RAHBAR COLLEGE
OF DENTISTRY

RAHBAR COLLEGE OF DENTISTRY

BDS 1st YEAR
STUDY GUIDE 2024-2025

TABLE OF CONTENTS

MISSION AND VISION OF UHS

Vision Statement:

UHS is a leading university aiming to keep its graduates apt with the ever-emerging global health challenges, evolving educational methodologies and emerging technological advancements to maintain its distinguishable position as a medical university.

Mission Statement:

UHS shall continue to strive for producing a human resource par at excellence to cater for the health needs of the people of Punjab and Pakistan.

MISSION AND VISION OF RCoD

Vision Statement:

To be a leading institution, producing globally competent health professionals through multidisciplinary integrated teaching to advance oral healthcare services and tackle local and global challenges with excellence in education, research, and innovation.

Mission Statement:

To train health professional students in an innovative educational environment, through revolutionary dental education, focusing on state-of-the-art clinical skills, patient care, national community health services, global research and technological advancements, to produce competent caregivers and life-long learners.

INTRODUCTION TO STUDY GUIDE

As you enter the 1st year of your Bachelor of Dental Surgery (BDS) program, this study guide is designed to help you navigate this crucial stage of your education. It focuses on consolidating your knowledge, enhancing clinical skills, and preparing you for your future career in dentistry.

Objectives of BDS 1st Year:

1. **Integration of Knowledge**: Reinforce and integrate the knowledge gained in previous years across all dental disciplines, including clinical dentistry, oral surgery, periodontology, prosthodontics, orthodontics, and pediatric dentistry.
2. **Clinical Proficiency**: Develop advanced clinical skills through hands-on practice and real patient interactions. Focus on diagnosing, treatment planning, and executing dental procedures with confidence.
3. **Professional Development**: Enhance your understanding of the ethical, legal, and professional responsibilities of a dentist. Prepare for the transition from student to practitioner.
4. **Exam Preparation**: Equip yourself with effective study strategies and resources to excel in final examinations and assessments.

CORE SUBJECTS IN BDS 1st YEAR

1. Oral Biology & Tooth Morphology
2. Anatomy
3. Physiology
4. Biochemistry
5. Islamiyat/ Pakistan Studies

Additional Modules

Additional subjects enhance the core curriculum, offering specialized knowledge, skills, deepening understanding and proficiency in related fields:

Research

ABBREVIATIONS

1. **RCoD:** Rahbar College of Dentistry
2. **BDS**: Bachelor of Dental Surgery
3. **SGD**: Small group discussion
4. **CBD**: Case-based discussion
5. **SEQ**: Short Essay Question
6. **OSPE**: Objective Structured Practical examination
7. **SOP**: Standard Operating Procedure

GENERAL GUIDELINES

- All lectures and tutorials will be conducted in one specific room allotted to your year.
- Students must follow the disciplinary guidelines laid down by the administration.
- Institutional Dress Code must be followed by all students.
- All students must wear white overalls in class.
- All students are required to wear their issued identity/student cards in class.
- The students will be required to maintain their subject logbooks and get them duly signed and checked. Any breach of discipline in the class will not be tolerated.
- Mutual respect for both genders is to be strictly observed.

RATIONALE OF CURRICULUM

The rationale for curriculum is to equip future dentists with the knowledge, skills, and attitudes necessary to provide high-quality oral healthcare to patients. Student-centered teaching methodology is employed in the curriculum, to ensure that the graduates are competent, compassionate, and ethical professionals, who can contribute to the overall health and well-being of the society.

- **Globally competent graduates:** The dental curriculum ensures teaching students the necessary clinical and inter personal skills which are at par with the global level, thus ensuring their state-of-the-art expertise with convenient employment opportunities.
- **Student's engagement through integrated teaching**: Students are actively engaged in learning through preclinical sessions, case-based learning, simulations, and clinical exposures, during foundation years. The continuous horizontal and vertical integration allows them to develop their ability to analyze complex information, interpret evidence, and make informed decisions. Spiral curriculum approach enhances the retention of the core principles while learning latest advancements.
- **Patient-centered approach:** Students develop a patient-centered perspective, emphasizing empathy, communication, and collaboration with a team-based learning approach. Graduates are better prepared to provide high-quality patient care due to their strong clinical skills and critical thinking abilities.
- **Real-world experience:** Students gain valuable experience through clinical rotations and simulations, preparing them well, as per the requirements of professional practice. The comprehensive care dentistry clinic provides them with a real-world scenario in a well supervised learning environment, thus ensuring efficient training.
- **Adaptability to changing healthcare landscape through research and innovation:** A student-centered curriculum shall be adapted to address evolving healthcare needs and advancements. Students are encouraged to think creatively and develop innovative solutions to overcome healthcare challenges.
- **Lifelong learning:** A student-centered approach fosters a culture of lifelong learning, essential for healthcare professionals, staying up-to-date with the latest advancements in dental science and technology. The drive to conduct research and and scientific break throughs shall make them leaders in practice.

To achieve these objectives, this dental curriculum includes a combination of classroom instructions, laboratory work, pre-clinical & clinical experience, and research opportunities. The student-centered curriculum provides a robust foundation for developing competent, compassionate, and adaptable healthcare professionals. By empowering students to take ownership of their learning and apply their knowledge to real-world scenarios, this approach equips them well to meet the challenges of an ever-changing healthcare landscape and deliver high-quality patient care.

INTRODUCTION TO CURRICULAR FRAMEWORK

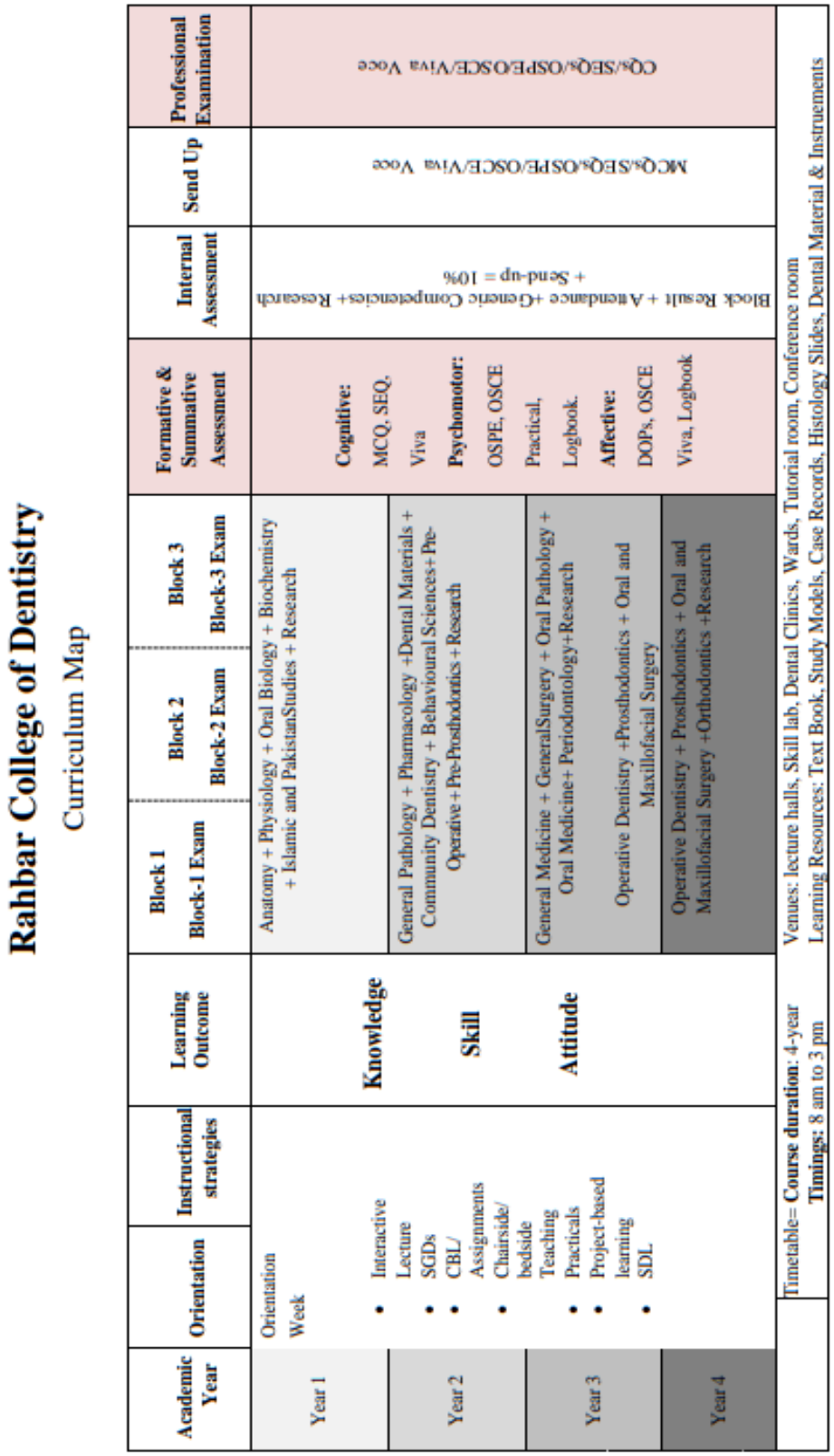
This study guide is developed as a resource material for the students and faculty. The study guide development process included representation from teaching faculty and students. The study guide aims to ensure alignment between societal, institutional, patient, and student needs. The curriculum implemented is a hybrid type of curriculum that has both horizontal and vertical integration via logical sequencing.

The curriculum comprises the following two phases:

Phase 1 (1st & 2nd Year): Includes teaching of basic sciences namely: Anatomy, Physiology, Biochemistry, Oral biology & Tooth Morphology, Science of Dental Material, Pharmacology, Community & Preventive Dentistry, General Pathology & Microbiology and Behavioural Sciences. It also includes initial training of pre-clinical Prosthodontics and pre-clinical Operative Dentistry, Research.

Phase 2 (3rd& Final Year): Includes teaching and training in Periodontology, Oral Pathology, Oral Medicine, General Medicine, General Surgery, Oral and maxillofacial Surgery, Prosthodontics, Orthodontics, Operative Dentistry, Comprehensive Care Dentistry and Research.

CURRICULUM MAP



RCoD PROGRAM OUTCOMES AND COMPETENCIES

Bachelor of Dental Surgery will have the following program outcomes at RCoD.

- The dental graduates will demonstrate the knowledge and skills necessary to practice dentistry in primary care settings to provide comprehensive patient care and make independent decisions for their patients.
- The graduates will promote dental health care within the community, utilizing the latest research, critical thinking and professionalism.
- The graduates will exhibit emotional intelligence, commit to lifelong learning, who can demonstrate leadership and foster innovation.

RCoD aims to produce a dental graduate to achieve the following competencies, as outlined by PM&DC.

Generic Competencies

1. Professionalism
   - Communication skills
   - Time management
   - Ethics & integrity
   - Teamwork
   - Problem-solving skills
   - Empathy in patient care
2. Critical thinker
3. Creativity - Innovation
4. Leadership
5. Emotional intelligence
6. Life-long learner

Specialty Oriented Competencies (Knowledge, Skill, Attitude)

1. Researcher
2. Emergency patient management
3. Comprehensive care dentistry
4. Implant dentistry
5. Operative dentistry and endodontics
6. Prosthodontics
7. Periodontics
8. Oral and maxillofacial surgery
9. Orthodontics
10. Oral medicine and radiology
11. Paediatric dentistry
12. Pain and anxiety management
13. Health promotion within the community

TEACHING METHODOLOGIES

The teaching learning will be through diverse methods and will include:

1. Large Group Interactive Session (LGIS)
2. Small Group Discussion (SGDs) including Tutorial
3. Case-Base Learning (CBL)
4. Practical
5. Self-Directed learning (SDL)
6. Chairside teaching
7. Reflective Writing

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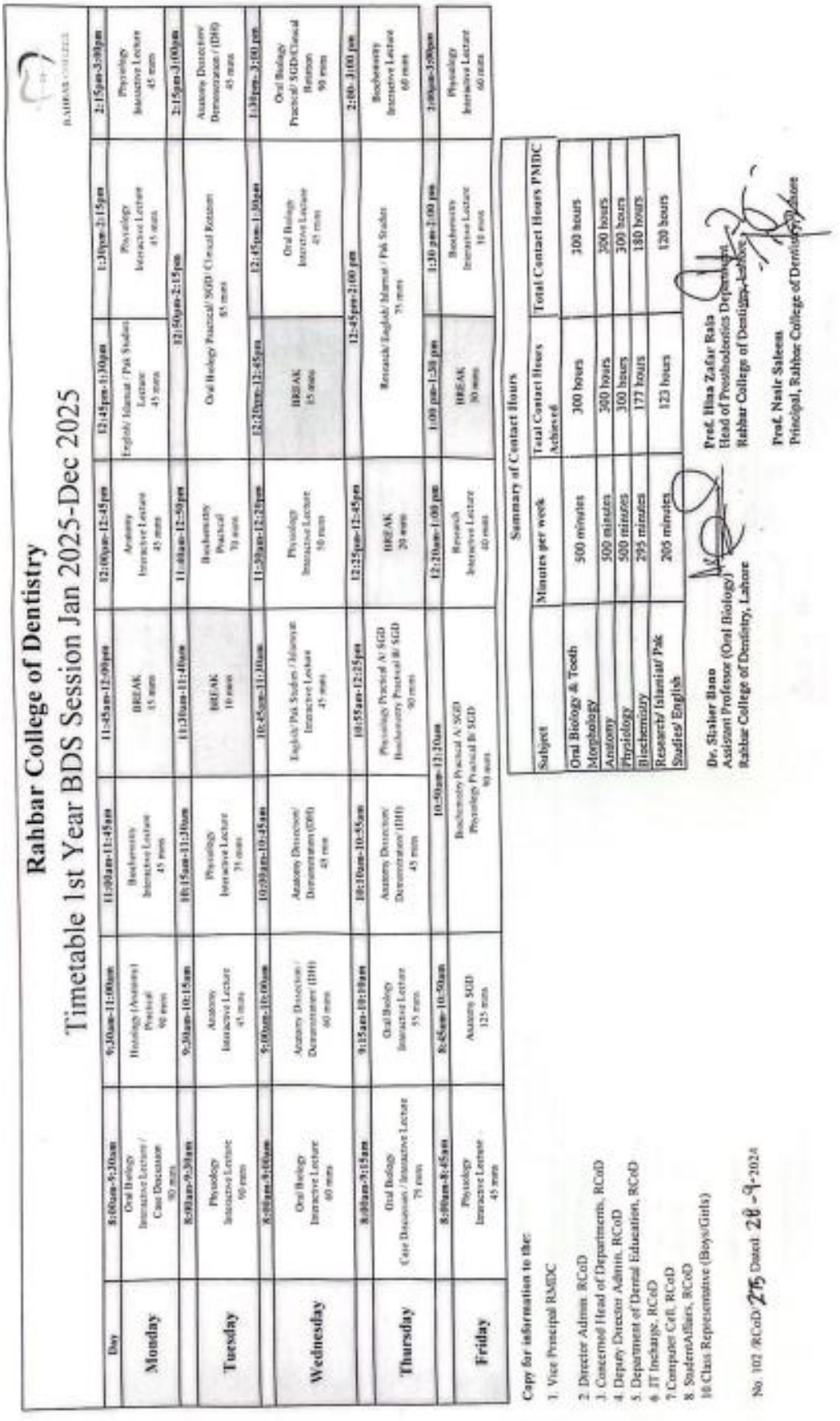
BDS 1st YEAR TIMETABLE



