



DENTAL COLLEGE HITEC-IMS
Study Guide Y1 - B2 - D22
1st Year BDS
Coordinator: Dr. Saman Malik



Contents

List of Abbreviations	4
NUMS Vision	5
Institutional Vision	5
Institutional Mission	5
Block Committee.....	6
Curriculum Overview/Implementation.....	7
Preface	7
Model.....	7
Organization.....	7
Assessment	7
1. InstitutionCompetency Framework.....	8
2. Alignment of Block Outcomes with Institutional Competencies	9
Assessment	10
2. Assessment Map	11
3. Academic Calendar	12
Sample Timetable	13
Block - II.....	14
Life Systems Integration.....	14
Structured Summary of Block II	15
1. Tentative Class Test Schedules	16
4. Tentative End of Block (EOB) Schedule	17



Physiology	18
Anatomy.....	28
Biochemistry	45
Vertically Integrated Modules	60
1. Research Methodology.....	60
2. Behavioural Sciences	61
Block II Syllabi.....	63
Physiology	63
Oral Biology.....	66
Anatomy.....	69
Biochemistry	73
Behavioural Sciences.....	74
Research Methodology.....	75
Learning Resources	76
1. Physiology	76
2. Anatomy.....	76
3. Oral Biology.....	77
4. Biochemistry	78



List of Abbreviations

- ANS Automatic Nervous System
- CBL Case Base Learning
- EECS Early Exposure to Clinical Skills
- EOB End of Block Examination
- FGD Focus Group Discussion
- GIT Gastrointestinal Tract
- LGIF Large Group Instructional Format
- LGIS Large Group Interactive Session
- MCQ Multiple Choice Question
- MIT Mode of Information Transfer
- NUMS National University of Medical Sciences
- OSCE Objectively Structured Clinical Examination
- OSPE Objectively Structured Practical Examination
- PMC Pakistan Medical Commission
- SAQ Short Answer Question
- SDL Self-Directed Learning
- SEQ Structured Essay Questions
- SGD Small Group Discussion
- TOS Table of Specification
- WFME World Federation of Medical Education
- IMLC Interactive Method to Learn Cranial Nerves



NUMS Vision

The vision of the National University of Medical Sciences is to improve the quality of life through education, research, innovation, and healthcare, thereby contributing to endeavors to make Pakistan and this world a better place to live in.

Institutional Vision

Leading advancement in Oral & Dental health through excellence
in Education, patient care and research

Institutional Mission

To serve the local and global communities by producing competent, ethical, socially responsible, research oriented and life long learning oral health care professionals



Block Committee

Coordinator: **Assistant Prof. Dr Saman Malik**

HoD Oral Biology, Contact No: 0312-3456303

S No.	Name	Designation	Departments	Contact Number
1.	Dr Rai Tariq	Professor	Community Dentistry	0333-5718658
2.	Dr Sadaf Mumtaz	Professor	Physiology	0347-5157965
3.	Dr Ayesha Haque	Associate Professor	Anatomy	0314-4568252
4.	Dr Ambreen Gul	Associate Professor	Biochemistry	0300-5905179
5.	Dr Saman Malik	Assistant Professor	Oral Biology	0312-3456303
6.	Dr Faizan Munir	Assistant Professor	Dental Education	0334-0031031
7.	Dr Fatima Tuz Zahra	Lecturer	Behavioural Sciences	0307-5887485
8.	Urwa Liaqat	Student	1 st Year	0333-5949679
9.	Arshia Shoukat	Student	2 nd Year	0311-0796622
10.	Anas Nadir	Student	2 nd Year	0313-6112202



Curriculum Overview/Implementation

Preface

The curriculum meets the standards of the Pakistan Medical Commission, the Higher Education Commission of Pakistan, and the World Federation of Medical Education. On completion of the program, our students have required competencies as defined worldwide in a graduate doctor.

Model

The curriculum of Dental College HITEC-IMS is based on the traditional, discipline-based model of educational strategies. However, we have incorporated some elements of the SPICES model, such as its student-centered, integrated, community-oriented, and systematic aspects. In addition, our curriculum has evolved, considering traditional, experiential, behavioral, attributional and constructivist perspectives of curricula.

Organization

The curriculum is organized and integrated along important vertical and horizontal dimensions. The content taught is integrated concurrently in the horizontal organization and vertically across the years of dental education. The course of the first year is divided into three blocks. In each block, the sequencing of the content is logical and integrated.

Teaching Strategies

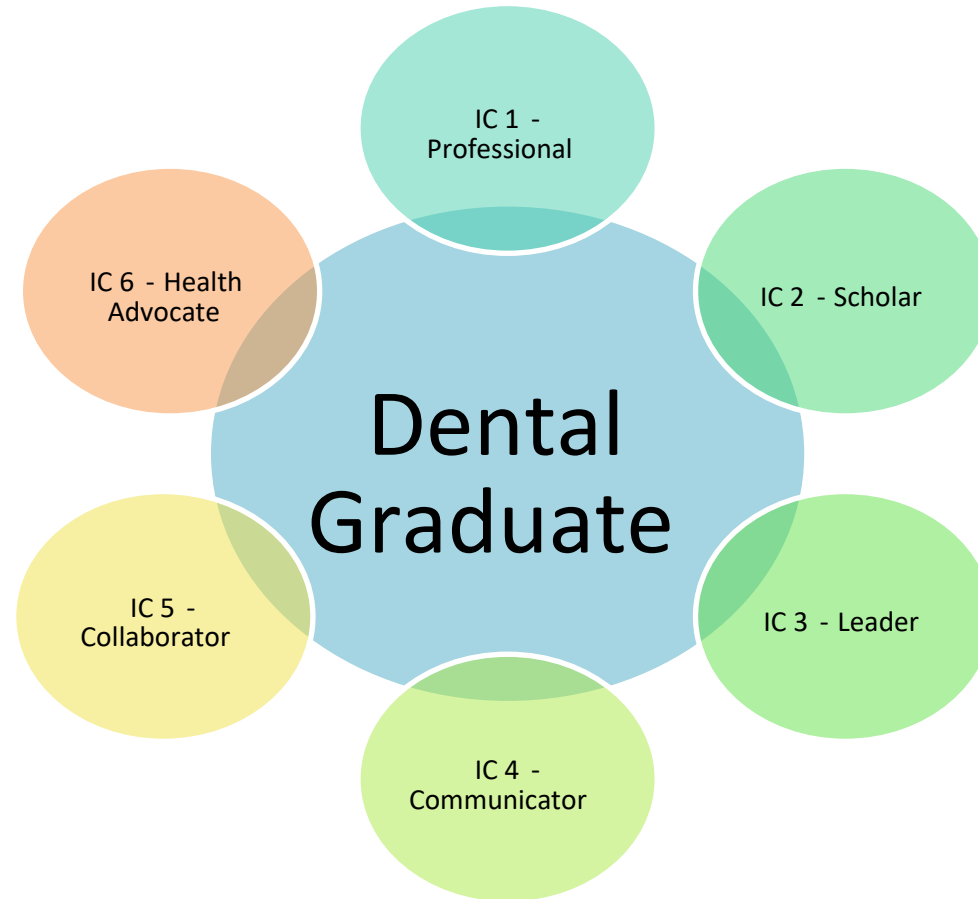
Multiple teaching strategies are used. LGIS are used to provoke thought, understanding and to standardize the delivery of concepts. It helps them to understand general themes of subject matter, updated research and best evidence medical information. We are teaching clinical implications of each topic to integrate basic and clinical sciences. This encounter is based on experience that is contextual, realistic, and relevant. Small group discussions encourage students to learn socially, discuss their concepts and refine their schemas. Working in laboratories and the dissection hall provides experiential and hands-on learning.

Assessment

The summative assessment includes end of block and pre annual examination. Formative assessment is based on assignments, presentation, flipped classroom journal club, quizzes and class tests. After the block exams and end of academic year, a pre annual examination is conducted according to standards outlined by NUMS.



1. Institution Competency Framework





2. Alignment of Block Outcomes with Institutional Competencies

S. No.	Block Outcomes	Institutional Competencies
1.	Correlate the anatomy of cells and their biochemical reactions with its application in clinical practice	IC 1 to IC 6
2.	Relate the histology of nerve, bone and muscle with its function along with clinical relevance	IC 2 to IC 6
3.	Discuss the anatomical and histological features of hard and soft tissues, including the head and neck region	IC 2
4.	Integrate the fundamental concepts of social and behavioral sciences with knowledge of other medical subjects	IC 1, IC 2, IC 6
5.	Apply the principles of research for writing research proposals	IC 2, IC 4, IC 5, IC 6
6.	Analyze multiple perspectives of Pakistan studies and Islamiyat	IC1, IC 2



Assessment

Types and Schedules



Assessment is continuous via class tests, quizzes, and assignments by the department. Continuous assessment is separate from the block exam that will be held at the end of 13th weeks of instruction.

Formative assessment will be in the form of tests/ written assignments/reflective writing/ presentations and feedback to the students during the teaching time. The purpose of formative assessment is to provide feedback to the students for improvement and for teachers to identify areas where students need further guidance.

From the 2nd week onwards, the class tests of Biochemistry, Physiology, Anatomy and Oral Biology will be held on a rotation basis, respectively. Finally, the 14th week will be dedicated to End of Block (EOB) exams. The EOB exam will comprise of theory and practical exam separately. EOB along with pre-annual exams, will contribute to marks in internal assessment, to be submitted to the university.

Students must secure 50% marks in theory and practical exams separately, per university criteria.

