pancreatic secretion	
11. Bile secretion (composition, function and regulation)	
• List the composition of bile and factors for its release	
• Explain the mechanism of conjugation and secretion of bile salts	
• Describe role of bile acids and emulsification of fats	
• Describe enterohepatic circulation of bile salts	
12. Vomiting & Defecation reflexes	
• Explain vomiting reflex & its causes	
• Explain defecation reflex & its regulation	
13. Disorders of gastro-intestinal tract	
• Discuss the common disorders of GIT and its related glands	

RESEARCH & SKILLS DEVELOPMENT CENTER

TOPICS & OBJECTIVES	*LEARNING STRATEGIES*
NG Tube Insertion	
• Demonstrate NG tube insertion & mannequin	Practical

LEARNING RESOURCES

SUBJECT	*RESOURCES*
ANATOMY	**A. GROSS ANATOMY** 1. K.L. Moore, Clinically Oriented Anatomy 2. Neuro Anatomy by Richard Snell **B. HISTOLOGY** 1. B. Young J. W. Health Wheather's Functional Histology **C. EMBRYOLOGY** 1. Keith L. Moore. The Developing Human 2. Langman's Medical Embryology
BIOCHEMISTRY	**A. TEXTBOOKS** 1. Harper's Illustrated Biochemistry 2. Lehninger Principle of Biochemistry 3. Biochemistry by Devlin
COMMUNITY MEDICINE	**A. TEXT BOOKS** 1. Community Medicine by Parikh 2. Community Medicine by M Illyas 3. Basic *Statistics* for the Health Sciences by Jan W Kuzma
PHARMACOLOGY	**A. TEXT BOOKS** 1. Lippincot Illustrated Pharmacology 2. Basic and Clinical Pharmacology by Katzung
PHYSIOLOGY	**A. TEXTBOOKS** 1. Textbook Of Medical Physiology by Guyton And Hall 2. Ganong ' S Review of Medical Physiology 3. Human Physiology by Lauralee Sherwood 4. Berne & Levy Physiology 5. Best & Taylor Physiological Basis of Medical Practice **B. REFERENCE BOOKS** 1. Guyton & Hall Physiological Review 2. Essentials Of Medical Physiology by Jaypee 3. Textbook Of Medical Physiology by InduKhurana 4. Short Textbook Of Physiology by Mrthur 5. NMS Physiology

ASSESSMENT METHODS:

- **Best Choice Questions(BCQs)** also known as MCQs (Multiple Choice Questions)
- **Objective Structured Practical/Clinical Examination (OSPE or OSCE)**

Internal Evaluation

- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% may include class tests, assignment, practicals and the internal exam which will all have specific marks allocation.

Formative Assessment

Individual department may hold quiz or short answer questions to help students assess their own learning.

The marks obtained are not included in the internal evaluation

For JSMU Examination Policy, please consult JSMU website!

More than 75% attendance is needed to sit for the internal and final examination

MODULAR EXAMINATION RULES & REGULATIONS (LNH&MC)

- Student must report to examination hall/venue, 30 minutes before the exam.
- **Exam will begin sharp at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in examination hall.**
- If any student is found with cell phone in any mode (silent, switched off or on) he/she will be not be allowed to continue their exam.
- No students will be allowed to sit in exam without University Admit Card, LNMC ID Card and Lab Coat
- Student must bring the following stationary items for the exam: Pen, Pencil, Eraser, and Sharpener.
- Indiscipline in the exam hall/venue is not acceptable. Students must not possess any written material or communicate with their fellow students.

SCHEDULE:

WEEKS	2nd YEAR	MONTH
WEEK 1	GIT & LIVER MODULE-I	28th February 2022
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		31st March 2022
WEEK 1	NEUROSCIENCE MODULE-I	5th April 2022
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		28th May 2022
WEEK 1	HEAD & NECK MODULE	30th May 2022
WEEK 2		
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		23rd August 2022
Mid Term Examination 28th to 30th July 2022*		

*Final dates will be announced later.