Rahbar College of Dentistry

Timetable 1st Year BDS Session Jan 2025-Dec 2025

Day	8:00am-8:30am	8:30am-8:45am	8:45am-10:45am	10:45am-11:00am	11:00am-11:45am	11:45am-12:00pm	12:00pm-12:45pm	12:45pm-1:30pm	1:30pm-2:15pm	2:15pm-3:00pm
Monday	Oral Biology Interactive Lecture / Case Discussion 90 min	Histology (Anatomy) Practical 90 min			Biochemistry Interactive Lecture 45 min	BREAK 15 min	Anatomy Interactive Lecture 45 min	English/ Islamiat / Pak Studies Lecture 45 min	Physiology Interactive Lecture 45 min	Physiology Interactive Lecture 45 min
	8:00am-9:30am				11:00am-11:45am		12:00pm-12:45pm		2:15pm-3:00pm	
Tuesday	Physiology Interactive Lecture 90 min	9:30am-10:15am	Anatomy Interactive Lecture 45 min	10:15am-10:30am	Physiology Interactive Lecture 35 min	BREAK 10 min	Biochemistry Practical 70 min	Oral Biology Practical/ SGD/ Clinical Rotation 45 min		Anatomy Dissection/ Demonstration / (DH) 45 min
	8:00am-9:30am		10:30am-10:45am		10:45am-11:30am		11:30am-12:25pm	12:25pm-12:45pm	12:45pm-1:30pm	1:30pm-2:30 pm
Wednesday	Oral Biology Interactive Lecture 60 mins	Anatomy Dissection/ Demonstration (DH) 60 mins		10:30am-10:45am	Anatomy Dissection/ Demonstration (DH) 45 min	English/ Pak Studies /Islamiat Interactive Lecture 45 min	Physiology Interactive Lecture 50 min	BREAK 15 min	Oral Biology Interactive Lecture 45 min	Oral Biology Practical/ SGD/Clinical Rotation 90 min
	8:00am-9:15am		10:30am-10:55am		10:55am-12:25pm		12:25pm-12:45pm	12:45pm-2:00 pm		2:00- 3:00 pm
Thursday	Oral Biology Case Discussion / Interactive Lecture 75 min	Oral Biology Interactive Lecture 55 min			Anatomy Dissection/ Demonstration/ (DH) 45 min	Physiology Practical A/ SGD Biochemistry Practical B/ SGD 90 min	BREAK 20 min	Research/ English/ Islamiat / Pak Studies 75 min		Biochemistry Interactive Lecture 60 min
	8:00am-8:45am		10:50am-12:20am				12:20am-1:00 pm	1:00 pm-1:30 pm	1:30 pm-2:00 pm	2:00pm-3:00pm
Friday	Physiology Interactive Lecture 45 min	8:45am-10:50am	Anatomy SGD 125 min		Biochemistry Practical A/ SGD Physiology Practical B/ SGD 90 min		Research Interactive Lecture 40 min	BREAK 30 mins	Biochemistry Interactive Lecture 30 min	Physiology Interactive Lecture 60 min

Summary of Contact Hours

Subject	Minutes per week	Total Contact Hours Achieved	Total Contact Hours PMDC
Oral Biology & Tooth Morphology	500 minutes	300 hours	300 hours
Anatomy	500 minutes	300 hours	300 hours
Physiology	500 minutes	300 hours	300 hours
Biochemistry	295 minutes	177 hours	180 hours
Research/ Islamiat/ Pak Studies/ English	205 minutes	123 hours	120 hours

Dr. Shaker Bano
Assistant Professor (Oral Biology)
Rahbar College of Dentistry, Lahore

Prof. Hina Zafar Rana
Head of Prosthodontics Department
Rahbar College of Dentistry, Lahore

Prof. Nasir Saleem
Principal, Rahbar College of Dentistry, Lahore

Copy for information to the:
1. Vice Principal RMDC
2. Director Admin, RCoD
3. Concerned Head of Departments, RCoD
4. Deputy Director Admin, RCoD
5. Department of Dental Education, RCoD
6. IT Incharge, RCoD
7. Computer Cell, RCoD
8. StudentAffairs, RCoD
9. Class Representative (Boys/Girls)

No. 102 /RCoD/ 215 Dated: 28 -9-2024

BDS 1st Year Clinical Rotation Plan

Rotation	Topic	Learning Outcomes	Batches
March	Oral Mucosa	Outline the boundaries of Oral Cavity & tissues in Oral Cavity Differentiate lingual papillae according to their location	Batch A: Oral Diagnostics Batch B: Oral Surgery Batch C: Periodontology Batch D: Orthodontics Batch E: Operative
April	Incisors & Canines	Differentiate between the artificial & natural maxillary & mandibular Incisors & Canines for tooth setup	Batch A: Prosthodontics Batch B: Operative Batch C: Oral Surgery Batch D: Periodontology Batch E: Orthodontics
May	TMJ	Demonstrate movements of TMJ	Batch A: Oral Surgery Batch B: Oral Diagnostics Batch C: Orthodontics Batch D: Operative Batch E: Prosthodontics
July	Premolars	Identify acrylic maxillary & mandibular Premolars for tooth setup	Batch A: Operative Batch B: Oral Surgery Batch C: Crown & Bridge Batch D: Prosthodontics Batch E: Periodontology
August	Dentogingival Junction	Identify the periodontal pocket	Batch A: Operative Batch B: Oral Surgery Batch C: Crown & Bridge Batch D: Prosthodontics Batch E: Periodontology
September	Molars	Identify acrylic maxillary & mandibular Molars for tooth setup	Batch A: Prosthodontics Batch B: Operative Batch C: Oral Surgery Batch D: Periodontology Batch E: Orthodontics
October	Deciduous Dentition	Distinguish deciduous & permanent dentition	Batch A: Oral Surgery Batch B: Oral Diagnostics Batch C: Orthodontics Batch D: Operative Batch E: Prosthodontics

***Clinical Rotation will be scheduled on last Wednesday from 1:30pm-3:00pm**

Batch A: 1-10
Batch-B: 11-20
Batch C: 21-30
Batch D: 31-40
Batch E: 41-50

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BDS 1st Year Temporal Coordination Table

Week	Anatomy	Physiology	Oral Biology	Biochemistry
1	General Anatomy: Introduction. Embryology: Introduction and Mitosis,Meiosis. Histology: Tissue preparation, Microscope and Artifacts. Gross: Skull.	Homeostasis and control system (Characteristics Components & Mechanism of functioning). Internalbody environment(ECF). Feedback (negative feedback system). Positive feedback gain of control system, feed forward control system. Cell membrane structure and function	Introduction to oral biology. Structure of oral tissues.Introduction to tooth morphology.	Introduction tobiochemistry Cell & organelles of cell membrane
2	General Anatomy: Bones . Embryology: Fertilization. Histology: Cell Shape Gross: Skull.	Cytoplasm, Membranous organelles (Nucleus, ER, Golgi complex). Membranous organelles (Mitochondria, Lysosomes, Peroxisomes). Non -membranous organelles. Discuss amoeboid locomotion and ciliary movements	Tooth numbering systems. Basic terminology usedin tooth morphology.	Membrane Transport mechanisms Acid and base balanceAcid and base imbalances

3	General Anatomy: JointsEmbryology: , gametogenesis. Histology: Simple Epithelium Gross: Scalp & face	**Class test** Key discussion Introduction to cellular transport proteins, means of transport. Passive transport (Diffusion osmosis) Active transport, Macro molecules, Phagocytosis, Pinocytosis, Active transport of molecules & ions, Primary, secondary, active transport, Co & Counter transport.	Alveolar Bone. Basic terminology usedin tooth morphology.	pH & Body Buffers Carbohydrates Classification
4	General Anatomy: Muscles Embryology: 1st week ofdevelopment Histology: Cell Junctions, Stratified Epithelium. Gross: Side of Neck	Introduction to excitable tissue, nervous tissue, neuroglia, neuron, nervefiber, Classification of nerve fiber. Origin of resting membrane potential. Nerve action potential & its phases, compound action potential, Ionic basis of action potential in nerve fibers & role of channels.	Alveolar Bone. . Basic terminology usedin tooth morphology.	Clinical significance ofMono, di & Polysaccharides. Isomerism Lactose intolerance galactosemia Blood glucose homeostasis

		Effects of ions on actionpotential, Properties of action potential. Graded potential.		
5	General Anatomy: Sutures Embryology: Cleavage,blastocyst formation, 2nd week of development Histology: Cytoskeletonof cell Gross: Triangles of neck1	Properties of nerve fibers 1 excitability (chronaxie & rheobase conduction in myelinated & unmyelinated nerve fibers). Physiological classification of synapses, comparisonof chemical & electricalsynapse. . Properties of synapse.	Development of oro-dental tissues Morphology of Anteriorteeth	Explain basic concept ofdigestion and absorption Discuss digestion and absorption of carbohydrates Discuss digestion and absorption of proteins Discuss digestion and absorption of lipids Indicate the process of digestion/absorption of genomics in human body. Discuss biochemical disorders of GIT
6	General Anatomy: Muscles Embryology: 2ND weekof development Histology: Connective tissue Gross: Triangles of neck	Neuromuscular junction, Neuromuscular transmission. motor endplate. end plate potential. Myasthenia gravis.	Development of oro-dental tissues Morphology of Anteriorteeth	Describe Composition, functions, daily secretion, stimulants and Depressant of Saliva,

		Physiological features of skeletal muscle.		Gastric juice and HCL Pancreatic juice
		General & Molecular mechanism of muscle contraction. Isotonic verses isometriccontraction, motor unit Enumerate types of muscle fibers (fast vs slow)		Intestinal juice andBile
7	General Anatomy: JointsEmbryology: 3–8 weeksof Development Histology: Connective tissue Gross: Triangles of neck	Mechanics of skeletal muscle contraction, Remodeling of muscleto match function. Excitation contraction coupling in skeletal muscles, Rigor motors Smooth muscles (Physiological features),Contractile mechanism in smooth muscles. Comparison of structure & function in three types of muscles	Development of toothand supporting structures Morphology of Anteriorteeth	Classification of lipids &fatty acids Phospholipids, glycolipids sphingolipids and their significance Lipoproteins

8	General Anatomy: CVSEmbryology: 3-8 weeksof Development Histology: Muscles Gross: Triangles of neck	**Class test** Introduction, composition and functions of blood	Development of toothand supporting structures Morphology of Anteriorteeth	Cholesterol chemistry, function and significance Functions & importanceof eicosanoids

		RBCs, structure functions. erythropoiesis, Hemoglobin synthesis.Iron metabolism Anemia & polycythemia		
9	General Anatomy: Classtest Embryology: 3-8th weekof development Histology: Bones Gross: Parotid gland	Functions and properties of WBCS, leukocytosis, leukemia, leukopenia Immunity, Cell mediated immunity. Humoral immunity Autoimmunity, organ transplantation and immunization, vaccination, Allergy & itstypes.	Enamel	Oxidation and biosynthesis of fatty acids Discuss synthesis, transport and excretion of lipids
10	Embryology Placenta Histology: Cartilage Gross: Temporal and infratemporal Regions	Hemostasis & blood coagulation. Platelets production, regulation& functions. Thrombocytopenia	Enamel	Discuss Cholesterol Synthesis Discuss the synthesis, storage and excretion of ketone bodies.

		. Clotting cascade. Hemophilia. Von Willibrand disease. Christmas disease. Bleeding time & clotting time.		

11	Embryology: Revision Histology: Spleen Gross: Submandibular region, Thyroid gland	Blood groups. Transfusion & transfusion reactions TEST Organization & functions of respiratory system Mechanics of pulmonary ventilation, plural, alveolar & transpulmonary pressure	Physiologic tooth movement, eruption andshedding Morphology of Anteriorteeth	Classify lipoproteins andgive their functions
12	Embryology: Revision Histology: Thymus glandGross: Structures in neck	Lung compliance & factors affecting it. Pulmonary volumes & capacity (Spirometry) Dead space. Principles of gas exchange & transport in blood. Nervous & chemical	Physiologic tooth movement, eruption andshedding Morphology of Anteriorteeth	Discuss Regulation of Blood Glucose Level. Discuss lactose intolerance and galactosemia Introduction to carbohydrate bioenergetics

		regulation of respiration. Breathing patterns. Respiratory changes in exercise, high altitude, deep sea diving		
13	Embryology: Development of face Histology: Palatine tonsils Gross: Cranial cavity	Hypoxia, dysponea, apnea, tachypnea, cyanosis, respiratory insufficiency.	Salivary Glands	Elaborate Glycolysis Discuss Citric acid cycle: catabolism ofacetyl CoA

		General organization &importance of endocrine system		
14	Embryology of Pharyngeal Apparatus Histology:Lymph NodesGross: Pharynx	Pituitary gland, thyroid,parathyroid hormones	Salivary Glands	Discuss metabolism ofglycogen Discuss Gluconeogenesis Regulation of carbohydrates metabolism
15	Histology: TongueGross: Nose	Pancreatic and adrenalhormones	Revision	Discuss purpose, importance and reactions of HMP.
16	Embryology: Development alanomalies Gross: Larynx Histology: Spinal cordNeuroanatomy: Spinal cord	Structure & physiologyof cardiac muscles Specialized excitatory and conductive systemof heart	Dentin-Pulp Complex Morphology of Posteriorteeth	Describe Structure, function andtypes of nucleic acids Discuss the chemical structure, properties

		Cardiac cycle		and functions of DNA & RNA
17	Gross:cervical vertebrae, joints of neckI Histology: Cerebrum Neuroanatomy: Spinal cord	Heart sounds. Regulation of heart pump. ECG. Cardiac arrhyhmias	Dentin-Pulp Complex Morphology of Posteriorteeth	Discuss the central dogma of molecular biology.
18	Embryology: Development and anomalies of tongue Gross: Tongue, hypoglossal nerve. Neuroanatomy: Brainstem	Circulation: concept of pressure flow & resistance Function of arterial, venous system Microcirculation & lymphatic system	Periodontium Morphology of Posteriorteeth	Define proteins, Enlist biochemical importanceand classification of proteins based on structure, functional, nutritional and biochemical aspects.
19	Gross: Anatomy of Ear Neuroanatomy: Brainstem And cerebellum	Arterial pulse. Blood pressure regulation Cardiac output. Venousreturn. Coronary circulation. Ischemic heart disease,cardiac failure, shock.	Periodontium Morphology of Posteriorteeth	Classify amino acids, give their properties andsignificance Explain the structure of proteins and their biochemical importance.