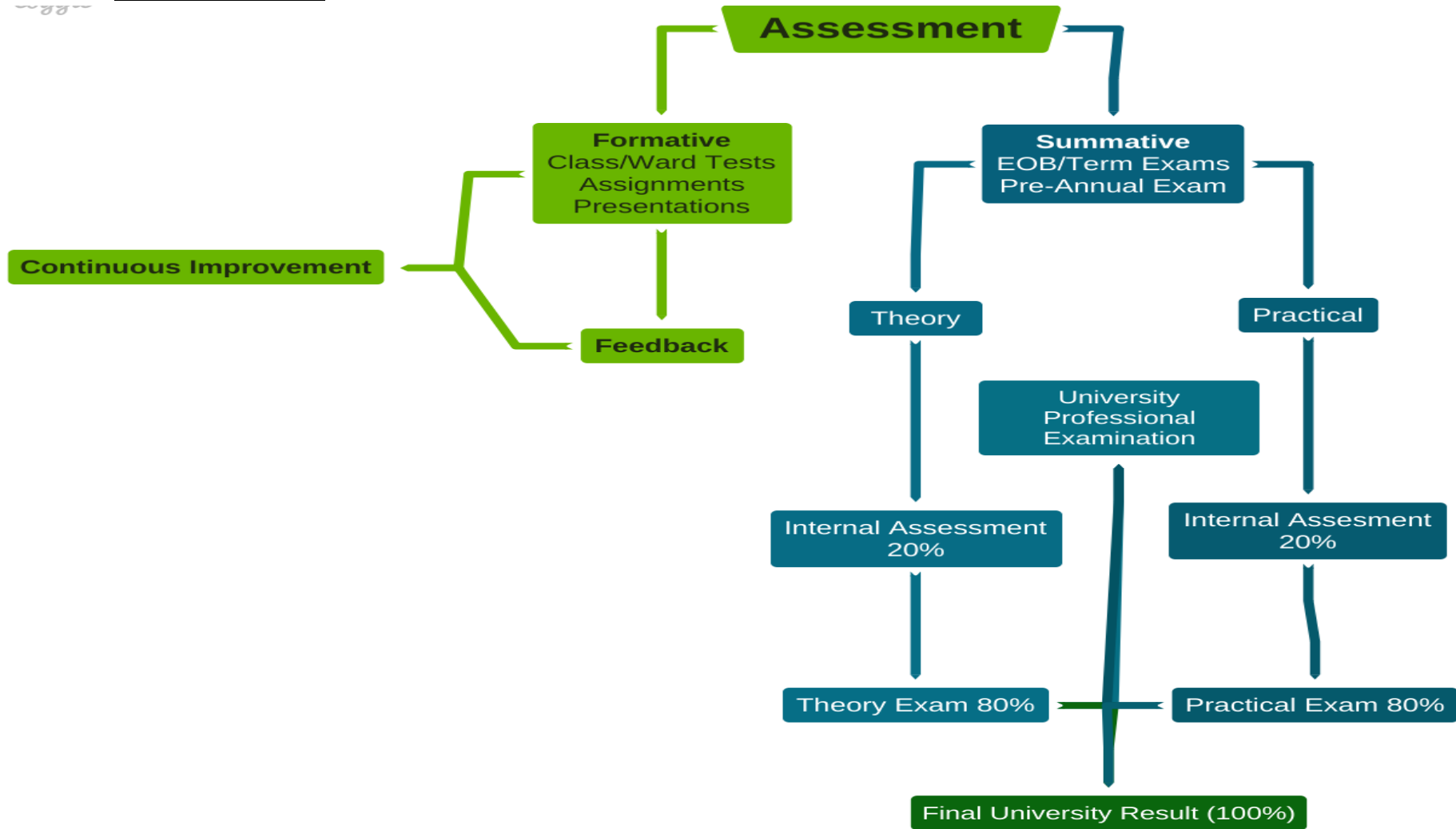
The students who fail at the end of the block exam will be allowed to attend the next block; however, his/her internal assessment will be affected accordingly.

Internal assessment criteria for submission of internal assessment marks of first Professional Examination NUMS:

1. The weightage of internal assessment shall be 20 marks for a 100 marks Paper (20%) in the annual examination.
2. End of block examinations, and pre-annual examination shall contribute to internal assessment.



2. Assessment Map





3. Academic Calendar

1st Year BDS CLASS-2022

Commencement of Classes - 01.02.2022			
BLOCK - 1 (14 WEEKS)			
(15 – 02 - 22 To 17 – 05 - 22)			
Activity	Duration	From	To
Orientation	01 week	01-02-22	6-02-22
Academics	07 weeks	7-02-22	25-03-22
Sports Week	01 week	28-03-22	01-04-22
Academics	04 weeks	04-04-22	29-04-22
Public Holiday	Nil	-----	----
Block Assessment	01 week (09 days)	09-05-22	17-05-22
Eid Ul Fitr	01 week (09 days)	30-04-22	08-05-22
Block - 2 (13 Weeks)			
(18 – 05 - 22 To 21 – 08 - 22)			
Academics	6 weeks	18-05-22	27-06-22
Public Holidays	Nil	----	-----
Eid-UI Azha+ Vacations	03 weeks	27-06-22	17-07-22
Academics	03 weeks	18-07-22	06-08-22
Block Assessment	01 week	09-08-22	21-08-22
Block - 3 (14 Weeks)			
(22 – 08 - 22 To 09 – 11 - 22)			
Academics	12 weeks	22-08-22	09 -11-22
Public Holiday	Nil	-----	-----
Send-Up	02 weeks	14-11-22	01-12-22
Pre-Prof Leave	26 Days	02-12-22	26-12-22
1 st Professional Exam (Tentative)	25 th of December 2022		



Sample Timetable

Day/ Time	8:30-9:20	9:20-10:10	10:10-10:30	10:30-11:20	11:20-12:10	12:10-12:30	12:30-1:50	1:50-3:30	
Monday	<u>Anatomy</u>	<u>Biochemistry</u>	-----Break-----	<u>PHYSIOLOGY</u>		-----Break-----	<u>PRACTICAL</u>	<u>ORAL BIOLOGY</u> <u>PRACTICAL</u>	
Tuesday	<u>PHYSIOLOGY</u>	<u>ORAL BIOLOGY</u>		<u>ANATOMY</u>			<u>PRACTICAL</u>	<u>1:50-2:50</u> <u>ORAL BIOLOGY</u>	<u>2:50:3:30</u> <u>BEHAVIOR SCIENCES</u>
Wednesday	<u>BIOCHEMISTRY</u>	<u>ANATOMY</u>		<u>PHYSIOLOGY</u>	<u>ORAL BIOLOGY</u>		<u>ANATOMY</u>	<u>ORAL BIOLOGY</u> <u>PRACTICAL</u>	
Thursday	<u>ANATOMY Dissection</u>			<u>BIOCHEMISTRY</u>	<u>PHYSIOLOGY</u>		<u>PRACTICAL</u>	<u>1:50- 2:30</u>	<u>2:30-3:30</u>
Friday	8:30-9:20	9:20-10:10	10:10-11:20	11:20-12:00	12:00-1:00	1:00-1:30	1:30-2:30	2:30-3:30	
	<u>ORAL BIOLOGY</u>	<u>BIOCHEMISTRY</u>	<u>PHYSIOLOGY</u>	<u>ISLAMIAT/PAK STUDIES</u>	<u>BIOCHEMISTRY</u>	Break	<u>PHYSIOLOGY</u>	<u>ANATOMY</u> <u>DISSECTION</u>	



Block - II

Life Systems Integration



Structured Summary of Block II

Code	Y1-B2-D22
Name	Life Sciences Integration
Duration of block	13 (9+4) 9 academics 3 weeks (summer vacation + Eid ul Adha) 1 block exam
Dates	17-5-22 to 21-8-22
Horizontally Integrated Themes	Oxygen-HB dissociation curve GIT Oral embryology Taste pathway Mastication
Vertically Integrated Themes	Research Methodology Behavioral Sciences
Prerequisite Blocks	1st Year 1 st Block



1. Tentative Class Test Schedules¹

DATE	SUBJECT	DAY
6 th June 22	Biochemistry	Monday
13 th June 22	Physiology	Monday
18 th July 22	Anatomy	Monday
25 th July 22	Oral Biology	Monday

¹ This is a tentative schedule. Therefore, it is subject to change.



4. Tentative End of Block (EOB) Schedule ²

Dates	Subject	8:30 - 11:30	12:00 pm - 3:30 pm
09-Aug-22 Tuesday	Anatomy	Theory	Viva
12-August-22 Friday	Biochemistry	Theory	Viva
15-Aug-22 Monday	Oral Biology	Theory	Viva
18-Aug-22 Thursday	Physiology	Theory	Viva
22-Aug-22 Monday	Integrated OSPE		

² This is a tentative schedule. Therefore, it is subject to change.



Learning Outcomes of Block II

Physiology

S. No.	Topics/Theme	Learning Outcomes	Learning Objectives	IC Codes	MITs	Assessment Tools
		By the end of this block students should be able to:				
CVS						
1.	Cardiac output and venous return	Analyze the factors regulating venous return and cardiac output at rest and during exercise	<u>Knowledge</u> <ul style="list-style-type: none"> • Discuss the determinants of cardiac output and factors affecting cardiac output • Describe the mechanics of low and high cardiac outputs along with their effects on heart • Describe the factors affecting stroke volume, heart rate and total peripheral resistance • List the functions of veins • Identify factors regulating venous return and significance of venous reservoirs • Describe the equality of cardiac output and venous return 	IC 2	LGIS	MCQs SEQs Viva Voce
			<u>Skill</u> <ul style="list-style-type: none"> • Examination of Heart Sounds 	IC 1 IC 4	Practical Demonstration	OSPE
			<u>Attitude</u>	IC 1 IC 4	Practical Demonstration	Formative Checklist



			<ul style="list-style-type: none"> • Follow proper dress code of a medical laboratory • Maintain his/her workstation according to the prescribed SOPs • Report any damage to lab equipment immediately 			
2.	Arterial blood pressure	Summarize regulatory mechanisms of blood pressure & cardiac output control in health and disease	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Describe the determinants of arterial pressure, factors affecting and mechanisms regulating blood pressure on short and long-term basis • Explain mean arterial pressure and its significance • Discuss the individual and integrative role of baroreceptors, chemoreceptor, volume receptors, arterial natriuretic factors and Renin-angiotensin - aldosterone system in regulation of arterial pressure • Discuss the characteristics of regional circulations (skeletal muscles, pulmonary, coronary & cerebral) 	IC 2	LGIS	MCQs SEQs Viva Voce
3.	Circulatory shock	Compare various types of shock and their pathophysiology	<p><u>Knowledge</u></p>	IC 2	LGIS	MCQs SEQs Viva Voce