20	Embryology: Revision Gross: soft palate Histology: Cerebrum	Structure & function of kidney Glomerular filtration,factors affecting it. Renal blood flow	Oral Mucosa	Enlist plasma proteinsand write down their clinicalsignificance Enlist immunoglobulins and give their significance.
21	Embryology: Development and anomalies of ear Gross: Paranasal sinuses Histology: Revision	Urine formation, micturation	Oral Mucosa	Discuss structure function and types ofHb. Oxygen binding capacityof hemoglobin and its regulation. Extrapolate & analyzethe Biosynthesis of Hemoglobin. Discuss & interpret the Degradation of Heme. Discuss hemoglobinopathies.
22	Gross: Cervical plexus Neuroanatomy: Ventricles of brain, meninges	Renal regulation of blood volume & extracellular fluid. Acid base balance	Oral Mucosa Morphology of Posteriorteeth	How amino acids are synthesized. Discuss Amonia toxicity

23	Gross: Skull Neuroanatomy: Thalamus	General structure & organization. Principles of GIT movements. Mastication, deglutition Peristalsis Vomiting	Temporo mandibular Joint (TMJ) Morphology of Posteriorteeth	Outline steps involved inurea cycle Porphyrins and bile pigments
24	Gross: Skull Neuroanatomy: Hypothalamus	Defecation Movements & secretoryfunctions of GIT GIT hormones Liver	Temporo mandibular Joint (TMJ) Morphology of Posteriorteeth	Discuss transcription, translation & posttranslational modification in protein synthesis
25	Embryology Development and anomalies of CNS Gross Anatomy of Larynx, introduction toNeuroanatomy: bloodsupply of brain and spinal cord Histology Practical & Lecture of ganglia and peripheral nerve	Sensory nervous system	General Embryology	Discuss the metabolism of Phenylalanine, Tyrosine and Tryptophan metabolism.
26	Embryology Development and anomalies of PNS, Gross Anatomy of Palate Histology Practical: OSPE TEST	Motor nervous system	Dental Anomalies Morphology of posteriorteeth	Explain Basic Principlesof Human Nutrition. Discuss Basic Principlesof Human nutrition [BMR, BMI, RQ, Nutrition Components]

				Elaborate nutritional deficiencies leading to Obesity & Anorexia.
27	Gross lecture Eyeball Histology Practical: EyeNeuronantomy: Meninges	Spinal cord	Dental Anomalies	Introduction to enzymology Factors affecting enzymeactivity
28	Gross Lecture: RevisionHistology Practical & lecture of Cerebellum Neuroanatomy: Dural venous sinuses	ANS	Oral Physiology	enzyme kinetics enzyme inhibitors application of enzymes
29	Gross; Revision Neuroanatomy: Cerebellum, functional areas of Cerebrum, Histology Revision	Taste, Smell, ear physiology	Oral Physiology	Classification of vitaminsFat soluble vitamins
30	Gross lecture Revision Histology Completion ofcopies Test of General Histology	Eye physiology	Revision	Water soluble vitamins

31	Gross Larynx revision Ventricle, Basal ganglia,tests OSPE and Revisions	Cell Junctions	Dental Occlusion Morphology of deciduous dentition	Classify hormones. Discuss Hormones of Anterior Pituitary: Growth Hormone/FSH/LH/ACTH [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism ofaction, functions, abnormalities]. Hormones of Posterior Pituitary: Prolactin/ADH

32	Limbic system, CSFformation and flow Histology Revision Test of General Embryology	Body fluids	Dental Occlusion Morphology of deciduous dentition	Thyroid Hormones Elaborate Insulin & Glucagon
33	Revision	Applied Physiology	Cytoskeleton cell Junctions Revision	Describe Synthesis ofpurines and pyrimidines and their clinical role Explain Protein synthesis of genetic code Explain regulation ofgene Expression

34	Revision	Revision theory	Revision	Give biochemical role and regulation of macrominerals (Na,K, Cl, Ca, Po4) and microminerals (Mg, Sulfur, Iodine, Floride , iron, Zinc, cupper)
35	Preparation of 3rd Modular Exam	Revision theory	Revision	Discuss techniques in biochemistry Chromatography Spectrophotometry
36	3rd block Exam	Revision theory	Revision	Electrophoresis PCR

ORAL BIOLOGY & TOOTH MORPHOLOGY

Welcome Note by Head of Department

Welcome to the Oral Biology Study Guide! As the Head of the Oral Biology Department, I am delighted to introduce you to an exciting journey through the intricate world of oral health science. This guide is designed to equip you with a comprehensive understanding of the biological processes that underpin oral health and disease. Our field bridges fundamental research with clinical practice, exploring everything from molecular mechanisms to innovative treatments.

We encourage you to approach this material with curiosity and enthusiasm, as it will not only deepen your knowledge but also enhance your ability to contribute to research and patient care.

I am confident that your studies will be both enlightening and rewarding. Welcome to a field that is both challenging and profoundly impactful. Let's embark on this intellectual adventure together.

Rationale for the Course/ Department

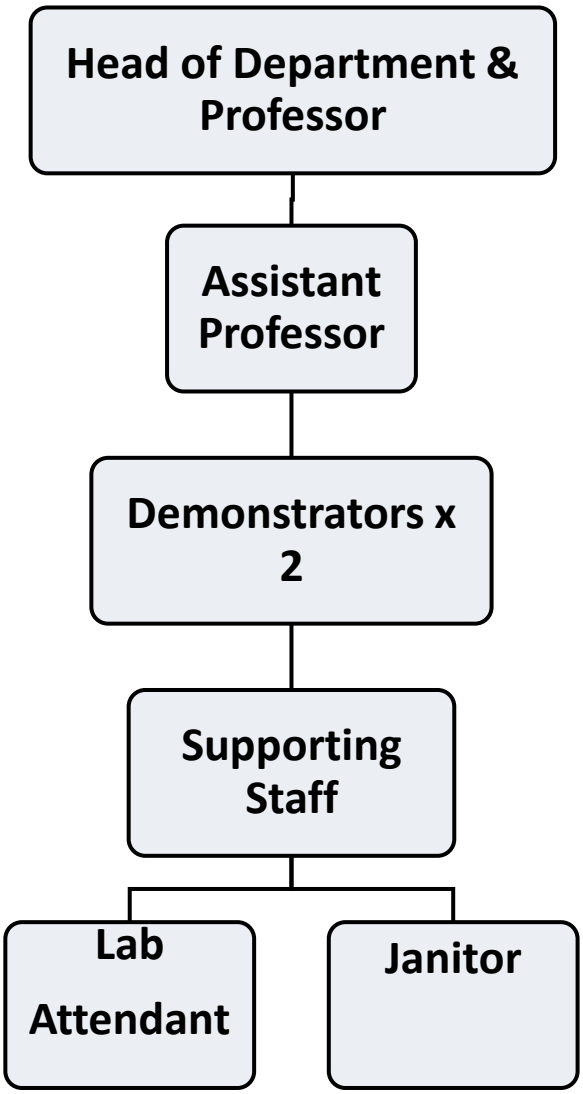
The Oral Biology Department plays a critical role in advancing our understanding of oral health and disease. Its rationale lies in bridging fundamental research with clinical applications to improve patient outcomes. By studying the biological processes underlying oral tissues, the department contributes to the development of innovative diagnostic tools and therapeutic strategies. This includes exploring the genetic, molecular, and cellular mechanisms that drive oral diseases like dental caries, periodontal conditions, and oral cancers.

Furthermore, the department fosters interdisciplinary collaboration, integrating insights from basic Medical and clinical Dental Sciences. Educating future professionals about the latest research and clinical practices is also a key component, ensuring that emerging dental practitioners are equipped with cutting-edge knowledge. Ultimately, the Oral Biology Department aims to enhance oral health, prevent disease, and improve the quality of life for individuals globally

Departmental Details

Head of Department	Dr. Asad Mahmood
Study Guide Developed by	Dr. Asad Mahmood Dr. Shaher Bano
Total Lectures	165
Total Practicals	66
Small Group Discussions	66

Departmental Organogram



Course Instructors

S.No	Name	Designation
1	Dr. Asad Mahmood	Professor
2	Dr. Shaher Bano	Assistant Professor

Oral Biology & Tooth Morphology

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Subject Specific & Integrated Learning Outcomes

Oral Histology

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1.	**Structure of the Oral Tissues**	**Knowledge** • Discuss parts of tooth • Enlist functions of each part • Outline the supporting structures of the tooth • Outline the mechanism of hard tissue formation • Discuss the mechanism of mineralization and degradation	Large Group Discussion	MCQs, SEQs, VIVA
		Skill • Illustrate the components of tooth & its supporting tissues	Practical	OSPE
		Attitude • Time management • Communication skills • Attendance • Active listening • Problem solving • Leadership	Practical/ SGD	OSPE
2.	**General Embryology**	**Knowledge** **Integration with Anatomy** • Discuss the germ cell formation & fertilization • Enlist the phases of prenatal development • Review the process of formation of three-layered embryo and fate of germ layers. • Highlight the process of formation of three-layered embryo and fate of germ layers. • Summarize the formation of neural tube • Enlist the derivatives of neural crest cells	Large Group Discussion	MCQs, SEQs, VIVA
		Skill • Illustrate the process of neurulation	Practical	OSPE
		Attitude • Time management	Practical	OSPE
3.	**Cytoskeleton & Intercellular Junctions**	**Knowledge** • Categorize structural elements of cytoskeleton	Interactive Lectures	MCQs, SEQs, VIVA

		• Classify intercellular junctions with their functions • Highlight the characteristic features of fibroblasts **Integration with Physiology & Biochemistry** • Classify collagen • Discuss the synthesis & degradation of collagen • Enlist inherited diseases involving collagen	Interactive Lectures	MCQs, SEQs, VIVA
4.	**Development of the Tooth & Supporting Structures**	**Knowledge** • Outline the initiation of tooth development. • Enlist different stages of the tooth development • Highlight the salient features of bud, cap, early and late bell stage of tooth development • Express the process of root formation of single & multi-rooted tooth	Large Group Discussion	MCQs, SEQs, VIVA
		Skill • Demonstrate the developmental stages of tooth by using microscope • Draw the developmental stages of tooth • Label the developmental stages of tooth • Illustrate the development of single & multirooted teeth	Practical	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Critical thinking • Self directed learning	Practical	OSPE, VIVA
5.	**Physiologic Tooth Movements: Eruption & Shedding**	**Knowledge** • Classify types of tooth movements • Enlist the histological features of tooth movements • Illustrate the mechanisms involved in tooth movements • Analyze the process & Pattern of shedding of teeth • Highlight the abnormal & orthodontic tooth movement	Interactive lectures/ SGD	MCQs, SEQs, VIVA

		Skill Determine the age of the given models/ Casts	Case based discussion	OSPE
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Stress management		
6.	**Enamel: Composition, Formation & Structure**	**Knowledge** • Enlist the physical & chemical characteristics of enamel • Discuss the fundamental organization of enamel • Identify the rod & Interrod interrelationships • Outline the life cycle of ameloblast • Demonstrate the light & electron microscopy of amelogenesis • Enlist the enamel proteins • Give the location, features & functions of enamel proteins • Identify DEJ & Enamel surface characteristics • Discuss stria of Retzius, cross striations, Gnarled Enamel, Tufts & Lamella • Categorize the defects of amelogenesis • Explain the changes that take place in enamel with age **Integration with Operative Dentistry** • Highlight the zones of caries • Corelate histology of Enamel with cavity preparation & Acid Etching	Large Group Discussion Interactive Lectures	MCQs, SEQs, VIVA MCQs, SEQs, VIVA
		Skill • Sketch the life cycle of ameloblast • Annotate the stages of life cycle of ameloblast • Demonstrate the microscopic structures present in enamel by using microscope • Illustrate enamel tufts, lamellae & spindles	Practical/ SGD	OSPE
		Attitude • Punctuality • Time management • Attendance • Self-directed learning • Critical thinking	Practical/ SGD	VIVA/ OSPE

7.	**Dentin-Pulp Complex**	• Define dentin-pulp complex. • Highlight the basic structure of dentin & its composition. • Classify dentin • Describe odontoblast differentiation, formation of primary, secondary & tertiary dentin • Distinguish the dentinal tubules, peri & intertubular dentin, sclerotic dentin, interglobular dentin, incremental lines & granular layer of Tomes • Define pulp. • Enlist the cells present in the pulp • Enlist the functions of pulp • Classify pulp stones • Relate the changes that take place in dentin pulp complex with age • Compare different theories of dentin sensitivity • Summarize their clinical relevance • Classify pulp stones • Enlist the changes that take place in dentin pulp complex with age with clinical correlation **Integration with Operative Dentistry** • Identify the pulpal reaction to dental caries & restorative procedures • Highlight tertiary dentine formation (direct & Indirect pulp capping)	Large Group Discussion/ Interactive Lectures	MCQs, SEQs, VIVA
		Skill • Demonstrate the microscopic picture of different histological structures of dentin • Illustrate histological structures present in Dentin • Illustrate different theories of dentin • Draw & label the histological zones of pulp	Practical/ SGD	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Active listening • Problem solving • Leadership • Meeting deadlines • Stress management	Practical/ SGD	OSPE

8.	**Periodontium**	**Knowledge** • Enlist the tissues included in periodontium • Outline the biochemical composition of cementum. • Classify cementum • Discuss the process of initiation of cementum formation & theories (Development) • Enlist the molecular factors regulating the cementogenesis and their functions • Classify cementoenamel junction • Enlist the PDL and gingival ligament fibers along with their functions • Enlist the cells present in periodontal ligaments • Highlight the innervation of PDL • Discuss alveolar process and histology of alveolar bone • Enlist the age changes associated with periodontium	Large Group Discussion	MCQs, SEQs, VIVA
		Skill • Illustrate the development of periodontium • Illustrate the fibers of periodontal ligament • Draw & label the gingival ligament fibers • Sketch the structure of alveolar bone showing its components	SGD/ Practical	OSPE
		Attitude • Time management • Communication skills • Punctuality • Active listening • Leadership • Stress management	SGD/ Practical	OSPE/ VIVA
9.	**Salivary Glands**	**Knowledge** • Highlight the development of major & minor salivary Glands • Discuss the mechanism of formation of saliva • Highlight the ductal modification of saliva • Identify the changes that takes place with age in salivary glands • Categorize the diseases associated with it	Interactive lectures	MCQs, SEQs, VIVA

		Integration with Biochemistry • List down the biochemical composition of saliva • Enlist the functions of saliva	Interactive lectures	MCQs, SEQs, VIVA
		Skill • Identify the microscopic features of salivary gland • Illustrate the structural organization of salivary glands • Draw the histology of major Salivary glands • Annotate the histological features of salivary glands	Practical/ PBL	OSPE
		Attitude • Time management • Communication skills • Team work • Punctuality • Active listening • Problem solving • Adaptability & flexibility • Leadership • Continuous improvement	Interactive lectures/ SGD/ Practical	OSPE
10	**Oral Mucosa**	**Knowledge** • Define oral mucosa • Outline the boundaries of Oral Cavity & tissues in Oral Cavity • Enlist the functions of Oral Mucosa • Outline the components tissues, lymphoid tissues & glands of oral mucosa • Enlist layers of oral epithelium • Enlist the non-keratinocytes in oral epithelium • Arrange the ultrastructural features & functions of non-keratinocytes • Highlight the junction of the epithelium & lamina propria • Illustrate the structural variations of masticatory & lining mucosa • Differentiate lingual papillae according to their location, structure, histology and specification to type of taste	Clinical Rotation Large Group Discussion/ Clinical Rotation to Oral Diagnostics	MCQs, SEQs, VIVA

		• Express the mucocutaneous, mucogingival & dentogingival junctions • Summarize the development of oral mucosa • Corelate the changes that takes place in oral mucosa with age		
		Skill • Illustrate the histological components of oral mucosa • Identify the epithelium of oral mucosa on microscope • Draw and label the histology of orthokeratinized, parakeratinized & non-keratinized epithelium • Illustrate different types of lingual papillae • Draw and label the structure of a taste bud • Illustrate mucocutaneous & dentogingival junction	Practical/ SGD	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening • Problem solving • Adaptability & flexibility • Leadership • Continuous improvement • Stress management • Empathy & Compassion • Patient handling	SGD/ Lecture/ Practical	OSPE/ VIVA
11	**Introduction to Bone**	**Knowledge** • Interpret the composition of bone. • Describe the gross histology of bone • Enlist the bone cells (osteoblasts & osteoclasts) • Reproduce the three mechanisms of bone formation e.g. endochondral, intramembranous and sutural bone • Devise the remodeling of bone	Interactive lectures	MCQs, SEQs, VIVA

		• Discuss the clinical considerations of bone		
		Skill • Sketch the gross structure of bone • Illustrate the steps of bone remodeling	Practical	OSPE
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Continuous improvement	Practical	OSPE
12	**Temporomandibular Joint**	**Knowledge** • Discuss the role of primary & secondary cartilages involved in development of mandible • Identify the role of cartilages in development of maxilla • Define TMJ • Classify joints • Enlist the articular surfaces, ligaments, nerve supply & clinical aspects. • Review the bones and cartilages associated with TMJ • Demonstrate the capsule and disk of the joint. • Express the histology of synovial membrane • Discuss the innervations of the joint • Highlight the development of TMJ • Arrange the Muscles of mastication according to their & insertion and functions • Enlist the clinical correlations of TMJ • Discuss the role of primary & secondary cartilages involved in development of mandible • Identify the role of cartilages in development of maxilla • Corelate development of jaws with Facial profiles	Interactive lectures Case Based Discussion	MCQs SEQs VIVA
		Skill • Draw and label gross anatomy of TMJ	Practical	OSPE

		• Devise the biomechanics of TMJ with the help of diagram • Demonstrate movements of TMJ in clinic	Clinical rotation to OMFS	
		Attitude • Communication skills • Team work • Attendance • Punctuality • Active listening • Problem solving • Patient handling	Practical/	
13	**Repair & Regeneration of Oral Tissues**	**Knowledge** • Relate the phases of healing with repair at dentogingival junction • Brief healing of enamel & dentin-pulp complex • Highlight Repair following tooth extraction • Highlight mechanism of repair of periodontium **Integration with General Pathology** • Differentiate between repair & regeneration • Discuss the phases of wound healing	Interactive lectures Interactive lectures	MCQ, SEQ, VIVA
14	**Oral Physiology**	**Knowledge** **Integration with Physiology** • Discuss the physiology of taste • Demonstrate the physiology of swallowing • Explain the physiology of mastication & speech • Explain the physiology of pain & dental pain • Explain the physiology of Olfaction	Interactive lectures	MCQs, SEQs, VIVA

Tooth Morphology

S. No	Topic	Learning outcomes	MIT	Mode of assessment
1.	**Introduction & Nomenclature**	**Knowledge** • Classify dentition • Identify the periods of dentition • Interpret the dental formula of deciduous & permanent dentition • Demonstrate the knowledge of universal, Palmer & FDI numbering systems • Discuss the anatomical features of a crown, root & its supporting structures • Define the name for tooth surfaces & thirds of tooth, line & point angles • Discuss the sequence of eruption of primary and permanent dentition • Relate the sequence of eruption with eruption ages	Interactive lectures/ SGD Case Based Discussion	MCQs, SEQs, VIVA
		Skill • Applying the knowledge of numbering system to identify permanent & deciduous dentition • Identify tooth surfaces & horizontal & vertical thirds of crown, line & point angles when given a diagram or models • Identify the cusp, cingulum, ridges, mamelons on a tooth model • Identify the fossa, grooves & pits on a tooth model	Practical/ SGD	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening	Practical/ SGD	OSPE VIVA
2.	**Anatomic & Physiologic Considerations of form & functions**	**Knowledge** • Enlist the major functions of human dentition • Identify the steps involved in the evolution of human dental mechanism • Discuss the comparative anatomy of human dentition with other species	Interactive lectures	MCQs, SEQs, VIVA

		• Define lobe and differentiate the name & number of lobes of the anterior & posterior teeth. • Identify the contact areas on individual tooth, the general rules in locating the contact areas and the changes occurring with age • Identify the interproximal space, its components, boundaries & functions • Define embrasures with general rules regarding its normal form & its significance • Discuss various crown surface forms		
		Skill • Identify crown surface forms of teeth on models • Define rules of cervical line on models	Practical /SGD	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening	Practical /SGD	OSPE
3.	**Permanent Incisors**	**Knowledge** • Highlight the general features of incisors • Enlist the developmental table • Describe the labial, lingual, mesial, distal and occlusal surfaces of all maxillary & Mandibular Incisors • Differentiate between central & lateral incisors • Differentiate between maxillary & mandibular incisors • Demonstrate the morphology of pulp & root morphology • Relate the variations & associated anomalies • Describe the features of deciduous incisors	Interactive lectures	MCQs, SEQs, VIVA
		Skill • Identify the models of maxillary & mandibular incisors • Draw the labial, lingual, mesial, distal & incisal surfaces	Practical/ SGD	VIVA/ OSPE

		• Label the labial, lingual, mesial, distal & incisal surfaces • Identify acrylic maxillary & mandibular Incisors for tooth setup	Clinical Rotation Prosthodontics	
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening	Practical/ SGD	OSPE
4.	**Permanent Canines**	**Knowledge** • Highlight the general features of maxillary & mandibular canines • Enlist the developmental table • Describe the labial, lingual, mesial, distal and occlusal surfaces of Maxillary & Mandibular Canines • Differentiate between maxillary & mandibular canines • Demonstrate the morphology of pulp & root morphology • Relate the variations & associated anomalies • Describe the features of deciduous incisors	Interactive lectures	MCQs, SEQs, VIVA
		Skill • Identify the models of maxillary & mandibular incisors • Draw the labial, lingual, mesial, distal & incisal surfaces • Label the labial, lingual, mesial, distal & incisal surfaces • Identify acrylic maxillary & mandibular Incisors for tooth setup	Practical/ SGD Clinical Rotation Prosthodontics	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening • Participation	Practical/ SGD	OSPE
5.	**Premolars**	**Knowledge** • Highlight the general features of premolars	Interactive lectures	

		• Enlist the developmental table • Describe the buccal, lingual, mesial, distal and occlusal surfaces of all maxillary & Mandibular Premolars • Differentiate between 1st & 2nd premolars • Differentiate between maxillary & mandibular premolars • Demonstrate the morphology of pulp & root morphology • Relate the variations & associated anomalies		MCQs, SEQs, VIVA
		Skill • Identify the models of maxillary & mandibular premolars • Draw the buccal, lingual, mesial, distal & occlusal surfaces • Label the labial, lingual, mesial, distal & incisal surfaces • Identify acrylic maxillary & Premolars for tooth setup	Practical/ SGD Clinical Rotation Prosthodontics	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening • Participation	SGD	OSPE
6.	**Permanent Molars**	**Knowledge** • Highlight the general features of premolars • Enlist the developmental table • Describe the buccal, lingual, mesial, distal and occlusal surfaces of all maxillary & Mandibular Premolars • Differentiate between 1st & 2nd premolars • Differentiate between maxillary & mandibular premolars • Demonstrate the morphology of pulp & root morphology • Relate the variations & associated anomalies • Discuss the features of deciduous molars	Interactive lectures/ SGD	MCQs, SEQs, VIVA
		Skill		

		• Identify the models of maxillary & mandibular molars • Draw the buccal, lingual, mesial, distal & occlusal surfaces • Label the labial, lingual, mesial, distal & incisal surfaces • Identify acrylic maxillary & mandibular Molars for tooth setup	Practical/ SGD Clinical Rotation (Prosthodontics)	OSPE
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Active listening • Participation	Practical/ SGD	OSPE
6.	**Occlusion**	**Knowledge** **Integration with Orthodontics** • Discuss the development of occlusion • Explain the three classes of occlusion • Discuss the general occlusal curvatures • Define overjet, overbite, primate spaces, leeway spaces • Define canine-guided and group function occlusion • Discuss centric occlusion & centric relation	Interactive lectures	MCQs, SEQs, VIVA
		Skill Demonstrate on model the overjet, overbite, normal occlusion, freeway space, leeway space	SGD/ Practical	OSPE
		Attitude • Communication skills • Team work • Attendance • Punctuality • Active listening • Problem solving	Practical/ SGD	OSPE/ VIVA

DEPARTMENTAL INVOLVEMENT IN INTEGRATED TEACHINGS

CORE SUBJECT: ORAL BIOLOGY

	1ST YEAR	2ND YEAR	3RD YEAR	4th YEAR	EXTRA COURSES
Subject				**Orthodontics**	
Topic				Development of Mandible	
SLOs				• Explore Growth in the Mandible • Identify the role and fate of Meckel's Cartilage • Determine the initial site of osteogenesis of mandible • Enlist secondary cartilages & their role in growth of mandible	
Subject				**Prosthodontics**	
Topic				Oral Mucosa	
SLOs				• Discuss features of keratinized mucosa • Highlight features of non-keratinized mucosa	
Subject				**Operative Dentistry**	
Topic				Biology of Dental Pulp	
SLOs				• Explain the structure & function of pulp	

Recommended Resource Books for Oral Biology & Tooth Morphology:

- Oral Histology: Development, Structure & Function- Richard Ten Cate's
- Orban's Oral Histology & Embryology
- Atlas of Oral Anatomy – Berkovitz
- Concise Dental Anatomy & Morphology – James L. Fuller
- Wheeler's Atlas of Tooth Form & Function

ANATOMY

Welcome Note by Head of Department

Welcome to the Anatomy program! As the Head of the Department, I am thrilled to guide you through this essential discipline that forms the backbone of medical knowledge. Understanding human anatomy is crucial for your future careers in healthcare, as it provides the foundation for all clinical practices. This study guide has been crafted to support your learning journey, offering resources and insights to help you master complex concepts. Embrace the challenges ahead and engage with your peers and faculty. Together, let’s explore the intricate structures of the human body and their significance in health and disease.

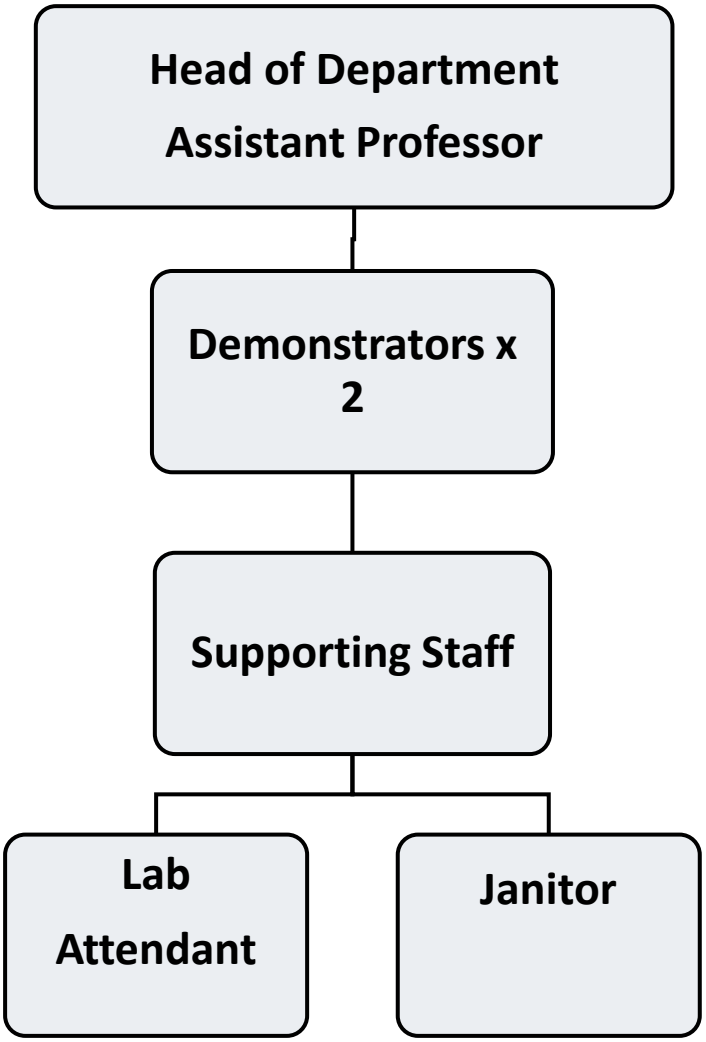
Rationale for the Course/ Department

Anatomy is fundamental for Bachelor of Dental Surgery (BDS) students, providing essential knowledge of the human body's structure, particularly the head and neck region. A thorough understanding of dental anatomy, including tooth morphology and the relationships between oral structures, is crucial for effective diagnosis and treatment. Anatomy informs surgical procedures, local anesthesia techniques, and the management of oral diseases. Additionally, knowledge of anatomical landmarks enhances communication with healthcare professionals. By mastering anatomy, future dentists can ensure precision in their clinical practice, improving patient outcomes and fostering a comprehensive approach to dental care and overall health

Departmental Details

Head of Department	Dr. Naeem Shahzad
Total Lectures	165
Total Tutorials/ Small Group Discussions	132

Departmental Organogram



Course Instructors

S.No	Name	Designation
1	Dr. Naeem Shahzad	Assistant Professor

Anatomy

Subject Specific Learning Objectives

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1.	**General Anatomy**	**Knowledge** ● Use the proper medical terminology ● Detail the structure, types and blood supply of bones ● State the different types of joints and classify them into various groups. ● Explain the mechanics of joint movement and state the degree of movement possible at a particular joint ● Understand the structure of various types of muscles. ● Classify and explain their arrangement and mode of action ● Understand the different types of blood vessels and their functions ● Define anastomosis and explain its benefits and types ● Explain the significance of possible vascular anomalies ● Classify the nervous system according to structure and function. ● Appreciate the formation, location and mode of action of spinal, cranial, and autonomic nerves.	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1.	**Introduction to Embryology**	**Knowledge** ● Define, And Describe Terms Used In Embryology	Large Group Discussion	MCQs, SEQs, VIVA

		• Understand The Significance of Embryologic Development and The Basics Of Genetics		
		Attitude • Time Management • Communication Skills • Attendance • Active Listening • Problem Solving • Leadership	SGD/ Lecture	VIVA
2.	**Male and Female Reproductive System**	**Knowledge** • Understand The Structure and Functions of Male Reproductive Organs • Understand The Structure and Functions of Female Reproductive Organs	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Empathy & Compassion • Patient Handling • Time Management • Stress Management	SGD/ Lecture	OSPE/ VIVA
3.	**Gametogenesis**	**Knowledge** • Explain Mitosis and Meiosis • Explain Phases of Cell Division with Respect to Differences Between Mitosis And Meiosis	Interactive Lectures	MCQs, SEQs, VIVA
		Attitude • Punctuality • Time Management • Attendance • Self-Directed Learning • Critical Thinking	SGD/ Lecture	OSPE/ VIVA
4.	**Transport of Gametes and Fertilization**	**Knowledge** • Explain Sperm Transport, Capacitation, Ovulation And Ovum Transport. Phases Of Fertilization And Its Outcomes. • Detail Phases Of Fertilization And Its Outcomes	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Time Management • Communication Skills • Team Work	SGD/ Lecture	OSPE/ VIVA

		• Attendance • Punctuality • Critical Thinking • Self Directed Learning		
5.	**First Week of Development**	**Knowledge** • Explain Cleavage and Formation of Morula and Blastocyst. • Describe Beginning of Implantation	Interactive lectures/ SGD	MCQs, SEQs, VIVA
		Attitude • Time Management • Communication Skills • Attendance • Punctuality • Problem Solving • Stress Management	SGD/ Lecture	OSPE/ VIVA
6.	**Second Week of Development**	**Knowledge** • Detail The Formation of Bilaminar Germ Disc, Amniotic Cavity, Primitive Yolk Sac, Extraembryonic Mesoderm, Chorionic Cavity, Secondary Yolk Sac and Completion Of Implantation	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Punctuality • Time Management • Attendance • Self-Directed Learning • Critical Thinking	Practical/ SGD	VIVA/ OSPE
7.	**Third Week of Development**	**Knowledge** • Detail The Process of Gastrulation • Explain The Development of Notochord, And Trilaminar Germ Disc • Detail The Organization of Intraembryonic Mesoderm and The Formation Of Intraembryonic Coelom, Neural Tube, And The Primitive CVS • Understand Vasculogenesis and Angiogenesis, And The Development Of Chorionic Villi	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Time Management		OSPE