			<ul style="list-style-type: none"> • Discriminate various types of shock, its types and stages of development • Differentiate between compensated and uncompensated shock • Recognize the short term and long-term compensatory mechanisms in circulatory shock • Diagnose and treat various types of shock based on clinical scenarios 			
4.	ECG	Interpret normal ECG	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Describe basis of ECG, different ECG Leads and their placements • Draw and label normal ECG showing various waves, segments and intervals • Discuss significance of waves, segments and intervals of ECG • Describe relationship between vector and lead, type and locations of leads and principles for vector analysis in a normal heart 	IC 2	LGIS	MCQs SEQs Viva Voce



			<p><u>Skill</u></p> <ul style="list-style-type: none"> Record normal ECG Calculate heart rate and various intervals and segments 	IC 1 IC 4	Demonstration	OSPE
			<p><u>Attitude</u></p> <ul style="list-style-type: none"> Follow proper dress code of a medical laboratory Maintain his/her workstation according to the prescribed SOPs Report any damage to lab equipment immediately 	IC 4 IC 5	Demonstration	Formative Checklists
Respiration						
5.	Introduction to Respiratory System	<ul style="list-style-type: none"> Correlate the anatomy of respiratory tract with its functions Discuss the role of conductive and gas exchange zones of lungs 	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Recognize the functional anatomy of various parts of respiratory system Describe the non-respiratory functions of respiratory tract 	IC 2	LGIS	MCQs SEQs Viva Voce
			<p><u>Skill</u></p> <ul style="list-style-type: none"> Demonstration of simple spirometry 	IC 2 IC 4 IC 5	Practical demonstration	OSPE



			<p>Attitude</p> <ul style="list-style-type: none"> • Follow proper dress code of a medical laboratory • Maintain his/her workstation according to the prescribed SOPs • Report any damage to lab equipment immediately 	<p>IC 1 IC 4</p>	<p>Demonstration</p>	<p>Formative checklists</p>
6.	Pulmonary Mechanics	<ul style="list-style-type: none"> • Explain the mechanics of respiration • Explain lung volume and pressure changes during quiet and forceful breathing 	<p>Knowledge</p> <ul style="list-style-type: none"> • Distinguish functions of inspiratory and expiratory muscles during quiet and forceful respiration • Correlate normal lung volumes/ capacities to various pressures and volume changes during forceful respiration and changes in volume and capacities 	<p>IC 2</p>	<p>LGIS</p>	<p>MCQs SEQs Viva Voce</p>
7.	Pulmonary Compliance	<p>Explain factors determining pulmonary compliance</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Discuss lung and chest wall compliance • Identify composition & role of surfactant in alveolar surface tension • Discuss the concept of work of breathing 	<p>IC 2</p>	<p>LGIS</p>	<p>MCQs SEQs Viva Voce</p>



8.	Respiratory Membrane & Diffusion of Gases	Compare the different modes of gas transport in blood	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Describe the layers of respiratory membrane in detail Appraise concept of diffusing capacity through respiratory membrane Identify factors affecting gas diffusion through respiratory membrane 	IC 2	LGIS	MCQs SEQs Viva Voce
9.	Diffusion of gases & Oxygen transport	<ul style="list-style-type: none"> Compare the different modes of gas transport in blood 	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Recall the mechanics of oxygen diffusion from alveoli to blood Distinguish mechanism of oxygen transport in the arterial blood, tissue fluid and cell 	IC 2	LGIS	MCQs SEQs Viva Voce
10.	Oxygen transport & Dissociative curve	<ul style="list-style-type: none"> Compare the different modes of gas transport in blood 	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Identify the role of Haemoglobin in oxygen transport Explain normal oxygen-hemoglobin dissociation curve by explaining factors that shift oxygen-hemoglobin dissociation curve to right and left 	IC 2	LGIS	MCQs SEQs Viva Voce
			<p><u>Skill</u></p> <ul style="list-style-type: none"> Determine ESR by Westergren method 	IC 4 IC 5	Practical demonstration	OSPE



			<p>Attitude</p> <ul style="list-style-type: none"> Follow proper dress code of a medical laboratory Maintain his/her workstation according to the prescribed SOPs Report any damage to lab equipment immediately 	<p>IC 1 IC 4 IC 5</p>	<p>Practical demonstration</p>	<p>Formative checklists</p>
11.	Carbon dioxide transport	<ul style="list-style-type: none"> Compare the different modes of gas transport in blood 	<p>Knowledge</p> <ul style="list-style-type: none"> Identify various chemical form in which CO₂ is transported in blood Describe normal CO₂ dissociation curve explaining Bohr effect, haldane effect and chloride shift 	<p>IC 2</p>	<p>LGIS</p>	<p>MCQs SEQs Viva Voce</p>
12.	Nervous regulation of respiration	<ul style="list-style-type: none"> Compare the chemical and neural regulation of respiration during rest and exercise Correlate ventilation with perfusion in different lung zones 	<p>Knowledge</p> <ul style="list-style-type: none"> Explain different group of neurons composing respiratory centre Review nervous control of inspiration and respiratory rhythm Recognize the regulatory mechanism of Hering Breuer inflation reflex 	<p>IC 2</p>	<p>LGIS</p>	<p>MCQs SEQs Viva Voce</p>
13.	Chemical regulation of respiration	<ul style="list-style-type: none"> Compare the chemical and neural regulation of 	<p>Knowledge</p>	<p>IC 2</p>	<p>LGIS</p>	<p>MCQs SEQs Viva Voce</p>



		respiration during rest and exercise • Correlate ventilation with perfusion in different lung zones	• Appraise location, function and stimulation (by CO ₂ and H ⁺) of central chemosensitive area • Identify the role of peripheral chemoreceptors for control of respiration • Determine the composite effects of PCO ₂ , pH, & PO ₂ on alveolar ventilation			
GIT						
14.	Neural control of GIT	Explain the interplay of autonomic and enteric nervous system in GI motility	<u>Knowledge</u> • Appraise physiologic anatomy of gastrointestinal tract with specific focus on role of interstitial cells of Cajal • Compare functions of mesenteric and myenteric plexuses • Link the role of autonomic nervous system in GI motility	IC 2	LGIS	MCQs SEQs Viva Voce
15.	Food Processing in oral cavity	Correlate the Pathophysiology of Mastication and deglutition with specified clinical presentations	<u>Knowledge</u> • Recall the role of teeth, tongue, cheeks and saliva in assimilation and digestion of food • Distinguish three phases of deglutition reflex • Outline different types of peristalsis in esophagus are taking place	IC 2	LGIS	MCQs SEQs Viva Voce



16.	Vomiting reflex	Describe mechanism (stimuli, pathways, center) and clinical significance of vomiting reflex	<u>Knowledge</u> <ul style="list-style-type: none"> • Explain the mechanism of vomiting reflex • Appraise the location and function of vomiting center/ chemoreceptor trigger zone in the brain 	IC 2	LGIS	MCQs SEQs Viva Voce
17.	Liver	Explain the non-metabolic functions of liver	<u>Knowledge</u> <ul style="list-style-type: none"> • Explain the role of liver in non-metabolic domains and give clinical importance of each 	IC 2	LGIS	MCQs SEQs Viva Voce
Renal						
18.	Edema	Elucidate edema types, clinical significance and factors responsible for causing edema	<u>Knowledge</u> <ul style="list-style-type: none"> • Explain the role of Starling forces and other safety factors (lymphatic, negative ISF pressure) in prevention of edema 	IC 2	LGIS	MCQs SEQs Viva Voce
19.	Functional anatomy of kidney	Recognize functions of kidneys	<u>Knowledge</u> <ul style="list-style-type: none"> • Outline the physiological anatomy of nephron and glomerular capillary membrane • List primary and endocrinal functions of kidney • Physiology of micturition reflex 	IC 2	LGIS	MCQs SEQs Viva Voce
20.	Glomerular Filtration	Explain the process of formation of	<u>Knowledge</u>	IC 2	LGIS	MCQs SEQs



		glomerular filtrate and its regulation	<ul style="list-style-type: none">• Correlate the determinants of GFR to clinical conditions• Identify the parameters involved in auto regulation of GFR and blood flow			Viva Voce
--	--	--	--	--	--	-----------



Anatomy						
S. No	Topics/ Theme	Learning Outcomes	Learning Objectives	IC Codes	MITs	Assessment Tools
			By the end of this block students should be able to			
1.	Skin and Fascia	Apply the general anatomical concept of skin and fascia in understanding of their regional distribution and differentiation	<u>Knowledge</u> <ul style="list-style-type: none"> Differentiate between thick and thin skin Enlist functions of skin Identify different types of skin, creases and lines Define fascia Differentiate between different modifications of fascia Describe the importance of cleavage lines and wound healing List the structures involved in first, second and third degrees of burns 	IC 2	LGIS	MCQ SEQ VIVA VOCE
2.	Arthrology	Anatomize the general features of joints	<u>Knowledge</u> <ul style="list-style-type: none"> Classify joints according to their structure with examples of each type especially from head and neck Describe the general structure of a synovial joint 	IC 2	LGIS	MCQ SEQ VIVA VOCE
3.		Explain the light microscopic structure	<u>Knowledge</u>	IC 2	LGIS	MCQ SEQ



	<p>Oral Cavity (Lip, Tongue, Salivary glands)</p>	<p>of lip and tongue, with special emphasis on papillae of tongue and taste buds. Explain the light microscopic structure of major salivary glands</p>	<ul style="list-style-type: none"> • Explain the histological structure of lip • Describe the microscopic structure of tongue, with special reference to epithelium on its two surfaces, types of lingual papillae and taste buds with their location and structure • Describe the Histological features of parotid, submandibular and sublingual glands with reference to their type, parenchyma, stroma, and duct system 			<p>VIVA VOCE</p>
			<p>Skill</p> <ul style="list-style-type: none"> • Draw labelled diagrams showing light microscopic structure of lip, tongue, submandibular, sublingual, and parotid glands • Identify microscopic sections of lip, tongue, plate, neural tube, and neural crest cells • List derivatives of the following: <ul style="list-style-type: none"> • Surface ectoderm • Neurectoderm • Neural crest 	<p>IC1 IC4 IC5</p>	<p>Laboratory Demonstration</p>	<p>OSPE</p>