		• Communication Skills • Team Work • Attendance • Active Listening • Problem Solving • Leadership • Meeting Deadlines	Practical/ SGD	
8.	**Fourth Week of Development**	**Knowledge** • Explain The Process of Neurulation • Understand The Significance of The Folding of Embryo • Detail The Development of Somites • State The Derivatives of The Neural Crest Cells, Ectoderm, Mesoderm, And Endoderm	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Time Management • Communication Skills • Punctuality • Active Listening • Leadership • Stress Management	SGD/ Lecture	OSPE/ VIVA
9.	**Fetal Period**	**Knowledge** • Understand All the Features Ending with Fetal Age, Edd Embryonic Development	Interactive lectures	MCQs, SEQs, VIVA
		Attitude • Time Management • Communication Skills • Team Work • Punctuality • Active Listening • Problem Solving • Adaptability & Flexibility • Leadership • Continuous Improvement	SGD/ Lecture	OSPE/ VIVA
10.	**Teratology**	**Knowledge** • State The Various Teratogens • Understand The Anomalies Cause by Exposure To Teratogens	Interactive Lectures	MCQs, SEQs, VIVA
		Attitude • Time Management • Communication Skills • Team Work	SGD/ Lecture	OSPE/ VIVA

		• Attendance • Punctuality • Active Listening • Problem Solving		
11.	**Special Embryology**	**Knowledge:** • Understand The Development and Derivatives of Pharyngeal Arches, Pouches, And Apparatus, Including Blood, Nerve Supply, And Related Structures (Tuberculum Impar, Copula, Hypobranchial Eminence). • Explain Nerve Supply Origins of The Tongue, Thyroid Development, And Role of The Ultimobranchial Body. • Discuss Facial Development (Frontonasal, Maxillary, Mandibular Prominences) And Palate Formation. • Outline Development of Optic Structures (Cup, Vesicles, Retina, Iris, Ciliary Body, Cornea, Sclera). • Explain Auditory Development, Including Placode and Vesicles. • Describe Cell Membrane Structure, Organelles, Cytoskeleton, And Cell Junctions. • Discuss Cell Renewal, Death, And Classification of Epithelia And Their Surface Specializations. • Explain Gland Structure (Exocrine, Mammary), Functions, And Related Clinical Conditions. • Classify Connective Tissues, Cells, And Extracellular Matrix, And Their Clinical Conditions. • Discuss Cartilage and Bone Composition, Cells, Structure, Formation, Growth, And Related Clinical Conditions. • Define Muscle Types (Skeletal, Cardiac, Smooth), Structure, Organization, And Tissue Regeneration. • Describe Vascular Wall Tissues, Blood Vessel Types, And Atherosclerosis. • Discuss Adaptive Immunity Cells, Lymphoid Organs (Thymus, Lymph Nodes, Spleen), And Immune System Conditions. • Classify Neurons, Their Structure, Function, Peripheral Nervous System, And Related Clinical Conditions.		

		• Describe Cerebrum, Cerebellum, Spinal Cord, And Sensory Receptors. • Summarize Skin Layers, Cells (Keratinocytes), Dermis, Subcutaneous Tissue, Hair, Nails, And Glands. • Outline Respiratory System Histology (Epithelium, Sinuses, Pharynx, Trachea, Bronchi, Lungs). • Describe Oral Structures (Lip, Cheeks, Tongue, Salivary Glands) And Digestive Tract. • Enumerate Endocrine Glands And Detail Pituitary Structure, Hormone Secretion, Thyroid And Parathyroid Cells. • Discuss The Eye's Structure (Tunics, Cornea, Retina) And Accessory Structures, Including Clinical Conditions. • Enlist External And Middle Ear Parts, Labyrinth Structures, And Sensory Areas.		
		Attitude • Time Management • Communication Skills • Team Work • Attendance • Punctuality • Critical Thinking • Self Directed Learning	SGD/ Lecture	OSPE/ VIVA

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1	Cell	**Knowledge:** 1. Describe And Draw The Structure Of Cell Membrane 2. Discuss The Structure And Functions Of Organelles, Inclusions And Cytoskeleton 3. Classify, Define And Elaborate The Structure And Functions Of Junctions 4. Discuss The Importance Of Cell Renewal And Death	Large Group Discussion	MCQs, SEQs, VIVA

		Skill ● Illustrate the histological components of cell	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE
2	Epithelium	**Knowledge:** 1. Classify, And State The Characteristic Features, Types, Location And Functions Of Simple Epithelium 2. Classify And State The Characteristics Features, Types, Location, And Functions Of Stratified Epithelium 3. Describe Specializations Of The Apical Cell Surface: A. Microvilli, B. Stereocilia, C. Cilia 4. Discuss The Importance Of These Specializations 5. Discuss The Clinical Conditions Associated With Epithelium	Large Group Discussio n	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of epithelium	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening	Practical/ SGD	OSPE

3	Exocrine Gland	**Knowledge:** 1. Define The Term Gland 2. Discuss General Structure Of Exocrine Gland 3. Classify Exocrine Glands On The Basis Of Morphology, Nature And Mode Of Secretions 4. Mammary Gland 5. Discuss The Clinical Conditions Associated With Glands	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of exocrine glands	Practical	OSPE
		Attitude ● Communication skills ● Attendance ● Active listening	Practical/ SGD	OSPE
4	Connective Tissue	**Knowledge:** 1. Classify Connective Tissue Cells 2. Elaborate The Histological Structures And Functions Of C.T Cells 3. Discuss The Extracellular Matrix Of C.T	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of connective tissue	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE

5	Connective Tissue Proper	**Knowledge:** 1. Classify, Compare And Contrast Different Type Of C.T 2. Discuss Various Types Of Clinical Conditions Associated With C.T Proper	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of connective tisse	Practical	OSPE
		Attitude ● Communication skills ● Attendance ● Active listening ● Leadership	Practical/ SGD	OSPE
6	Cartilage	**Knowledge:** 1. Identify And Account For Perichondrium 2. Discuss Cells And Extracellular Matrix Of Cartilage 3. Classify And Identify The Differences Between Different Types Of Cartilages 4. Discuss Various Types Of Clinical Conditions Associated With Cartilage	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of cartilage	Practical	OSPE
		Attitude ● Problem solving ● Leadership	Practical/ SGD	OSPE

7	Bone	**Knowledge:** 1. Explain The Composition Of Bone Matrix 2. Discuss The Four Types Of Cells Associated With Bone 3. Demonstrate Difference Between Periosteum And Endosteum 4. Describe The Microscopic Structure Of Bone 5. Explain Haversian System 6. Enlist The Differences Between Spongy And Compact Bone 7. Elaborate The Different Processes Of Bone Formation 8. Explain Bone Growth In Length And Diameter 9. Discuss Various Types Of Clinical Conditions Associated With Bone	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of bone matrix	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Active listening ● Leadership	Practical/ SGD	OSPE
8	Muscle Tissue	**Knowledge:** 1. Define Skeletal Muscle 2. Explain Organization Of A Skeletal Muscle 3. Demonstrate A Clear Understanding Of Organization Within Muscle Fibers 4. Identify The Essential Role Of Sarcoplasmic Reticulum And Transverse Tubule System 5. Discuss Major Characteristics Of Cardiac And Smooth Muscle Fiber Types 2.Enlist The Important Comparisons Of The Three Types Of Muscle. 6. Give An Account About Regeneration Of Muscle Tissue	Large Group Discussion	MCQs, SEQs, VIVA

		Skill ● Illustrate the histological components of muscle tissue	Practical	OSPE
		Attitude ● Attendance ● Active listening ● Leadership	Practical/ SGD	OSPE
9	The Circulatory System	**Knowledge:** 1. Discuss Tissues Of The Vascular Wall Of: A. Elastic Arteries, B. Muscular Arteries C. Arterioles, D. Capillaries 2. Explain Atherosclerosis Lesion 3. Compare Major Features And Role Of Major Blood Vessel Types 4. Discuss The Tissues Of The Vascular Wall Of Venules And Veins 5. Discuss The Tissues Of The Vascular Wall Of Lymphatic Vessels 6. Compare Arteries, Veins, And Lymph Vessels	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of the vessels	Practical	OSPE
		Attitude ● Active listening ● Communication skills ● Attendance ● Problem solving ● Leadership	Practical/ SGD	OSPE
10	The Immune System And Lymphoid Organs	**Knowledge:** 1. Discuss Cells Of Adaptive Immunity: Antigen-Presenting Cells And Lymphocytes 2. Explain The Histological Features Of Thymus And Its Role In T-Cell Maturation And Selection	Large Group Discussion	MCQs, SEQs, VIVA

		3. Explain Mucosa-Associated Lymphoid Tissue 4. Elaborate The Histological Features Of Lymph Nodes And Its Role In The Immune Response 5. Give An Account Of Spleen And Functions Of Splenic White And Red Pulp 6. Histologically Compare Important Lymphoid Organs. 7. Discuss Various Types Of Clinical Conditions Associated With Immune System		
		Skill ● Illustrate the histological components the immune system	Practical	OSPE
		Attitude ● Problem solving ● Leadership ● Time management ● Communication skills ● Attendance ● Active listening	Practical/ SGD	OSPE
11	Nerve Tissue	**Knowledge:** 1. Classify Neurons Morphologically And Functionally 2. Explain The Cell Body (Perikaryon), Dendrites, And Axons Of Neurons With Their Functional Correlation 3. Define Peripheral Nervous System 4. Describe The Histological Structure Of Nerve Fibers 5. Explain Nerve Organization 6. Discuss Ganglia 7. State The Origin, Location And Principal Functions Of Neuroglial Cells 8. Differentiate Between Sensory Receptors Keeping In View Their Location, Structure And Function 9. Discuss The Clinical Conditions Associated With Nervous System	Large Group Discussion	MCQs, SEQs, VIVA

		Skill ● Illustrate the histological components of nerve tissue	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE
12	CNS	**Knowledge:** 1. Describe Histologic Features Of Cerebrum 2. Compare The Structure Of Pyramidal And Nonpyramidal Cells 3. State The Major Histological Features And Functions Of Cerebellum 4. Discuss Components Of White And Grey Matter Of Spinal Cord	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of cerebrum	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Leadership	Practical/ SGD	OSPE
13	Skin	**Knowledge:** 1. Summarize The Layers Of Skin 2. Distinguish Between Keratinocytes And Non-Keratinocytes Structurally And Functionally 3. Describe The Layers Of Dermis And Subcutaneous Tissue 4. Explain The Structure Of Hair	Large Group Discussion	MCQs, SEQs, VIVA

		5. Discuss Different Parts Of Nails 6. Describe The Histological Structure And Functions Of Skin Glands: I. Sebaceous Glands A. Sebaceous Glands, B. Sweat Glands 7. Discuss The Clinical Conditions Associated With Integumentary System		
		Skill ● Illustrate the histological components of skin	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance	Practical/ SGD	OSPE
14	The Respiratory System	**Knowledge:** 1. Enlist The Cells Present In Respiratory Epithelium And Olfactory Epithelium, Also Mention Their Histological Anatomy 2. Discuss His Knowledge About Paranasal Sinuses 3. Discuss His Knowledge About Pharynx And Larynx 4. Describe Histologic Features Of The Trachea. 5. Compare And Contrast Between The Structure Of Trachea And Bronchi 6. Elaborate The Major Histological Features And Functions Of Airways Within The Lungs 7. Enumerate Components Of Blood Air Barrier And Its Importance 8. Discuss Various Types Of Clinical Conditions Associated With Respiratory System	Large Group Discussion	MCQs, SEQs, VIVA

		Skill ● Illustrate the histological components of cells present in the respiratory system	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE
15	Git And Associated Glands	**Knowledge:** 1. Describe The Structure Of Lip And Cheeks 2. Discuss The Structure And Functions Of Tongue, Lingual Papillae And Taste Buds 3. Detail The General Structure Of Digestive Tract And Esophagus 4. Discuss The Medical Conditions Associated With Esophagus And Nerve Plexus 5. Enlist The Major Salivary Glands And Explain Their Histological Structure 6. Discuss The Duct System Of Salivary Glands 7. Demonstrate Differences Between Salivary Glands	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of GIT and Associated Glands	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance ● Active listening ● Problem solving ● Leadership	Practical/ SGD	OSPE

16	Endocrine	**Knowledge:** 1. Enumerate Discrete Endocrine Glands 2. Describe: A. The Hypothalamic-Hypophyseal Tract B. Adenohypophysis (Anterior Pituitary) C. Control Of Hormone Secretion In The Anterior Pituitary D. Neurohypophysis (Posterior Pituitary) 3. Detail Major Cell Types Of The Anterior Pituitary And Their Functions 4. Summarize The Histological Features And Functions Of Follicular And Parafollicular Cells Of Thyroid Gland 5. Distinguish Between Chief Cells And Oxyphil Cells Structurally And Functionally 6. Discuss The Clinical Conditions Associated Thyroid And Parathyroid Glands	Large Group Discussion	MCQs, SEQs, VIVA
		Skill ● Illustrate the histological components of endocrine glands	Practical	OSPE
		Attitude ● Time management ● Communication skills ● Attendance	Practical/ SGD	OSPE

Gross Anatomy

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1	**Osteology**	**Knowledge:** ● Define norma frontalis, Identify the bones and joints in norma frontalis ● Describe the bony features of norma frontalis	Demonstration/SGS	Viva ,OSPE, SEQs, MCQs

		• Describe the boundaries and contents of orbit, identify openings and various foramina and name structures passing through them. • Name the bones taking part in the formation of facial skeleton • Describe ossification, developmental changes, attachments of the mandible • Describe the fractures of the mandible and maxilla • Describe the bony features and attachments of Norma Verticalis &occipitalis. • Define sutures and know types of sutures with their clinical significance. • Define fontanelle the with their types and clinical aspects • Describe the bony features and attachments of norma lateralis • Describe Pterion with its clinical significance • Define the boundaries of temporal, infratemporal and Pterygopalatine fossa • Describe the bony features, relations and attachments of Norma basalis. • Name the structures passing through various foramina • Describe the formation of hard palate		
		Skill • Illustrate the components of skull	Practical	OSPE
		Attitude • Time management • Communication skills • Attendance	Practical/ SGD	OSPE
2	**Cranial Nerves**	**Knowledge:** • Describe the bony features, relations and attachments of cranial cavity	Demonstration/SGS	Viva, OSPE,

		• Name the structures passing through various foramina in anterior, middle and posterior cranial fossa • Describe the fractures of anterior, middle and posterior cranial fossa and their consequences • Describe Pituitary gland with its location, relations, blood supply • Describe meninges (layers, attachments, clinical aspects) • Define Subdural and subarachnoid spaces describe subarachnoid cisterns • Name various dural venous sinuses • Explain location, tributaries, drainage, communication and clinical aspects of dural venous sinuses.		SEQs
		Skill • Illustrate the components of Cranial Nerves	Practical	OSPE
		Attitude • Time management • Problem solving • Leadership	Practical/ SGD	OSPE
3	**Face**	**Knowledge:** • Draw & label the Cutaneous innervation of face • Describe the origin, course, distribution and branches of facial nerve and clinical aspects • Describe the origin, course, distribution and branches of facial nerve and clinical aspects • Describe the blood supply and lymphatic drainage of face and clinical aspects	Demonstration/SGS	Viva, OSPE
		Skill • Illustrate the components of face	Practical	OSPE
		Attitude • Time management • Communication skills		OSPE

		• Attendance • Active listening	Practical/ SGD	
4	**Orbital**	**Knowledge:** • Define the boundaries of the orbital cavity and name its contents. • Describe orbital septum and check ligaments • Describe the structure of eye lid • Name the components of the lacrimal apparatus. • Describe formation, circulation and drainage of lacrimal fluids • Describe the nerve supply of lacrimal gland and clinical aspect • Describe the coats of eyeball, aqueous humor and vitreous body • Describe Extra ocular muscles with attachments, actions and nerve supply • Describe arteries and veins of orbit • Describe the nerves of orbit (III,IV,VI) with their course, branches and distribution • Describe Ciliary ganglion with its location, roots, branches and clinical aspects • Describe the origin and course of Optic Nerve • Describe the boundaries of temporal fossa and their contents • Describe the boundaries of infra temporal fossa and their contents • Describe the construction of the hard and soft palate and the floor of mouth • Describe the attachment of muscles of palate, nerve supply and blood supply • Describe the external features of parotid gland with its surfaces, relations, structures within parotid gland, nerve supply and clinical aspects • Identify, locate parts (borders, surfaces) relation, blood supply, nerves supply and clinical aspects of submandibular and sublingual gland	Demonstration/SGS	Viva, OSPE

		• Describe the boundaries of nasal cavity Describe the formation of Nasal septum Describe Blood supply and nerve supply of nasal cavity • Describe the origin, course, distribution of olfactory nerve with its clinical aspects • Name Paranasal sinuses describe their location, drainage blood supply, nerve supply and clinical aspect		
		Skill • Illustrate the components of orbit	Practical	OSPE
		Attitude • Time management • Communication skills • Attendance • Active listening • Problem solving • Leadership	Practical/ SGD	OSPE
5	**Ear**	**Knowledge:** • Describe features of external ear (auricle, external audiometers) Blood and Nerve supply • Describe the boundaries of middle ear cavity and name its contents. • Describe bony and membranous labyrinth Describe the origin, cause of the vestibulocochlear nerve Trace the pathway of hearing • Describe the muscles of mastication with their attachments, nerve supply and clinical aspects • Describe Maxillary artery with its parts, course branches and distribution • Describe TMJ with its type, articular surfaces, ligaments, movements, nerve supply and clinical aspects	Demonstration/SGD	Viva, OSPE SEQs, MCQ
		Skill • Illustrate the components of ear	Practical	OSPE
		Attitude • Communication skills • Problem solving	Practical/ SGD	OSPE

		• Leadership		
6	**Pterygopalatine Fossa**	**Knowledge:** • Describe the boundaries of Pterygopalatine fossa • and its contents • Describe Pterygopalatine ganglion with its location, roots, branches and clinical aspect	Demonstration/SGS	Viva, OSPE SEQs, MCQ
		Skill • Illustrate the components of pterygopalatine fossa	Practical	OSPE
		Attitude • Problem solving • Leadership • Time management • Communication skills • Attendance • Active listening	Practical/ SGD	OSPE
7	**Oral Region**	**Knowledge:** • Outline boundaries of the oral cavity Describe the structure of lips, gums • Describe the external feature of Tongue Describe the muscles of tongue with their attachments, nerve supply, blood supply and lymphatic drainage and clinical aspects • Describe the origin, course, distribution and branches of hypoglossal nerve • Describe the external features and attachments of hyoid bone • Identify typical and atypical cervical vertebrae Describe the external feature, muscular attachment, ligaments of cervical vertebrae and their ossification • Describe types of cervical vertebral joints articular surface, attachment, ligaments and movements Describe movements at atlanto -oocipital atlanto axial joints and vertebral joints • Describe the layers of deep cervical fascia their attachments, relation and various spaces formed with their clinical importance	Demonstration/SGS	Viva, OSPE SEQs, MCQ

		• Describe the boundaries and of anterior and posterior triangle Subdivision of anterior and posterior triangle • Describe the contents of posterior triangles Describe attachment of sternocleidomastoid and trapezius with their actions and their nerve supply • Describe the origin, course, distribution and branches of accessory nerve with clinical aspects. • Describe the contents of anterior triangle Describe the attachment of Supra & infrahyoid muscles with their actions and nerve supply • Describe the origin, course, relations, termination and branches of common carotid external and internal carotid arteries • Describe the origin, course, relations, termination and tributaries of External and Internal jugular vein and anterior jugular vein • Describe the course , relations branches and distribution of vagus nerve • Describe the location, formation, relations branches distribution and clinical aspects of cervical part of Sympathetic chain • Name the contents and muscles of the sub occipital triangle • Describe the prevertebral muscles with attachments, actions, nerve supply and clinical aspects • Describe thyroid gland with location relations, blood supply, lymphatic drainage nerve supply and clinical aspects • Describe the structural frame work(cartilage, joints, membranes& ligaments) • Describe the interior of larynx, blood supply and nerve supply with clinical aspects • Describe the origin, course ,distribution and branches of vagus nerve in neck • Describe trachea with its extent, course, relations blood supply, nerve supply and Clinical aspects		

		• Describe the extent, course and relations of nasopharynx, oropharynx and laryngopharynx • Describe the muscles of pharynx with their attachments, nerve supply • Describe the internal features of pharynx, blood supply, nerve supply • Describe the location, relations of palatine tonsils blood supply, nerve supply and clinical aspects • Describe esophagus with its extent, course, relations blood supply, nerve supply and Clinical aspects • Describe the basic organization of nervous system and parts of the brain and their relative positions to one another • Discuss general functions of nervous system • Draw and label the transverse sections of the spinal cord at different levels showing the position of the nerve cell groups in the gray column of spinal cord • Draw and label the transverse sections of the spinal cord at different levels showing the arrangement of ascending and descending tracts Describe the functions of ascending and descending tracts • Describe the blood supply of spinal cord and clinical aspects • Discuss path way & sensation carried by spinothalamic tract & spinocerebellar tract • Discuss physiology of pain with emphasis on pain control mechanism • Discuss functions of sensory & motor cortex • Describe the blood supply of spinal cord and clinical aspects • Describe the injuries to the spinal cord • Explain pyramidal & extra pyramidal Pathway • Discuss upper motor & lower motor neurons lesions • Discuss classification of reflexes. Describe spinal cord reflexes • Describe the blood supply of spinal cord and clinical aspects		
		Skill		

		• Illustrate the components of oral region	Practical	OSPE
		Attitude • Attendance • Active listening • Time management • Communication skills • Problem solving • Leadership	Practical/ SGD	OSPE

DEPARTMENTAL INVOLVEMENT IN INTEGRATED TEACHINGS

CORE SUBJECT: ANATOMY

	1ST YEAR	**2ND YEAR**	**3RD YEAR**	**4th YEAR**	**EXTRA COURSES**
Subject	**Oral Biology**				
Topic	General Embryology				
SLOs	• Discuss the germ cell formation & fertilization • Enlist the phases of prenatal development • Review the process of formation of three-layered embryo and fate of germ layers. • Highlight the process of formation of three-layered embryo and fate of germ layers. • Summarize the formation of neural tube • Enlist the derivatives of neural crest cells				

List of Resource Books

- Langman's Medical Embryology by Sadler
- The developing Human by Moore & Persand
- Clinical Neuroanatomy by R Snell
- Clinically oriented Anatomy by Moore
- Atlas of Histology by Difoire's
- Medical Histology by Dr. Laiq Hussain Siddiqui

Anatomy

- Color Atlas of Anatomy by McMinn
- Anatomy for dental students by Johnson & Moore
- Last's Anatomy by Mc Minn
- Gray's Anatomy for students
- Basic Histology Janqueira, Carneiro Contopoulos
- Wheater's Functional Histology Text & Color Atlas

PHYSIOLOGY

Welcome Note by Head of Department

Welcome to the Physiology program! As the Head of the Department, I am excited to embark on this educational journey with you. Physiology is essential for understanding the intricate functions of the human body and how these processes relate to health and disease, particularly in dentistry. This study guide is designed to enhance your learning experience, providing valuable resources and insights. I encourage you to engage actively with the material and your peers. Together, we will explore the fascinating mechanisms that underpin life, equipping you with the knowledge necessary for your future clinical practice

Rationale for the Course/ Department

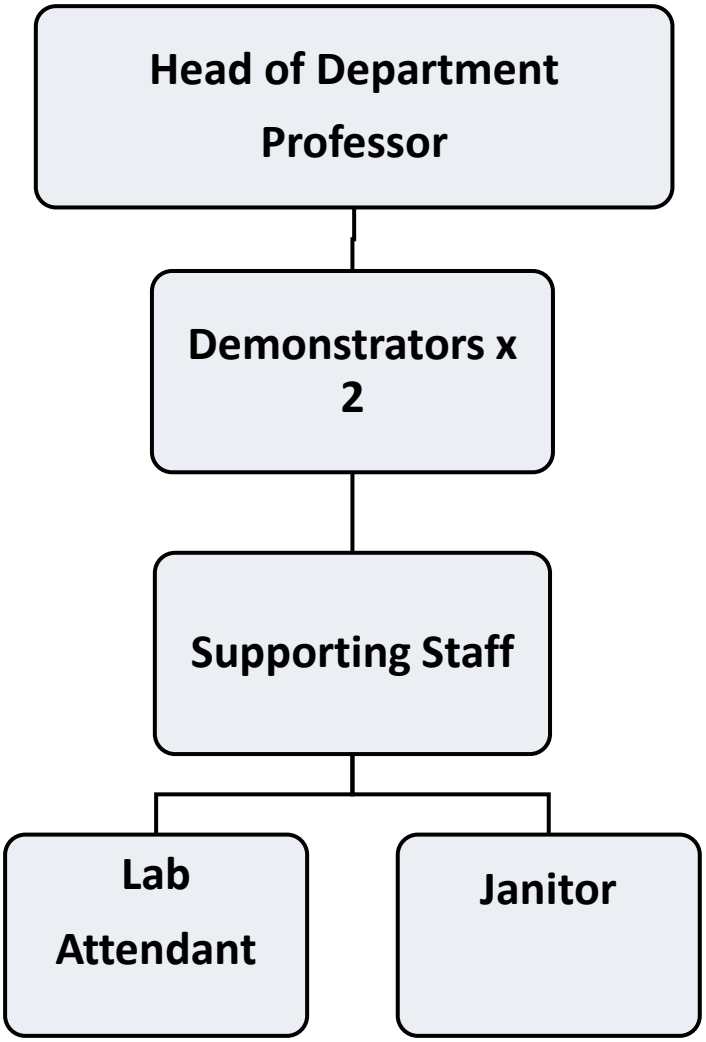
Physiology is a cornerstone of the Bachelor of Dental Surgery (BDS) curriculum, as it explores the functional mechanisms of the human body, particularly regarding oral health. Understanding physiological processes, such as digestion, respiration, and circulation, is vital for comprehending how systemic health affects dental conditions. Knowledge of neurophysiology is essential for effective pain management and anesthesia techniques. Additionally, physiology informs the impact of various diseases on oral structures and functions. By mastering these concepts, future dentists can make informed clinical decisions, optimize treatment plans, and enhance patient care, ultimately leading to improved outcomes in dental practice

Departmental Details

Head of Department	Dr. Saima Rizwan
Total Lectures	165
Total Tutorials/ Small Group Discussions	132

Physiology

Departmental Organogram



Course Instructors

S.No	Name	Designation
1	Dr. Saima Rizwan	Professor

Physiology

Subject Specific Learning Objectives

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1.	The Cell and its functions	**Knowledge** • Explain the structure of cell membrane Enlist the types of cell membrane proteins • Enumerate the functions of membrane proteins • Define and enumerate the functions of cell Glycocalyx • Discuss functions of Endoplasmic Reticulum, Golgi Apparatus, Lysosome, Peroxisomes, Mitochondria • Define Homeostasis • Explain control system of body by giving examples • Differentiate between Extracellular and Intracellular Fluids • Explain the positive and negative feedback mechanisms with examples • Discuss Ameboid and Ciliary movement • Enlist functions of cytoskeleton • Define and enlist types of endocytosis • Explain the mechanism of pinocytosis • Classify different transport mechanisms • Compare the composition of Na, K and Cl in extracellular and intracellular fluid • Define and enlist different types of diffusion • Explain the process of facilitated diffusion with the aid of diagram • Define and classify different types of active transport • Describe primary and secondary active transport with examples • Explain voltage and ligand gated channels with examples. • Discuss functions and significance of Na/K ATPase pump.	Large Group Discussion	MCQs, SEQs, VIVA
		Skill • Compare different types of microscopes Label parts of compound microscope, Demonstrate clinical uses • Use calibration, Demonstrate uses	Practical	OSPE
		Attitude • Time management		OSPE

		• Communication skills • Attendance • Active listening • Problem solving	Practical/ SGD	
15	**Locomotion**	**Knowledge** • Describe the Physiological anatomy of Neurons & classification of neurons • Explain the Physiological basis of membrane potential. • Explain diffusion potentials of Na & K. • Explain Physiological Basis of Nernst potential • Describe the Physiological basis of generation of RMP • Describe the ionic basis of an action potential • Discuss different stages of action potential • Explain the mechanism of conduction of Nerve impulse in myelinated and unmyelinated nerve fibers • Elaborate significance of saltatory conduction • Determine the physiological anatomy of skeletal muscles, general and molecular mechanism of muscle contraction. Walk-along theory • Explain energetics of Muscle Contraction, Characteristics and mechanics of whole muscle contraction, rigor mortis • Describe physiological anatomy of neuromuscular junction Transmission of nerve impulse across neuromuscular junction, excitation-contraction coupling, myasthenia gravis • Smooth Muscles: Document types & Structure; RMP & Action potential in smooth muscle, mechanical contraction, excitation contraction • Explain latch Mechanism and nervous and hormonal control of smooth muscle contraction, comparison of skeletal, smooth & cardiac muscle	Large Group Discussion	MCQs, SEQs, VIVA
		Attitude • Time management	Practical	OSPE
16	**Hematopoietic System**	**Knowledge** • Explain the Composition and Functions of blood; RBC Structure & Composition,	Interactive Lectures	MCQs, SEQs, VIVA

		Life span, Plasma proteins Erythropoiesis, Stages, and Regulation • Enumerate the types of normal hemoglobin. • Explain the role of Iron in Hemoglobin formation. • Hemoglobinopathies Iron metabolism • Define anemia, classify anemia, Relate the effects of anemia on circulatory system; Polycythemia: • Enlist Types, relate the effects on circulatory system cyanosis • Enlist Types of WBCs, summarize genesis, Normal Count, Life span, and Functions • Discuss Monocyte – Macrophages System, Functions of macrophages • Enumerate lines of Defense, Leukopenia, Leukocytosis, Leukemia, Lymphopenia • Give Classification of immunity, differentiate between Innate and acquired immunity. • Explain Humoral immunity & antibodies • Reproduce Cell mediated immunity. Allergy—define allergy, explain its types • Describe Hypersensitivity reactions • Explain Hemostasis Stages. Define Platelet Plug and mechanism of blood coagulation. • Explain prevention of blood clotting- intravascular anticoagulants, lysis of blood clots • Elaborate Bleeding disorders, Anticoagulants, Blood coagulation tests • Enumerate different blood group types. Explain the basis of ABO and Rh blood system • Discuss the Landsteiner law	Interactive Lectures	MCQs, SEQs, VIVA
		Skill • Illustrate extrinsic and intrinsic pathways for initiating clotting • Predict the normal range, relate increase and decrease count with clinical disease, Use formula • Demonstrator example, give units and predict normal range • Predict normal range • Predict normal range, relate ESR with clinical disease	Practical	OSPE/ Practical Performance