			<ul style="list-style-type: none"> • Intraembryonic mesoderm (paraxial, intermediate, lateral plate) • Endoderm • Describe early differentiation of somite and the development of intraembryonic coelom • Describe the folding of the embryo in the median plane and correlate it with its consequences 			
4.	Handling of microscopes and slides	Demonstrate a professional attitude while dealing with learning resources	<p><u>Attitude</u></p> <ul style="list-style-type: none"> • Follow proper dress code of laboratory • Handle microscopes and slides properly according to SOPs displayed in laboratory • Switch off microscopes before leaving • Report any damage to lab equipment immediately 	IC 2 IC 4	Laboratory	Formative Checklist
5.	The embryonic period; 3rd to 8th week	Explain the development of embryo from 3 rd to 8 th week	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Define neurulation • Describe process of formation of neural tube • Describe relocation of connecting stalk to the anterior abdominal 	IC 2	LGIS	MCQ SEQ VIVA VOCE



			wall and its differentiation into umbilical cord			
			Skills <ul style="list-style-type: none"> Identify the structures related to general development on given models of general embryology 	IC 1 IC 4	Demonstration	OSPE
6.	Handling of models	Demonstrate a professional attitude while dealing with learning resources	Attitude <ul style="list-style-type: none"> Demonstrate correct handling of the models according to SOPs displayed Place the model parts correctly after task and return to authorized person Report any damage to the model 	IC 1 IC 4	Laboratory	Formative Checklist
7.	Musculo-Skeletal System (skull, face, thyroid gland)	Explain the embryological basis behind the development of skull, face and thyroid gland correlate them with various relevant clinical presentations	Knowledge <ul style="list-style-type: none"> Identify the sources of skull Classify skull on embryological basis Explain features of a newborn skull Describe the events in development of cartilaginous and membranous neurocranium Identify the fontanelles with reference to their location, closing time and clinical significance 	IC 2	LGIS	MCQ SEQ VIVA VOCE



			<ul style="list-style-type: none"> • Explain the embryological basis of crania, microcephaly, and various types of craniosynostosis 			
8.	Head	Explain the embryological basis of congenital anomalies related to pharyngeal arches and pouches, tongue, nose and paranasal sinuses, face, palate, thyroid, and parathyroid glands	<p>Knowledge</p> <ul style="list-style-type: none"> • Define pharyngeal arch, pharyngeal groove and pharyngeal cleft and pharyngeal membrane • Enlist the derivatives of pharyngeal arches pharyngeal grooves, pharyngeal clefts and pharyngeal membranes • Discuss the development of face with special reference to role of neural crest cells • Describe the development of nasal cavities and paranasal sinuses • Justify the association of craniofacial anomalies with other anomalies caused by improper migration of neural crest cells • Discuss development of thyroid gland and correlate it with ectopic thyroid tissue • Discuss development of parathyroid glands 	IC 2	LGIS	MCQ SEQ VIVA VOCE



			<ul style="list-style-type: none"> • Discuss the descent of thyroid and parathyroid glands to their definitive positions • Discuss the definitive positioning of parathyroid gland arising from third arch lower than the one arising from fourth arch 			
9.	Skull	Elucidate the topographic anatomy of skull	<p>Knowledge</p> <ul style="list-style-type: none"> • Explain the general plan of studying skull from different views • Identify important bony landmarks on the bones as viewed from lateral, superior, inferior, anterior, and posterior views • List structures traversing the foramina in these bones • Identify the bones forming the boundaries of orbit, nasal cavity, oral cavity, temporal, infratemporal fossa & pterygopalatine fossa on the given bone 	IC 2	SGD	MCQ SEQ VIVA VOCE
10.	Scalp	Correlate the structure and neurovascular supply of scalp with anatomical basis of	<p>Knowledge</p> <ul style="list-style-type: none"> • Explain extent of scalp on model • Enumerate layers of scalp in sequential order 	IC 2	SGD	MCQ SEQ VIVA VOCE



		relevant clinical conditions	<ul style="list-style-type: none"> Correlate gross features of each layer with anatomical basis of black eye, profuse bleeding, gaping wound, spread of scalp infection and shape of hematoma 			
11.	Oral cavity	Correlate the gross anatomy of oral cavity and tongue with anatomical basis of relevant clinical conditions	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Name different boundaries of oral cavity Describe blood and nerve supply and lymphatic drainage of oral cavity Identify the location of inferior alveolar nerve block Describe the salient features of floor of mouth Discuss the attachments, actions, nerve supply and relations of suprahyoid muscles 	IC 2	SGD	MCQ SEQ VIVA VOCE
			<p><u>Skill</u></p> <ul style="list-style-type: none"> Identify parts of tongue Identify the gross features of dorsal and ventral surfaces of the tongue Name the intrinsic and extrinsic muscles of tongue 	IC 2 IC 4	SGD	OSPE



			<ul style="list-style-type: none"> • Describe attachments, actions, and nerve supply of muscles of tongue • Describe the motor, general and special sensory innervations of tongue 			
12	Face	Correlate the gross anatomy of face with anatomical basis of relevant clinical conditions	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain the characteristic features of facial skin • Elucidate the cutaneous innervation of face • Group facial muscles according to the orifices they are guarding • Describe the nerve supply of muscles of facial expressions • Describe the course of arteries, veins, lymphatics and nerves of the face with the help of model • Correlate gross features of face with anatomical basis of danger area, trigeminal neuralgia, Bell's palsy • Identify muscles of facial expressions • Illustrate the cutaneous innervation of face 	IC 2	SGD	MCQ SEQ VIVA VOCE
13	Mandibular and maxillary branches Of Trigeminal Nerve	Correlate the anatomy of mandibular and maxillary divisions of	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Describe the pathway of mandibular nerve from nucleus to target organs 	IC 2	SGD	MCQ SEQ VIVA VOCE



		Trigeminal nerve with their lesions	<ul style="list-style-type: none"> • Describe the pathway of maxillary nerve from nucleus to target organs • Describe the lesion of nerves with special reference to infections of molar teeth 			
14	Facial nerve	Correlate the anatomy of facial nerve with its lesions	<p>Knowledge</p> <ul style="list-style-type: none"> • Discuss the course and distribution of facial nerve • Discuss the relationship of facial nerve with pterygopalatine and submandibular ganglia • Discuss the effects of lesion of facial nerve at different levels • Differentiate anatomical basis of clinical presentation of Upper Motor Neuron (UMN) and Lower Motor Neuron (LMN) lesion of facial nerve 	IC 2	SGD	MCQ SEQ VIVA VOCE
15	Temporal and infratemporal region	Correlate the location, boundaries and contents of temporal and Infratemporal fossa with relevant clinical conditions	<p>Knowledge</p> <ul style="list-style-type: none"> • Identify the location, boundaries, contents and communications of temporal and infratemporal fossa on a given model and skull • Describe the course and 	IC 2	SGD	MCQ SEQ VIVA VOCE



			<p>distribution of mandibular nerve from origin to distribution</p> <ul style="list-style-type: none"> • Tabulate the attachments, actions and nerve supply of muscles of mastication • Trace location and various routes and distribution of otic ganglion • Discuss role of lateral pterygoid as a peripheral heart on anatomical basis of pterygoid venous plexus • Discuss importance of pterygoid venous plexus in case of intracranial spread of infection to cavernous sinus • Discuss the origin and distribution of superficial temporal, first and second parts of maxillary artery 			
16	Mandible	Discuss the topographic anatomy of mandible	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Identify parts of mandible 	IC 2	SGD	<p>MCQ SEQ VIVA VOCE</p>



			<ul style="list-style-type: none"> Describe ramus and body of mandible with respect to its bony features and attachments 			
17	Temporomandibular joint (TMJ)	Correlate the gross anatomical features of temporomandibular joint with clinical significance	<p>Knowledge</p> <ul style="list-style-type: none"> Identify the type of TMJ Identify the articular surfaces of TMJ on a given model or dry bones Explain the attachments of capsule Name the ligaments of TMJ Describe the attachments and relations of ligaments of TMJ Describe the type and shape of articular disc Justify the presence of two joint cavities and types of movements occurring in each Describe the movements of jaw at TMJ with special reference to axis and muscles producing them Describe the clinical signs of anterior dislocation of TMJ and explain the steps of its reduction 	IC 2	SGD	MCQ SEQ VIVA VOCE
18	Submandibular region	Correlate the gross anatomy of hard and soft	<p>Knowledge</p> <ul style="list-style-type: none"> Discuss boundaries of submandibular triangle 	IC 2	SGD	MCQ SEQ VIVA VOCE



		palate with their relevant clinical conditions	<ul style="list-style-type: none"> • Describe the parts, relations, neurovascular of submandibular gland • Trace the routes of submandibular ganglion • Describe the distribution of submandibular ganglion • Correlate the anatomy of submandibular fascial space with Ludwig's angina 			
19	Hard and soft palate	Correlate the gross anatomy of hard and soft palate with their relevant clinical conditions	<p>Knowledge</p> <ul style="list-style-type: none"> • Discuss the bony framework of hard palate • Identify the gross features of hard palate and soft palate • Identify muscles of soft palate on the model • Describe the attachments, nerve supply and actions of muscles of soft palate • Describe blood supply and nerve supply of soft palate • Identify the main muscles forming the palatoglossal and palatopharyngeal arches 	IC 2	SGD	MCQ SEQ VIVA VOCE
20	Pharynx	Correlate the gross anatomy of pharynx with	<p>Knowledge</p> <ul style="list-style-type: none"> • Differentiate extent, anatomical features, vascular supply, nerve 	IC 2	SGD	MCQ SEQ VIVA VOCE