		• Predict the normal range, relate increase and decrease count with clinical disease • Produce blood smear and demonstrate uses • Predict the normal range, relate increase and decrease count with clinical disease • Apply knowledge of blood group to understand agglutination • Discover prolong bleeding time causes and diseases • Discover prolong clotting time causes and diseases		
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality	Practical	OSPE, VIVA
17	**Cardiovascular System Module**	**Knowledge** • Analyze physiologic anatomy of Cardiac Muscle, Properties of myocardium. • Explain Ventricular Action Potentials and Excitation contraction coupling • Describe SA node action potential: SA node as pace maker of heart abnormal pacemakers of heart • Cardiac Cycle- Document Pressure and Volume Changes in Ventricles, atrial waves • Explain Excitatory & Conductive System of Heart & its Control • Interpret Recording and interpretation of ECG, ECG leads • Analyze Abnormal ECG • Discuss Cardiac arrhythmias, Heart blocks, • Interpret Premature contractions, Flutter and Fibrillation, cardiac arrest • Explain Physical characteristics of circulation and its basic principles, inter-relationship of pressure • Define Blood flow and resistance, laminar and turbulent blood flow, resistance to blood flow, conductance of blood in vessels, Fourth- Power Law • Evaluate Arterial Pressure Pulsations, Veins & Their Functions	Large Group Discussion	MCQs, SEQs, VIVA

		• Summarize Acute Control of Local Blood Flow, vasodilator theory, oxygen lack theory, autoregulation by metabolic and myogenic mechanisms, endothelial derived constricting factors • Describe Nervous regulation of circulation, autonomic nervous system, vasomotor center • Short term regulation, Reflex Mechanisms for Maintaining Normal Arterial Pressure, baroreceptor & chemoreceptor reflex, atrial reflex, CNS ischemic response, Cushing reflex • Document The Renin-Angiotensin aldosterone system and Hypertension • Define Circulatory shock, stages of shock and types of shock. • Explain Venous return and its regulation Factors effecting venous return • Elaborate Control of Blood Flow in Skeletal Muscles at rest and during exercise Coronary circulation and its regulation and ischemic heart disease • Describe Cardiac Failure • Interpret Heart sounds and murmurs • Define Circulatory shock, enlist stages of shock and types of shock.			
		Skill • Inspect respiratory system, Observe palpation and auscultation • Demonstrate rate, rhythm, volume, character of arterial pulse, Observe Radio-femoral delay • Observe systolic and diastolic pressure, Interpret pulse pressure and mean pressure	Practical	OSPE/ Practical Performance	
		Attitude • Team work • Attendance • Punctuality • Self directed learning			
18	**GIT System**	**Knowledge** • Explain Physiological anatomy of GIT, Electrical activity, slow wave and spike potential, Enteric nervous system. Movements in GIT • Define Swallowing • Explain stages of swallowing • Elaborate Motor functions of stomach	Interactive lectures/ SGD	Practical	OSPE, VIVA

		• Elaborate Movements of small intestine • Elaborate Movements of large intestine • Discuss Defecation Reflex • Discuss Salivary secretion, Gastric secretions and Pancreatic secretions • Describe Vomiting and its control pathway • Define Peptic Ulcer, Achalasia • Enumerate functions of liver and gall bladder			
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Stress management	Interactive Lectures	OSPE, VIVA	
19	**Respiration**	**Knowledge** • Explain Organization and Functions of the Respiratory System. Mechanics of Pulmonary Ventilation • Explain Lung Volumes &Capacities, Physiologic shunt, Alveolar ventilation, Dead Space & Its Effect on Alveolar Ventilation, Functions of the Respiratory Passageway • Discuss Oxygen transport, oxygen hemoglobin dissociation curve, factors shifting oxygen-hemoglobin dissociation curve • Describe Carbon Dioxide transport, Haldane Effect, Carbon Dioxide Dissociation Curve, respiratory exchange ratio • Summarize Nervous control of respiration • Summarize chemical control of respiration • Explain Regulation of Respiration during Exercise, factors affecting respiration, Cheyne Stokes breathing • Describe Respiratory insufficiency/diseases, hypoxia, cyanosis, hypercapnia, dyspnea, artificial respiration • Explain Aviation, acute and chronic mountain sickness. Elaborate Space physiology and deep-sea diving	Large Group Discussion/ Interactive Lectures	MCQs, SEQs, VIVA	
		Skill			

		• Inspect respiratory system, Observe palpation and auscultation • Predict normal range, relate the decrease and increase count with clinical disease • Inspect respiratory system, demonstrate breath holding	Practical	OSPE/ Practical Performance
		Attitude • Punctuality • Time management • Attendance • Critical thinking	Practical/ SGD	VIVA/ OSPE
20	**Body Fluid and kidney**	• Elaborate Functions of Kidney, physiological Anatomy of Kidney & Bladder Micturition. Explain Micturition Reflex & its Abnormalities • Define GFR, Renal Blood Flow, Control of GFR & Renal Blood Flow, Autoregulation of GFR & Renal Blood Flow • Explain Urine formation, Tubular reabsorption with active & passive mechanism, Reabsorption & secretion along different parts of nephron & regulation Clearance method to quantify renal function • Outline Formation of dilute and concentrated urine, Counter current multiplier and exchange	Large Group Discussion/	MCQs, SEQs, VIVA
		Attitude • Time management • Communication skills • Team work • Attendance • Active listening	Practical/ SGD	OSPE
21	**Central Nervous System**	• Explain the role of the muscle spindle in voluntary motor activity clonus-oscillation- muscle jerks, flexor reflex and withdrawal reflex • Illustrate Motor cortex & corticospinal tract, Explain transmission of signals from cortex to muscles • Recall Cerebellum and explain its motor functions, Describe neuronal circuit • Discuss Basal Ganglia, Explain its motor functions and lesions • Describe Physiologic anatomy of cerebral cortex, Wernicke's area & Broca's area.	Large Group Discussion	MCQs, SEQs, VIVA

		• Discuss functions & disorder of cerebellum • Elaborate Functions of Limbic system and the hypothalamus • Define Sleep, explain two types of sleep, outline basic theories of sleep, Summarize Brain waves and EEG Epilepsy		
		Skill • Evaluate clinical aspects of cranial nerves • Evaluate clinical aspects of bulk & tone of skeletal muscle • Demonstrate ankle jerk and knee jerk • Demonstrate pupillary reflex and corneal reflex • Demonstrate Extinction, fine touch, position, stereognosis and vibration • Interpret route and receptors, Give clinical aspect • Demonstrate upper and lower neuron lesion • Demonstrate finger, nose, heel shin, Diadochokinetic, gait, tremor test •	Practical	OSPE/ Practical Performance
		Attitude • Time management • Communication skills • Punctuality • Active listening • Leadership • Stress management	SGD/ Practical	OSPE/ VIVA
22	**Special Senses**	**Knowledge** • Enumerate Physical principals of optics & refractive principals, explain errors of refraction • Discuss Accommodation & its mechanism, presbyopia, visual acuity fluid system of the eye • Recall Physiologic anatomy of retina, explain rhodopsin cycle- retinal visual cycle, describe excitation of rods, elaborate visual pathways and its lesions, • Summarize light and dark adaptation • Explain Color Vision and tricolor mechanism of color detection, Elaborate neural functions of retina	Interactive lectures	MCQs, SEQs, VIVA

		• Explain Organization and function of visual cortex, color detection Autonomic control of accommodation and papillary aperture, eye movements • Recall Tympanic membrane and explain ossicular system, describe functions of middle ear Cochlea, Elaborate functions of organ of corti, Explain Place principle, Summarize determination of loudness • Describe Central auditory mechanisms, auditory nervous pathway, hearing abnormalities • Recall Sense of taste, Explain Primary sensation of taste, recall sense of smell, Elaborate olfactory receptors and its pathway		
		Attitude • Time management • Communication skills • Punctuality • Active listening • Continuous improvement	Interactive lectures/ SGD/ Practical	OSPE
23	**Endocrinology**	**Knowledge** • Explain Chemical messengers Hormone secretion, transport, and clearance from blood • Explain Intracellular signaling • Recall Pituitary Hormones Growth Hormone & Explain its abnormalities • Elaborate Functions of posterior pituitary hormones • Explain Synthesis, secretion & metabolic functions of Thyroid Hormone • Describe Regulation of thyroid hormone and diseases of thyroid • Summarize Synthesis and secretion of ACTH, Elaborate Functions of Aldosterone & cortisol • Explain Abnormalities of ACTH secretions • Recall Insulin, explain its secretion & metabolic effects, Glucagon	Large Group Discussio n/	MCQs, SEQs, VIVA

		• Explain somatostatin & its functions. Explain Diabetes mellitus - type 1 & type 2 • Explain Ca+ & PO4- regulation in ECF & plasm, Vit. D. Parathyroid hormone Calcitonin		
		Attitude • Time management • Communication skills • Attendance • Punctuality • Active listening	SGD/ Lecture/ Practical	OSPE/ VIVA
24	**Autonomic Nervous System**	**Knowledge** • Explain Organization of ANS, Parasympathetic & Sympathetic System	Interactive lectures	MCQs, SEQs, VIVA
		Skill • Sketch the gross structure of bone • Illustrate the steps of bone remodeling	Practical	OSPE
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Continuous improvement	Practical	OSPE
25	**Skin and Body Temperature**	**Knowledge** • Elaborate Mechanisms & regulation of temperature, set point Abnormalities of temperature regulation, Heat Gain/Loss Mechanisms Skin Function	Interactive lectures	MCQs SEQs VIVA
		Skill • Interpret normal range, Define hypothermia and hyperthermia	Practical	OSPE/ Practical Performance
		Attitude • Communication skills • Team work • Attendance • Punctuality • Active listening	Practical/ Lecture	OSPE

Physiology

DEPARTMENTAL INVOLVEMENT IN INTEGRATED TEACHINGS

CORE SUBJECT: PHYSIOLOGY

	1ST YEAR	2ND YEAR	3RD YEAR	4th YEAR	EXTRA COURSES
Subject	**Oral Biology**				
Topic	Oral Physiology				
SLOs	• Discuss the physiology of taste • Demonstrate the physiology of swallowing • Explain the physiology of mastication & speech • Explain the physiology of pain & dental pain • Explain the physiology of Olfaction				
Subject	**Oral Biology**				
Topic	• Cytoskeleton				
SLOs	• Classify collagen • Discuss the synthesis & degradation of Extracellular Matrix • Enlist inherited diseases involving collagen				

List of Resource Books

- Text book of Medical Physiology by Guyton & Hall (14th Ed)
- Review of Medical Physiology (20th Ed) 2001 Ganong. Published by Appleton & Lange. ISBN 0838582826
- Physiology by Linda S. Costanzo
- Physiology by Mushtaq Ahmad Vol. (I & II)

BIOCHEMISTRY

Welcome Note by Head of Department

Welcome to the Biochemistry program! As the Head of the Department, I am excited to guide you through this fascinating journey of understanding the molecular mechanisms that underlie life processes. Biochemistry bridges biology and chemistry, providing insights into metabolism, enzymology, and genetic information. Our dedicated faculty is here to support your learning and foster critical thinking. This study guide is designed to enhance your understanding and encourage exploration. Embrace the challenges and discoveries ahead, as they will equip you with valuable skills for your future careers

Rationale for the Course/ Department

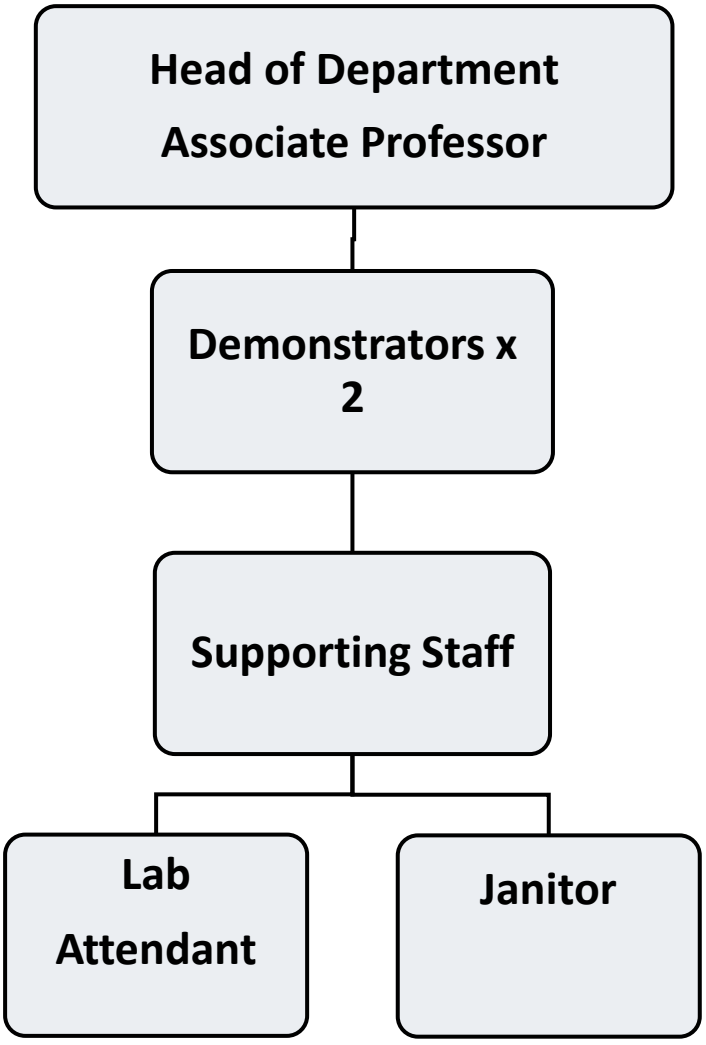
Biochemistry is essential for Bachelor of Dental Surgery (BDS) students as it provides a foundational understanding of the biochemical processes that affect oral health. Knowledge of metabolic pathways, enzyme function, and cellular signaling is crucial for diagnosing and treating dental diseases. Understanding the biochemical composition of saliva, dental tissues, and plaque formation helps in developing effective preventive strategies and therapeutic interventions. Furthermore, biochemistry informs the pharmacology of dental medications, aiding in safe and effective patient care. This interdisciplinary approach enhances clinical decision-making, enabling future dentists to integrate scientific principles into practice for improved patient outcomes.