		relevant clinical conditions	<p>supply of three parts of pharynx on anatomical basis</p> <ul style="list-style-type: none">• List muscles of pharynx with nerve supply and action• Name structures passing through the spaces between muscles of pharynx• Trace origin of Pharyngobasilar fascia on base of skull• Correlate anatomical knowledge of pharyngobasilar fascia with patency of nasopharynx• Justify role of Eustachian tube in equalizing middle ear pressure, age related obliquity• Describe anatomical route of spread of infections from nasopharynx to middle ear• Correlate boundaries of tonsillar fossa and tonsillar bed with significant structures that must be			
--	--	------------------------------	--	--	--	--



			protected during tonsillectomy • Define Killian's dehiscence			
21	Nose and paranasal sinuses	Correlate the gross anatomy of nose and paranasal sinuses with relevant clinical conditions	<p>Knowledge</p> <ul style="list-style-type: none"> • Describe the skeletal framework of different walls of nose • Describe the features, vascular supply, nerve supply and openings in lateral wall of nose • Describe the features, vascular supply, nerve supply of medial wall of nose • Discuss the significance of little's area in a case of epistaxis • Discuss the location and drainage of paranasal sinuses in skull and on radiograph 	IC 2	SGD	MCQ SEQ VIVA VOCE
22	Pterygopalatine fossa	Describe the anatomy of pterygopalatine fossa in relation with surrounding structures	<p>Knowledge</p> <ul style="list-style-type: none"> • Identify the location of pterygopalatine fossa on skull • List bones forming walls of pterygopalatine fossa • Enumerate the contents and communications 	IC 2	SGD	MCQ SEQ VIVA VOCE



			<ul style="list-style-type: none"> • Describe the distribution of third part of maxillary artery, nerve and pterygopalatine ganglion • Justify the role of pterygopalatine ganglion in hay fever/ allergies 			
23	Orbit	Correlate the anatomy of orbital contents with relevant clinical significance	<p>Knowledge</p> <ul style="list-style-type: none"> • Describe the skeletal framework of bony orbit and its communications • List the contents of orbit • Identify the parts of eyeball on a model • Tabulate the attachments, nerve supply and actions of extraocular muscles • Justify the movements of extraocular muscles based on their attachments • Trace the course and distribution of cranial nerves 3, 4 and 6 • Justify the peculiar position of eyeball in case of lesion of cranial nerves 3, 4 and 6 • Trace the route and distribution of ciliary ganglion • Describe the course and distribution of ophthalmic nerve 	IC 2	SGD	<p>MCQ SEQ VIVA VOCE</p> <p>Formative: Presentations/ assignments</p>



			<ul style="list-style-type: none"> Describe the nerve supply of lacrimal gland 			
24	Lacrimal apparatus	Correlate the anatomy of lacrimal apparatus with relevant clinical significance	<p>Knowledge</p> <ul style="list-style-type: none"> Enumerate the structures forming lacrimal apparatus Describe the nerve supply of lacrimal apparatus Correlate the anatomical structures of lacrimal apparatus with the features of blocked lacrimal duct 	IC 2	SGD	<p>MCQ SEQ VIVA VOCE</p> <p>Formative: Models/posters Presentations/ assignments</p>
25	Ear (external, middle, and internal)	Correlate the gross anatomy of ear with relevant clinical conditions	<p>Knowledge</p> <ul style="list-style-type: none"> Describe the gross anatomical features, boundaries, structures, and contents of middle ear cavity Describe the structures forming the walls of middle ear cavity on the given model Discuss the importance of infection in middle ear cavity in relation to its communications Trace the pathway and distribution of facial nerve within petrous part of temporal bone 	IC 2	SGD	<p>MCQ SEQ VIVA VOCE</p> <p>Formative: Models/posters Presentations/ assignments</p>
26	Handling of models	Demonstrate a professional attitude while dealing with learning resources	<p>Skill</p> <ul style="list-style-type: none"> Handle the models according to SOPs displayed on museum walls 	IC 1 IC 4	Laboratory Demonstration	OSPE



			<ul style="list-style-type: none"> • Demonstrate the correct placing of model parts after task and return to authorized person Report any damage to the model 			
27	Gross anatomy of head and neck	Identify the important structures in region of head and neck on cadavers, specimens, and models	<p>Skill</p> <ul style="list-style-type: none"> • Identify muscles, bones, ligaments, nerves, vessels, organs, and their parts on given models and dissected specimens 	IC 2 IC 4 IC 5	SGD/ Demonstration	OSPE
28	Surface marking	Mark the vital structures of head and neck on skin of a subject	<p>Skill</p> <ul style="list-style-type: none"> • Identify the important landmarks of head and neck and mark them on a subject • Mark the parotid duct, thyroid gland, main vessels and nerves of the head and neck on the given subject 	IC 2 IC 4	SGD/ Demonstration	OSPE
29	Imaging of head and neck	Identify the important bony landmarks in region of head and neck on x-rays.	<ul style="list-style-type: none"> • Identify the important bony landmarks of cervical vertebrae, paranasal sinuses, skull on x ray 	IC 2 IC 4	SGD/ Demonstration	OSPE



Biochemistry						
S. No.	Topic/ Theme	Learning Outcomes	Learning Objectives	IC Codes	Instructional Strategies	Assessment Tool
1	Introduction to Biochemistry	Describe the basic concepts of biochemistry	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain the scope & importance of Biochemistry • Elaborate on various biomolecules and their significance 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva
2	Biochemistry of cell	Differentiate between Cell Organelles, their structure, biochemical functions, and associated disorders List various Cytology techniques for the study of a cell	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Enumerate various Cell Organelles (Nucleus, Mitochondria, Ribosomes, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes and Peroxisomes) • Discuss the biochemical functions of these organelles in cellular metabolism • Elaborate genetic control of cellular functions with the help of a diagram • Describe various cytology techniques for the study of a cell • Explain centrifugation 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva
3.	Biological Membranes	Discuss the chemical composition of a cell membrane and its	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain the chemical composition of the cell membrane with the help of a diagram and describe its 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva



		significance regarding a particular cellular environment	significance regarding its composition <ul style="list-style-type: none"> • Discuss the mechanism of transport across the cell membrane 			
		Relate the concept of chemistry and the role of signal transduction in health and disease	<ul style="list-style-type: none"> • Describe the chemistry of the cell signalling mechanism and enlist various receptors involved in it accordingly • Elaborate on the role of signal transduction in health and disease • Discuss the Mechanisms of signal transduction (e.g., G-Proteins associated pathways) 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva
4.	Biochemistry of body fluids	Demonstrate understanding of the biochemistry of body fluids	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Discuss the ionisation of water and weak acids and bases • Describe the concept of pH and pH scale • Describe dissociation constant & titration curve of weak acids, the concept of pK values • Discuss buffers, their mechanism of action • Describe Henderson-Hassel Balch Equation (No derivation) • Explain biomedical importance of osmosis and osmotic pressure 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva



			<ul style="list-style-type: none"> • Discuss surface tension, viscosity & their importance related to body fluids 			
5.	Protein Chemistry	Relate the significance of different proteins in medicine	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Describe proteins, dipeptides, tripeptides, and polypeptides with examples • Describe structural organisation of proteins and their Biochemical importance • Classify proteins (physicochemical, functional, structural, nutritional etc.) • Define amino acids. • Draw their structure and explain their various properties & function • Classify amino acids and give their nutritional significance • Discuss fibrous and globular proteins • Describe the dissociation & titration curve and the importance of amino acids regarding pH maintenance in the human body • Enlist various proteins' separation mechanisms, e.g., salting out, electrophoresis, chromatography and centrifugation 	IC 2	LGIS	MCQ SAQ/SEQ Viva



			<ul style="list-style-type: none"> • Explain each in detail • Explain foldings & misfolding of proteins along with associated diseases 			
6.	Plasma proteins and Immunoglobulins	Relate the basic knowledge of plasma proteins to their clinical significance	<p>Knowledge</p> <ul style="list-style-type: none"> • Define Plasma proteins & give their clinical significance • Draw and label the Structure of Immunoglobulins • Enumerate the major types, functions & clinical significance of Immunoglobulins 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva
7.	Enzymes	<p>Apply the basic concepts of enzymes in clinical diagnosis and therapeutic use</p> <ul style="list-style-type: none"> • Elaborate on the biochemical importance of enzymes, coenzymes, co-factors, and isoenzymes, as well as their role in various clinical conditions 	<p>Knowledge</p> <ul style="list-style-type: none"> • Define Enzymes and classify them based on their mechanism of actions • Explain co-enzymes, cofactors, and isoenzymes with their biochemical importance • Discuss the mechanism of catalysis of enzymes • Describe the factors affecting enzymes activity Introduction, definition • Define Michaelis Menten equation & Line weaver Burk plot and its application in enzyme kinetics (no derivation of equations) 	IC 2	LGIS SGD	MCQ SAQ/SEQ Viva



			<ul style="list-style-type: none"> • Compare different types of enzyme inhibitions with examples & biomedical importance • Explain the regulation of enzyme activity-overview • Discuss the application of enzymes in clinical diagnosis and therapeutic use 			
8.	Nucleotides chemistry	Relate the knowledge of chemistry and metabolism of nucleotide in health and disease	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain nucleic acids, their types, structure and functions • Describe chemistry and structure of nucleotides and their biochemical role • Discuss nucleotides, structure and their derivatives • Explain biochemical roles of nucleotides 	I C 2	LGIS SGD	MCQ SAQ/SEQ Viva
9.	Globular proteins/ haemoglobin	Correlate the biochemical basis of Porphyrin and Haemoglobin with clinical conditions	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain the chemistry and biosynthesis of haemoglobin • Discuss structure, functions, and types of haemoglobin • Explain the oxygen binding capacity of haemoglobin, factors affecting and regulating the oxygen-binding capacity of haemoglobin 	IC 2	LGIS SGD	MCQ SAQ/SEQ Viva



			<ul style="list-style-type: none"> Describe degradation of heme, formation of Bile pigments, its types, transport and excretion Describe Jaundice and its types Discuss hemoglobinopathies (HP- S, Thalassemia) and their biochemical causes 			
10.	Carbohydrate chemistry	Discuss the significance of different carbohydrates in medicine	<p>Knowledge</p> <ul style="list-style-type: none"> Describe the biomedical importance of carbohydrates Describe structure, functions and derivatives of monosaccharides Describe disaccharides with important examples Describe oligosaccharides-their combination with other macromolecules Describe polysaccharides and their biochemical role with examples 	IC 2	LGIS SGD	MCQ SAQ Viva
11.	Practical	Demonstrate use of different glassware and instruments along with identification	<p>Skill</p> <ul style="list-style-type: none"> Demonstrate use of glassware Demonstrate use of laboratory equipment: microlab incubator, water bath, hot air oven, centrifuge machine, electronic balance pH meter 	IC 1 IC 4 IC 5	Demonstration Practical	OSPE
		Analyse the results of a given	<p>Perform:</p> <ul style="list-style-type: none"> Biuret Test 	IC 1 IC 4	Practical	OSPE



	experiment/ Qualitative analysis of Proteins	<ul style="list-style-type: none"> • Ninhydrin Test • Xanthoproteic Test • Millon's Test • Aldehyde Test • Sulphur Test 	IC 5		
Handling the equipme nt and chemicals	Practice safety during lab work	<p><u>Attitude</u></p> <ul style="list-style-type: none"> • Follow the proper dress code of a laboratory • Handle chemicals and lab equipment correctly according to SOPs displayed in the laboratory • Report any damage to lab equipment immediately 	IC 1 IC 4	Demonstration	Formative Checklist
Cleanliness of workstation	Arrange the required apparatus and chemicals safely	<p><u>Skill</u></p> <ul style="list-style-type: none"> • Maintain workstation according to SOPs 	IC 1 IC 4 IC 5	Demonstration	Formative Checklist
		<p><u>Attitude</u></p> <ul style="list-style-type: none"> • Demonstrate effective communication skills • Apply the rules of group dynamics • Demonstrate time management skills 	IC 1 IC 4	Demonstration	Formative Checklist



Oral Biology						
Week No.	Topic / Theme	Learning Outcomes	Learning Objectives	IC Codes	MITs	Assessment Tools
Week 12	Periodontium Cementum	Discuss the gross histological features and properties of periodontium	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> Define cementum, periodontal ligament, gingiva, cementoamel junction, Sharpey's fibers, cementoid, cementodentinal junction, hypercementosis, ankylosis, cementicles, lamina dura and bundle bone Describe physical properties of cementum in terms of harness, location, thickness, function, vascularity, innervation, types, formative cells, and permeability Discuss chemical composition of cementum in percentage (inorganic and organic including names of cells, types of collagen fibers and noncollagenous proteins) 	IC 2	LGIS	MCQs SEQs
	Canines	Explain the morphology of canines	<p><u>Skill</u></p> <ul style="list-style-type: none"> Identify different surfaces of upper canine 	IC 2 IC 4	Demonstration	OSPE
	Cementum	Identify histological	<p><u>Skill</u></p> <ul style="list-style-type: none"> Identify cementum in images/ slides of ground section of tooth 	IC 2 IC 4	Demonstration	OSPE



		features of cementum	<p>Attitude</p> <ul style="list-style-type: none"> • Follow the proper dress code of a laboratory • Handle chemicals and lab equipment correctly according to SOPs displayed in the laboratory • Report any damage to lab equipment immediately 	IC 2 IC 4	Laboratory Demonstration	Formative Checklist
		Identify morphological features of teeth	<p>Skill</p> <ul style="list-style-type: none"> • Draw and label upper canine 	IC 2 IC 4	Demonstration	OSPE
Week 13 (02)	Cementum	Discuss properties and histological features of cementum with clinical correlations	<p>Knowledge</p> <ul style="list-style-type: none"> • Classify cementum in terms of presence or absence of cells, origin of collagen fibers (extrinsic and intrinsic) and combination of both • Classify cementum in terms of presence or absence of cells, origin of collagen fibers (extrinsic and intrinsic) and combination of both • Classify cements enamel junction in terms of enamel and cementum overlapping also discuss clinical significance 	IC 2	LGIS	MCQs SEQs
	Canine	Explain morphology of canines	<p>Knowledge</p> <ul style="list-style-type: none"> • Discuss different surfaces of upper canine 	IC 1 IC 4	SGD	OSPE
			<p>Skill</p> <ul style="list-style-type: none"> • Draw and label lingual surface of upper canine 	IC 1 IC 4	Laboratory demonstration	OSPE



			Attitude <ul style="list-style-type: none"> Follow the proper dress code of a laboratory Handle chemicals and lab equipment correctly according to SOPs displayed in the laboratory. Report any damage to lab equipment immediately 	IC 1 IC 4	Laboratory demonstration	OSPE
Week 14 (03)	Cementum	Discuss properties and histological features of cementum with clinical correlations	Knowledge <ul style="list-style-type: none"> Differentiate intrinsic and extrinsic collagen fibers in terms of formation, location, histology, and dimension Discuss age related changes occurring in cementum in terms of appearance, thickness, cementicles and repair process Discuss the process of cementogenesis 	IC 2	LGIS SGD	MCQS SEQs
	Canine	Explain morphology of canines	Knowledge <ul style="list-style-type: none"> Discuss different surfaces of lower canine 	IC 2 IC 4	SGD	MCQS SEQs
			Skill <ul style="list-style-type: none"> Draw and label lingual surface of lower canine Demonstration on models 	IC 2 IC 4	Demonstration	OSPE
Week 15 (04)	PDL Ligament	Explain the histomorphological features of Periodontium with its clinical correlation	Knowledge <ul style="list-style-type: none"> Describe periodontal ligament development, location, average width, content (names of cells, types of collagen fibers, elastic and reticular fibers, ground substance) function, remodeling, and age changes 	IC 2	Lectures Demonstrations/SGD	MCQS SEQs Viva



		<ul style="list-style-type: none"> Enumerate the five principal fiber bundles of periodontal ligament 			
		<p>Skills</p> <ul style="list-style-type: none"> Draw and label surfaces of upper 1st premolar 	IC4 IC5	Laboratory demonstration	OSPE
	Explain histomorphological features of Periodontium	<p>Skills</p> <ul style="list-style-type: none"> Draw and label PDL Fibers 	IC 4 IC 5	Laboratory demonstration	OSPE
PDL Ligament	Explain histomorphological features of periodontium with clinical implications	<p>Knowledge</p> <ul style="list-style-type: none"> Discuss the blood and nerve supply of PDL Discuss the blood and nerve supply of PDL Define oral mucosa, vermillion border, vermillion zone, vestibule, mucogingival junction, mucocutaneous junction, submucosa Describe boundaries, appearance, texture, histology, functions, age changes, blood supply and nerve supply of oral mucosa 	IC 2	LGIS	MCQs SEQs Viva
Upper 1 st Premolar	Explain morphological features of teeth on models with diagrams	<ul style="list-style-type: none"> Discuss different surfaces of upper 1st premolar 	IC 2	LGIS	MCQs SEQs
Gingiva	Explain histomorphological features of periodontium with	<p>Knowledge</p> <ul style="list-style-type: none"> Define different types of gingiva <p>Skill</p> <ul style="list-style-type: none"> Draw and label gingival fibers 	IC 2 IC 4	Demonstration	MCQs SEQs OSPE



		clinical implications	<ul style="list-style-type: none"> • Draw and label the occlusal surface of 1st premolar 	IC 5		
Oral mucosa	Explain histomorphological features of Oral Mucosa with clinical implications	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Describe histological features of lamina propria (papillary layer, reticular layers, cells, fibers, ground substance, blood vessels, nerves) • Describe histology of oral mucosa • Define Fordyce spot, Linea alba, Odland body, keratohyalin granules, orthokeratinization, parakeratinization, acanthosis, acantholysis, hyperkeratosis, keratinocytes, nonkeratinocyte, melanosomes, melanophage 	IC 2	LGIS	MCQs SEQs Viva	
		<p><u>Skill</u></p> <ul style="list-style-type: none"> • Identify Fordyce's granules in pictures/images Describe location, shape, size, and significance of Odland bodies/membrane coating granules/lamellar bodies in keratinized and non-keratinized epithelium 	IC1 IC4 IC5			Demonstration
Lower 1 st Premolar	Explain morphological features of teeth on models with diagrams	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Discuss different surfaces of lower 1st premolar 	IC 2	Demonstration	MCQs SEQs VIVA	
		<p><u>Skills</u></p> <ul style="list-style-type: none"> • Draw and label histological picture of oral mucosa • Draw upper 1st premolar 	IC 4 IC5			Practical



			Identify upper 1st premolar models			
Week 19 (07)	Oral Mucosa	Explain histomorphological features of Oral Mucosa with clinical implications	<p>Knowledge</p> <ul style="list-style-type: none"> Describe location, shape, size of keratohyaline granules in keratinized and non-keratinized epithelium Describe and identify histological features and functions of non-keratinocyte in oral epithelium (melanocytes, Langerhans, Merkel, inflammatory cells) in terms of shape of cell, origin, and location Discuss location, shape, covering epithelium and function of tongue papillae (fungiform, filiform, circumvallate papillae) Discuss clinical implications of oral mucosa 	IC 2	LGIS Demonstration CBL	MCQs SEQs VIVA
	Tongue		<p>Skill</p> <ul style="list-style-type: none"> Draw and label taste bud 	IC 2	Demonstration	OSPE
	Lower 1 st Premolar	Explain morphological features of teeth on models with diagrams	<p>Knowledge</p> <ul style="list-style-type: none"> Discuss different surfaces of lower 1st premolar Discuss lower 1st premolar on model 	IC 2	SGD	MCQs SEQs VIVA
			<p>Skill</p> <p>Draw and label lower 1st premolar</p>	IC 2 IC 4	Demonstration	OSPE
Week 20 (08)	Mastication	Discuss the process of mastication	<p>Knowledge</p> <ul style="list-style-type: none"> Describe mastication in terms of structural apparatus, muscles involved, 	IC 2	LGIS Demonstration CBL	Assignment



			chewing cycle (opening, closing and occlusal phase) and neurological pathway controlling mastication			
			Knowledge <ul style="list-style-type: none"> Enumerate stages of mastication (pull back process of tongue, squeeze back mechanism), and reflexes of mastication (jaw-jerk reflex, jaw unloading reflex, jaw open reflex) 	IC 2	LGIS	MCQs SEQs VIVA
	Tongue	Discuss the development of Head and neck	Knowledge <ul style="list-style-type: none"> Discuss the development of tongue 	IC 2	SGD	MCQs SEQs VIVA
	Lower 1 st Premolar	Explain morphological features of teeth on models with diagrams	Skill <ul style="list-style-type: none"> Identify lower 1st premolar Draw and label lower 1st premolar 	IC 2 IC 4	Demonstration	OSPE
			Knowledge <ul style="list-style-type: none"> Describe composition, pH, volume, function (in terms of effects and components responsible for those effects), formation and secretion of saliva 	IC 2	Demonstration	MCQs SEQs VIVA
Week 21 (09)	Embryology	Discuss the development of Head and neck with clinical implications	Knowledge <ul style="list-style-type: none"> Discuss and identify the structure during the development of tongue Describe development of palate Discuss the development of face 	IC 2	LGIS/ SGD	MCQs SEQs VIVA
			Knowledge	IC 2	LGIS/ SGD	MCQs



	Lower 2 nd Premolar	Explain morphological features of teeth on models with diagrams	<ul style="list-style-type: none"> • Discuss different surfaces of lower 2nd premolar 			SEQs VIVA
			<u>Skill</u> <ul style="list-style-type: none"> • Identify features of lower 2nd premolar on models • Draw and label lower 2nd premolar 	IC 2 IC 4 IC 5	Demonstration	OSPE
	Pain	Discuss pathophysiology of pain	<u>Knowledge</u> <ul style="list-style-type: none"> • Describe physiology of pain • Describe physiology of proprioception 	IC 2	LGIS	MCQs SEQs VIVA
			<u>Attitude</u> <ul style="list-style-type: none"> • Demonstrate effective communication skills • Apply the rules of group dynamics • Demonstrate time management skills 	IC 2 IC 4	SGD	Formative Checklist



Vertically Integrated Modules

1. Research Methodology

S. No.	Topic/Theme	Learning Outcomes	Learning Objectives	IC Codes	Instructional Strategies	Assessment Tool
1.	Introduction to Research	Discuss the historical background of research in medicine	<u>Knowledge</u> <ul style="list-style-type: none"> • Define research • Describe the historical background of research • Discuss important terminologies regarding research 	IC 2	LGIS	MCQs
2.	Importance of Research	Discuss the significance of research in medicine	<u>Knowledge</u> <ul style="list-style-type: none"> • Describe the importance of evidence-based practice • Apply the knowledge of research in health sciences 	IC 2	LGIS	MCQs
3.	Introduction to Research Process	Explain the process and requirements of good research for a doctor	<u>Knowledge</u> <ul style="list-style-type: none"> • Describe an overview of process of research • Discuss the characteristics of a good research • Illustrate the qualities of a good researcher 	IC 2	LGIS	MCQs



4.	Types of Research	Classify different types of research and their applications	<u>Knowledge</u> <ul style="list-style-type: none"> Describe the characteristics of basic and applied research Differentiate between quantitative and qualitative research Discuss the characteristics of observational, and interventional research 	IC 2	LGIS	MCQs
----	--------------------------	---	--	------	------	------

2. Behavioural Sciences

Topic/Theme	Learning Outcomes	Learning Objectives	IC Codes	Instructional Strategies
Healthcare Models and their Application	Discuss healthcare models with application	<u>Knowledge</u> <ul style="list-style-type: none"> Discuss Eco- Bio Psycho-Social Model in clinical practice 	IC 2	LGIS
Medical Ethics and Professionalism	Discuss concepts of medical ethics and professionalism	<u>Knowledge</u> <ul style="list-style-type: none"> Differentiate favorable and unfavourable attitudes in clinical practice 	IC 2	LGIS
	Discuss informed consent and ethical clinical challenges	<u>Knowledge</u> <ul style="list-style-type: none"> Discuss ethical and scientific skills of taking information from patients and assimilating it to others at clinical setups Demonstrate skills like breaking bad news and handling death, dealing with terminally ill patients, carrying out effective crisis intervention, and resolving conflicts 	IC 2	LGIS



	<p>Discuss informed consent for clinical examination</p> <p>Discuss the importance of patient privacy</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Discuss consent for examination (non- intimate/ intimate) and for performing procedures (drawing blood, administering injections/ IV lines, lumbar puncture etc.) • Maintaining Patient privacy and confidentiality • Examining or performing procedures on the anesthetised patient 	<p>IC 2</p>	<p>LGIS</p>
	<p>Discuss the basic structure and function of the central and peripheral nervous system</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Examine the structure and function of the nervous system • Explain the function of neurons and neurotransmitters 	<p>IC 2</p>	<p>LGIS</p>
	<p>Determine the social interplay of health, illness, and treatment</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Explain the health belief model and explanatory models of health and illness • Interpret illness narratives told by patients 	<p>IC 2</p>	<p>LGIS</p>



<p>Medical Anthropology</p>	<p>Discuss the impact of culture on global, national, and local health care systems</p> <p>Recognize the value of society on medical approaches</p>	<p><u>Knowledge</u></p> <ul style="list-style-type: none"> • Discuss the role of healing and healers in society • Analyze the impact of religion, psychology, culture and anthropology in understanding medicine and healing • Analyze disease, sickness, illness, and human life cycle from cultural aspects 	<p>IC 2</p>	<p>LGIS</p>
-----------------------------	---	---	-------------	-------------

Block II Syllabi

Physiology

Sr. #	Week	Topic Name	MIT
30.	10 (B1)	Composition Functions of Blood & Plasma Proteins	LGIS



31.	10 (B1)	Erythropoiesis and its regulation	LGIS
32.	10 (B1)	Hb synthesis and Iron metabolism	LGIS
33.	11 (B1)	Anemia	LGIS
34.	11 (B1)	Polycythemia plus dyscrasias	LGIS
35.	11 (B1)	Granulopoiesis	LGIS
36.	11 (B1)	Monocyte-Macrophage system	LGIS
37.	11 (B1)	Inflammation and Necrosis	LGIS
38.	12 (B1)	Eosinophils, basophils, Leukemia, leukopenia	LGIS
39.	12 (B1)	Immunity	LGIS
40.	1 & 2	Hemostasis and Coagulation pathway	LGIS
41.	1 & 2	Blood groups	LGIS
42.	2	Transfusion reactions) especially Ery fetalis	LGIS
43.	2	Introduction to GIT, CNS, and Hormones	LGIS
44.	2 & 3	Enteric nervous system	LGIS
45.	2	Stomach functions & Emptying	LGIS
46.	3	Mastication and Swallowing	LGIS
47.	3	Vomiting Reflex	LGIS
48.	3	Non-metabolic functions of Liver and its clinical significance	LGIS
49.	4	Functions of small intestine & colon	LGIS
50.	4	Introduction to Respiration and Functions of the Respiratory tract	LGIS
51.	4	Pulmonary mechanics	LGIS
52.	4	Pulmonary Volumes and Capacities	LGIS
53.	5	Pulmonary compliance and Role of Breathing	LGIS
54.	5	Principles of Gas Exchange	LGIS
55.	5	V/Q ratio	LGIS
56.	5	Cough and Sneezing Reflex	LGIS
57.	6	O ₂ and CO ₂ Transport	LGIS
58.	6 & 7	Regulation of Respiration	LGIS



59.	7	Hypoxia and Cyanosis	LGIS
60.	7	Body fluid compartments , edema safety factors	LGIS
61.	7	Intro to the Urinary system	LGIS
62.	8	Determinants of Glomerular Filtration Rate	LGIS
63.	8	Autoregulation of GFR	LGIS
64.	8 & 9	Precessing of Glomerular Filtrate (Renal Tubular Reabsorption and Secretion) <u>Renal Function tests</u> (Urine Concentration and Dilution)	LGIS
65.	8 & 9	Regulation of BP by kidneys Pressure Natriuretic & Diuresis Renin-Angiotensin Mechanism	LGIS
66.	9	Micturition Reflex	LGIS
11.	1	ESR by Westergren method	Practical/SGD
12.	2	Bleeding time and Clotting time	Practical/SGD
13.	3	Spirometry	Practical/SGD
14.	4	Determine Red blood cell count using Neubauer's chamber	Practical/SGD
15.	5	Determine Total leucocyte count using Neubauer's chamber	Practical/SGD
16.	6	Determine the differential leucocyte count	Practical/SGD
17.	7	Determination of Platelet count	Practical/SGD
18.	8	Determine ABO and Rh blood groups	Practical/SGD



Oral Biology

Topics	MIT
Week -12	
Ligament, gingival, CEJ, sharpey's fibers, hypercementosis, ankylosis ,lamina dura ,bundle bone	LGIS
Physical properties of cementum	LGIS
Chemical composition of cementum	LGIS
Discuss different surfaces of upper canine	LGIS
Identify cementum in images/slides of ground section of tooth	SGD
Draw and label upper canine	SGD
Week-13	
Classify cementum in terms of presence or absence of cells,origin of collagen fibers and combination	
Classify cementum in terms of presence or absence of cells,origin of collagen fibers and combination	LGIS
Classify CEJ in terms of enamel and cementum overlapping and is significance	LGIS
Discuss different surfaces of upper canine	LGIS
Draw different types of CEJ	Practical
Draw and label lingual surface of upper canine	Practical
Week-14	
Differentiate intrinsic and extrinsic collagen fibers in terms of formation of cementum	LGIS



Discuss age related changes occurring in cementum	LGIS
Discuss cementogenesis	SDL
Discuss different surfaces of lower canine	LGIS
Identify different types of cementum on pictures	SGD
Demonstration on models of lower canine	SGD
Describe PDL development, location, average and age changes Describe types of collagen, functions and remodelling of PDL	LGIS
Enumerate the five principal fiber bundles of periodontal ligament	LGIS
Discuss different surfaces of lower canine	LGIS
Discuss different surfaces of upper first premolar	LGIS
Draw and label surfaces of upper 1 st premolar	practical
Draw and label PDL fibers	practical
Discuss the blood and nerve supply of PDL, define types of gingival.	LGIS
Define oral mucosa its boundaries functions age changes	LGIS
Discuss different surfaces of upper 1 st premolar	SDL
Discuss occlusal surface of upper first premolar	LGIS
Draw and label gingival fibers	Practical
Draw and label occlusal surface of upper 1 st premolar	Practical
Describe histological features of lamina propria	LGIS
Describe histology of oral mucosa	LGIS



Identify Fordyce,s granules in pictures,images	LGIS
Discuss different surfaces of lower 1 st premolar	LGIS
Draw and label histological picture of oral mucosa	practical
Draw upper 1 st premolar model study	Practical
Describe location, shape, size of keratohyaline granules in keratinized and non-keratinized epithelium	LGIS
Discuss tongue papillae	LGIS
Discuss clinical implications of oral mucosa	LGIS
Discuss different surfaces of lower 1 st premolar	LGIS
Draw and label taste bud	Practical
Model study of lower 1 st premolar	SGD
Describe mastication,muscles,pathway	LGIS
Enumerate stages of mastication,reflexes	LGIS
Discuss different surfaces of upper 2 nd premolar	LGIS
Embryolcial developmet of face and mandible	LGIS
Model study lower 1 st premolar	SGD
Describe PH volume, formation of saliva	practical
Discuss stages of swallowing	LGIS
Embryolcial developmet of face tongue and maxilla	LGIS
Discuss different surfaces of lower 2 nd premolar	LGIS
Discuss occlusal surface of lower 2 nd premolar	LGIS



Embryological development of face	Practical
Model study of lower 1 st premolar	SGD

Anatomy

Sr. No	Topics	Discipline	MIT
WEEK-1			
1	Bone	Histology	Practical
2	Surface marking	Gross anatomy	SGD
3	Skull I	Gross anatomy	SGD
4	Skull II	Gross anatomy	SGD
5	Skull III	Gross anatomy	SGD
WEEK-2			
1	Muscle	Histology	Practical
2	Circulation	General anatomy	LGIS
3	Bone	Histology	LGIS
4	Skull IV	Gross anatomy	SGD
5	Meninges and sinuses	Gross anatomy	SGD
WEEK-3			
1	Cartilage	Histology	LGIS
2	Skin-Fascia	General anatomy	LGIS



3	Lip and Tongue	Histology	Practical
4	Embryonic period	Embryology	LGIS
5	Scalp	Gross anatomy	SGD
6	Face I	Gross anatomy	SGD
7	Facial nerve	Neuroanatomy	IMLC
WEEK-4			
1	Oral cavity	Histology	LGIS
2	Salivary glands	Histology	Practical
3	Musculoskeletal system I	Embryology	LGIS
4	Skin-Fascia	General anatomy	LGIS
5	Face II	Gross anatomy	SGD
6	Oral Cavity I	Gross anatomy	SGD
7	Trigeminal nerve	Neuroanatomy	IMLC
8	Trigeminal nerve	Neuroanatomy	IMLC
WEEK-5			
1	Lymphoid System I	Histology	LGIS



2	Lymphoid System II	Histology	LGIS
3	Thymus and lymph nodes	Histology	Practical
4	Musculoskeletal system II	Embryology	LGIS
5	Oral Cavity II	Gross anatomy	SGD
6	Hard/Soft palate Submandibular region	Gross anatomy	SGD
7	Pharynx I	Gross anatomy	SGD
WEEK-6			
1.	Tonsils	Histology	Practical FMC
2.	Branchial arches	Emrbyology	LGIS
3.	Connective tissue	Histology	LGIS
4.	Pharynx II	Gross anatomy	SGD
5.	Pharynx III	Gross anatomy	SGD
WEEK-7			
1.	Nervous tissue	Histology	Practical
2.	Thyroid/Parathyroid	Embryology	LGIS
3.	Nose I	Gross anatomy	LGIS
4.	Nose II		LGIS



5.	Temporal Infratemporal fossa I	Gross anatomy	SGD
6.	Temporal Infratemporal fossa II	Gross anatomy	SGD
WEEK-8			
1.	Ear	Gross anatomy	LGIS
2.	Ear	Gross anatomy	LGIS
3.	Eye	Gross anatomy	LGIS
4.	Pterygopalatine Fossa I	Gross anatomy	SGD
5.	Pterygopalatine Fossa II	Gross anatomy	SGD
6.	Nose III	Gross Anatomy	SGD
7.	Revision	Histology	Practical



Biochemistry

WEEK	LECTURE	TOPICS	MIT
WK 1	LEC 1	Physiology paper	
	2	Chemistry of polysaccharides	LGIS
	3	Water soluble vitamins-Vit C	LGIS
	4,5	Thiamine, Riboflavin, Biotin	LGIS
Wk-2	1	OSPE	
	2	Niacin, pyridoxine	LGIS
	3	Folic acid,	LGIS
	4,5	Cobalamine	
Wk-3	1	Introduction to metabolism	LGIS
	2	Regulation of metabolism	LGIS
	3	Chemistry of lipids	LGIS
	4,5	Functions of lipids, Phospholipids	LGIS
Wk-4	1,5	TEST	
	2	Eicosanoids synthesis	LGIS
	3	Eicosanoids functions	LGIS
	4	Digestion & absorption of lipids	LGIS
Wk-5	1	Metabolism of chylomicrons	LGIS
	2	Mobilization of fats	LGIS
	3	Beta oxidation	LGIS
	4,5	Beta oxidation-odd chain FA	LGIS
WK 6-9	SUMMER VACATIONS		
Wk-10	1	Energy calculation	LGIS
	2	Ketone bodies synthesis	LGIS
	3	Ketone bodies metabolism	LGIS
	4,5	Regulation of Cholesterol synthesis	LGIS
Wk-11	1	Bile acids & bile salts	LGIS



	2	Plasma lipoproteins	LGIS
	3	Chemistry of GIT-SALIVA	LGIS
	4,5	Gastric juice	LGIS
Wk-12	1	Pancreatic juice	LGIS
	2	Bile	LGIS
	3	Gall stones/cholelithiasis	LGIS
	4,5	Peptic ulcer disease	LGIS
Wk-13	1	Digestion & absorption of carbohydrates	LGIS
	2	Digestion & absorption of lipids	LGIS
	3	Digestion & absorption of proteins	LGIS
	4,5	Digestion & absorption of nucleotides	LGIS
EOB EXAM			

Behavioural
Sciences

Week	Topic/ Theme	MIT
Week 04	Healthcare models and their application	LGIS
Week 05	Healthcare models and their application	LGIS
Week 06	Medical ethics and professionalism	LGIS
Week 07	Medical ethics and professionalism	LGIS
Week 08	Medical ethics and professionalism	LGIS
Week 09	Medical ethics and professionalism	LGIS
Week 10	Medical ethics and professionalism	LGIS



Week 11	The neurological basis of behaviour	LGIS
Week 12	The neurological basis of behaviour	LGIS

Research

Methodology

Sr. No.	Week	Topic / Theme	MIT
1.	Week 16	Identification & formulation of a good research problem & question	LGIS
2.	Week 17	Developing quality study title, rationale & objectives with their justification	LGIS
3.	Week 18	Introduction to data and types of variables	LGIS



Learning Resources

1. Physiology

TEXTBOOKS

1. Guyton and Hall
Textbook of Medical Physiology 14th Edition.

REFERENCE BOOKS

2. Mushtaq Ahmed Essentials of Medical Physiology Vol. 1 and 2 5th Edition
3. Lauralee Sherwood Human Physiology 9th Edition.

PRACTICAL JOURNAL

4. Laboratory Manual in Physiology

2. Anatomy

Gross Anatomy	
Textbooks	Reference Books
Clinical Anatomy for medical students By Richard S. Snell (9th Edition)	LAST's Anatomy regional & applied (12th Edition)
Clinical Neuroanatomy By Richard S. Snell (7th Edition)	Gray's Anatomy By Henry Gray (40th Edition)
Cunningham's manual of practical anatomy Vol-3 (head& neck and brain)15th Edition	Atlas of Anatomy By Grant's By Netter (6th Edition)
Embryology	
Textbooks	Reference Books
Langman's Medical Embryology (13 th Edition)	Netter's Embryology Atlas



The Developing Human By Keith L-Moore (10th Edition)	
Histology	
Medical Histology By Prof Laiq Hussain (7th Edition)	Histology by Michel H. Ross (6th edition)
Basic Histology By Luiz Carlos Junqueira (14th Edition)	
Di-Fiore's Atlas of Histology (12th Edition)	
Neuroanatomy	
Snell's Neuroanatomy	
OTHER LEARNING RESOURCES	
Hands-on activities	Students will be involved in practical sessions and hands-on learning activities to enhance their learning
Laboratory Museum and dissection hall	Students will utilize the laboratory to Discuss textbook knowledge to specimens and prosecutions
Videos/CD's/DVDs, Internet Resources	Animated videos of dissections and developmental anatomy are availatoryle to reinforce the concepts
Self-Directed Learning	Self- Study is incorporated to help students manage individual tasks and assignments.

3. Oral Biology

- 1) BERKOVITZ 5 T.H. edition
- 2) ORAL HISTOLOGY TENCAT'S (Antonio Nancie 9th edition)
- 3) TOOTH MORPHOLOGY (Wheeler's 9th Edition)
- 4) CONCISE DENTAL ANATOMY AND MORPHOLOGY / James L. Fuller, Gerald E. Denehy



4. Biochemistry

- 1) Lippincott's Illustrated Review, Latest edition William and Wilkins publishers
- 2) Harpers illustrated Biochemistry, the Latest Edition McGraw Hill publishers.
- 3) Textbook of Medical Biochemistry by Chatterjee. Latest Edition