Departmental Details

Head of Department	Dr. Afshan Bilal
Total Lectures	120
Total Tutorials/ Small Group Discussions	90

Biochemistry

Departmental Organogram



Course Instructors

S.No	Name	Designation
1	Dr. Afshan Bilal	Associate Professor

Biochemistry

Subject Specific Learning Objectives

S. No.	Topic	Learning Outcomes	MIT	Mode of Assessment
1.	**Basic aspects and Introduction**	**Knowledge** • Discuss elements of life, atomic and molecular composition of life, functional groups and polarity of molecules • Discuss elements of life, atomic and molecular composition of life, functional groups and polarity of molecules • Discuss special properties of water like hydrogen bonding, solvent properties, specific heat capacity, latent heat of vaporization, surface tension, metabolic water • Give an Introduction to macromolecules i.e. Carbohydrates, lipids, proteins and nucleic acids • Define common features of polymeric molecules	Large Group Discussion/ Interactive Lectures	MCQs, SEQs, VIVA
		Skill • Introduction to use of laboratory facilities / equipment including safety measures	Practical	OSPE / Practical performance
		Attitude • Time management • Communication skills • Attendance • Active listening • Problem solving • Leadership	Practical/ SGD	OSPE
2	**Water and pH**	**Knowledge** • Describe dissociation of water and pH scale, pH of various biological fluids. • Derive pH and log values. • Define Buffers, titration curve, concept of Ka and pKa and Isoelectric pH. • Highlight the process of formation of three-layered embryo and fate of germ layers. • Discuss importance of pH for biological systems. • Define Bohr effect and Optimum pH of enzymes. • Discuss Henderson Hasselback equation and its applications	Large Group Discussion	MCQs, SEQs, VIVA

		• Discuss body buffer systems: bicarbonate, ammonia, phosphate and proteins) and their mechanism of action • Define pH metry, isoelectric focusing, isoelectric pH and protein solubility. • Relate pH and drug absorption.		
		Skill • Prepare solutions (molar and normal) from various kinds of laboratory chemicals (solid and liquids) • Preparation of various kinds of buffer solution • Basic methods of laboratory calculations • Introduction and conversion of conventional and Sl measuring units.	Practical	OSPE / Practical performance
		Attitude • Time management • Attendance • Active listening	Practical	OSPE
26	**Cell and Signal Transduction**	**Knowledge** • Give organization and composition of eukaryotic and prokaryotic cells • Explain biochemical composition of cell membrane. • Discuss membrane asymmetry, glycocalyx, blood group antigens • Identify importance of cholesterol in membranes. • Describe diffusion (simple and facilitated), osmosis and osmotic pressure, transport of charged molecules and Gibbs-Donnan equilibrium • Outline Pores (aquaporins), channels and carriers • Explain active transport (primary and secondary), membrane pumps, cotransport and counter transport • Describe phagocytosis, pinocytosis, endocytosis and exocytosis • Enlist Cell markers • Discuss freeze/thaw cycles, homogenization, permeabilization, sonoporation, centrifugation, salting out, chromatography, dialysis, electrophoresis and southern blotting • Discuss ELISA, X-ray crystallography, NMR spectroscopy and mass spectrometry	Interactive Lectures	MCQs, SEQs, VIVA

		• Discuss lysosomal storage disorders (mucopolysaccharidoses and sphingolipidoses), disorders of Golgi apparatus (I-cell disease), mitochondrial disorders (mitochondrial encephalopathy lactic acidosis and stroke MELAS, Leber's hereditary optic neuropathy LHON), peroxisomal disorders (Zellweger syndrome, adrenoleukodystrophy ALD)." • Discuss types of signals. • Define gap junctions, autocrine, paracrine and endocrine signals • Enlist various types of receptors. • Explain ligand gated ion channels, G-protein coupled receptors, Catalytic receptors and intracellular receptors. • Discuss receptor tyrosine kinases. • Classify G-proteins. • Elaborate Adenylyl cyclase and cAMP cascade • Explain Phospholipase and IP3, DAG cascade • Discuss calcium calmodulin cascade • Describe paroxysmal nocturnal hemoglobinuria, hereditary pherocytosis, cystic fibrosis, methicillin resistant staphylococcus aureus (MRSA), metastasis (loss of cellular polarization and membrane asymmetry), Cholera toxin, pertussis toxin, liposome drug delivery system, drugs affecting cell membrane (nitrates, polymyxin B sulfate, gramicidin).		
		Attitude • Time management • Attendance • Active listening	Large Group Discussion	MCQs, SEQs, VIVA
27	**Chemistry of amino acids and proteins**	**Knowledge** • Discuss structure, characteristics and classification of amino acids based on R group, polarity, and nutritional value. • Identify the properties of carboxylic acid and amino groups. • Identify role of glycine and glutamate as neurotransmitters. • Elaborate the role of histidine in gastric acid production and allergic response. • Discuss amino acids as buffers.	Large Group Discussion	MCQs, SEQs, VIVA

		• Define titration curve, monoprotic, diprotic and triprotic acids • Outline properties of peptide bond. • Discuss biologically active peptides like Carnosine, anserine, glutathione, bradykinin, kallidin, angiotensin, oxytocin, vasopressin, encephalin • Chromatography (adsorption, partition, gel filtration, ion-exchange), electrophoresis and isoelectric focusing • Discuss composition, functions and classification of proteins • Highlight primary structure of proteins • Describe secondary, tertiary, quaternary and quinary structure of proteins • Discuss structure, types and biomedical significance of immunoglobulins • Discuss structure, types and biomedical significance of plasma proteins • Discuss alpha1 antitrypsin deficiency • Discuss Charcot Marie Tooth disease CMT, transmissible spongiform encephalopathy TSE/Creutzfeldt-Jakob disease and Alzheimer's. • Describe Beta amyloid and tau protein.		
		Skill • Tests to detect proteins / peptides / amino acids (Heat coagulation test, sulphoslicylic acid test, Hellers Ring test, and Ninhydrin test)	Practical	OSPE/ Practical Performance
		Attitude • Time management • Communication skills • Team work • Attendance • Punctuality • Critical thinking • Self directed learning	Practical	OSPE, VIVA
28	**Porphyrins and heme proteins**	**Knowledge** • Enlist Heme proteins. • Describe biosynthesis of heme Analyze the process & Pattern of shedding of teeth • Discuss structure of myoglobin. • Describe structure and types of hemoglobin.	Interactive lectures/ SGD	MCQs, SEQs, VIVA

		• Explain oxygen binding of myoglobin and hemoglobin (oxygen dissociation curves for both). • Enlist factors affecting and regulating the oxygen- binding capacity of hemoglobin • Discuss methemoglobin and methemoglobinemia's, sickle cell anemia/ hemoglobin S disease, hemoglobin C disease, hemoglobin SC disease and thalassemia • Describe degradation of heme along with synthesis, hepatic uptake, conjugation and excretion of bilirubin. • Identify fate of bilirubin in intestine • Discuss causes of hyperbilirubinemias along with the acquired and congenital disorders • Describe Jaundice and Kernicterus		
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Stress management		
29	**Chemistry of Lipids**	**Knowledge** • Classify lipids and give their general biological functions • Explain structure and importance of fatty acids, unsaturated fatty acids, their properties and significance. • Describe isomerism in fatty acids. • Highlight importance of Ω3, Ω6 fatty acids, trans fats and nutritionally essential fatty acids • Discuss the physical and chemical properties of fatty acids • Describe the structure, properties and significance of triacylglycerols • Discuss structure, properties and significance of phospholipids. • Describe lung surfactant, platelet activating factor and cardiolipin. • Identify enzymes involved in degradation of phospholipids. • Enlist types of glycolipids along with their significance and degradation	Large Group Discussion Interactive Lectures	MCQs, SEQs, VIVA MCQs, SEQs, VIVA

		• Discuss origin, half-life, potency, functions and clinical significance of prostaglandins, thromboxane and leukotrienes • Describe the role and properties of cholesterol and its related compounds (bile acids). • Describe lipid peroxidation and its significance • Enlist natural and synthetic antioxidants and their mechanism of action • Discuss leukodystrophies and sphingolipidoses. • Discuss role of Aspirin in prevention of myocardial infarction. • Elaborate the role of Leukotriene receptor antagonists in asthma.		
		Skill • To find out the presence of pure and impure glycerol in given solution • To find out the Greasy nature of lipid by spot test.	Practical	OSPE/ Practical Performance
		Attitude • Punctuality • Time management • Attendance • Self-directed learning • Critical thinking	SGD	VIVA/ OSPE
30	**Chemistry of Carbohydrates**	• Define and classify carbohydrates. • Discuss isomerism in monosaccharides • Discuss chemical and physical properties of carbohydrates • Discuss monosaccharides of biochemical importance • Discuss disaccharides of biochemical importance • Discuss oligosaccharides of biochemical importance • Discuss homopolysaccharides of biochemical importance • Discuss heteropolysaccharides of biochemical importance	Large Group Discussion/	MCQs, SEQs, VIVA
		Skill • Qualitative analysis of carbohydrates and proteins. • Tests to detect monosaccharides of biomedical significance like glucose	Practical	OSPE/ Practical Performance

		fructose and galactose. (Benedicts' test, salivanoff,s test, Osazoone test)		
		Attitude • Time management • Communication skills • Team work • Attendance • Active listening • Problem solving • Leadership	Interactive Lectures/ Practical	OSPE
31	**Enzymes**	**Knowledge** • Classify enzymes • Discuss properties of enzymes • Discuss mechanism of enzyme action • Describe the factors affecting reaction rate • Discuss Michealis –Menten and Lineweaver Burk plot and equation. • Identify various types of enzyme inhibition • Describe regulation of enzyme activity • Discuss isoenzymes and their clinical significance	Large Group Discussio n	MCQs, SEQs, VIVA
		Attitude • Time management • Communication skills • Punctuality • Active listening • Leadership • Stress management	SGD/ Practical	OSPE/ VIVA
32	**Vitamins**	**Knowledge** • Give definition, classification and requirement for humans of various vitamins • Enlist factors affecting the vitamin content of food • Discuss important dietary sources, RDA, intestinal absorption, transport, storage and diseases associated with water soluble vitamins • Discuss important dietary sources, RDA, intestinal absorption, transport, storage and diseases associated with fat soluble vitamins	Interactive lectures	MCQs, SEQs, VIVA
		Attitude • Time management • Communication skills • Team work	Interactive lectures/ SGD	OSPE

		• Punctuality • Active listening • Problem solving • Adaptability & flexibility • Leadership • Continuous improvement		
33	**Minerals**	**Knowledge** • Give introduction to minerals and trace elements • Discuss Calcium and phosphorus metabolism • Discuss Phosphorus, magnesium and sulfur • Discuss Sodium, potassium and chloride • Discuss Iron metabolism • Discuss Iodine and copper • Discuss Zinc, selenium, chromium, cadmium, manganese, and fluoride • Describe Iron deficiency anemia, hemochromatosis, Wilson disease, tetany, hypercalcemia. • Highlight Iodine deficiency and goiter. • Describe muscle weakness, neurologic defects and abnormal collagen in copper deficiency. • Discuss Cardiomyopathy (Keshan disease) in selenium deficiency • Identify growth retardation and impaired wound healing in Zinc deficiency	Large Group Discussio n/	MCQs, SEQs, VIVA
		Attitude • Communication skills • Team work • Attendance • Punctuality • Active listening • Continuous improvement	SGD/ Lecture/ Practical	OSPE/ VIVA
34	**Nucleotides and nucleic acids**	**Knowledge** • Discuss chemistry of purines and pyrimidines. • Explain structure, function and types of DNA along with packaging of DNA	Interactive lectures	MCQs, SEQs, VIVA

		• Discuss structure, function and types of RNA • Outline the biomedical significance of Purine and pyrimidine analogs as drugs		
		Attitude • Time management • Communication skills • Attendance • Punctuality • Problem solving • Continuous improvement	Lectures	OSPE/ VIVA
35	**Nutrition**	**Knowledge** • Discuss balanced diet. • Define dietary reference intakes, acceptable macronutrient distribution ranges, EAR, RDA, AI and UL • Discuss energy metabolism • Define and discuss metabolic rate, factors affecting metabolic rate and basal metabolic rate BMR • Calculate caloric requirement of a person • Explain biomedical significance of proteins in nutrition. • Identify biomedical significance of lipids in nutrition • Discuss biomedical significance of carbohydrates in nutrition • Enlist the nutritional requirements in pregnancy, lactation, infancy and old age • Explain obesity and metabolic syndrome • Discuss Protein energy malnutrition (Marasmus and Kwashiorkor) • Describe the effects of deficiency of essential fatty acids, anorexia nervosa and bulimia nervosa • Explain how hemorrhoids, chronic constipation and diverticular disease of colon is caused due to low fiber diet	Interactive lectures	MCQs SEQs VIVA
		Attitude • Communication skills • Attendance	Interactive Lectures	

		• Punctuality • Active listening		
36	**Extracellular Matrix (ECM)**	**Knowledge** • Discuss composition and functions of ECM • Describe structure, biosynthesis and degradation of collagen • Describe structure, biosynthesis and degradation of elastin. Identify role of alph-1 antitrypsin in elastin degradation. • Give major biochemical differences between collagen and elastin • Describe structure, biosynthesis and degradation of Fibrillin-1, Fibronectin and Laminin • Discuss structure, classification, functions and distribution of glycosaminoglycans and proteoglycans • Discuss Leukocyte adhesion deficiency LAD II • Collagenopathies (Ehlers Danlos syndrome and osteogenesis imperfect) and Mucopolysaccharidoses	Interactive lectures	MCQ, SEQ, VIVA
37	**Bioenergetics & Biological Oxidation**	**Knowledge** • Discuss endergonic and exergonic reactions, free energy, free energy change, ATP and other compounds as carriers of energy • Discuss electron transport chain along with its components and organization • Identify reactions of electron transport chain • Explain redox potential • Describe methods of electron transfer among the components of electron transport chain and energy release during electron transport • Identify Inhibitors and uncouplers of electron transport chain • Elaborate the process of ATP synthesis in ETC • Define chemiosmotic hypothesis of oxidative phosphorylation	Interactive lectures	MCQs, SEQs, VIVA

38	**Carbohydrate metabolism**	**Knowledge** • Discuss the reactions of aerobic and anaerobic glycolysis occurring in RBCs and other tissues. • Outline the Biomedical significance and energy yield of aerobic and anaerobic glycolysis. • Describe substrate level phosphorylation • Discuss the regulation of glycolytic pathway. • Highlight the metabolic fates of pyruvate • Discuss the reactions of TCA cycle and their regulation along with energy yield • Identify the importance of TCA cycle and its amphibolic role • Discuss the reactions of gluconeogenesis using pyruvate as precursor and its regulation • Explain the entrance of amino acids into TCA cycle. • Highlight the intermediates of TCA cycle • Discuss the role of glycerol and other compounds as gluconeogenic precursors • Identify the role of gluconeogenesis in plasma glucose level regulation, cori cycle and glucose alanine cycle • Explain the synthesis and importance of UDP glucose • Discuss the reactions of glycogenesis and glycogenolysis • Explain regulation of glycogen synthase and glycogen phosphorylase. • Identify the importance of allosteric regulation of glycogen phosphorylase 'a' (a plasma glucose sensor) by plasma glucose • Discuss the reactions of oxidative and nonoxidative phases of HMP pathway • Identify the importance of HMP pathway along with uses of NADPH.	Interactive lectures, / SGS	MCQs, SEQs, VIVA

		• Discuss the reactions of uranic acid pathway along with its biologic importance • Explain the metabolism of fructose and galactose • Discuss sorbitol metabolism • Describe the synthesis of lactose • Explain the regulation of plasma glucose via hormonal (insulin, glucagon, growth hormone, epinephrine and cortisol) and nonhormonal factors. • Identify the role of various metabolic pathways in glucose level regulation • Discuss hypoglycemia and hyperglycemia along with their important causes and clinical manifestations • Discuss Lactic acidosis. • Identify the causes of genetic deficiency of pyruvate kinase and pyruvate dehydrogenase. • Explain the disorders of glycogen metabolism. • Highlight the G6PD deficiency. • Identify the effect of hyperglycemia on sorbitol metabolism. • Explain Essential fructose and hereditary fructose intolerance. • Describe galactokinase deficiency and classic galactosemic • Enlist various types of diabetes mellitus along with its clinical manifestations. • Outline the metabolic changes in type 1 and type 2 diabetes mellitus • Discuss the diagnosis of diabetes mellitus		
16	**Metabolism of lipids**	**Knowledge** • Describe production of cytosolic acetyl CoA, fatty acid synthase multienzyme complex, reactions of cytosolic fatty acid synthesis • Describe elongation of fatty acid chain, synthesis of polyunsaturated fatty acids and regulation of fatty acid synthesis	Interactive lectures, / SGD	MCQs, SEQs, VIVA

		• Outline the synthesis and storage of Triacylglycerol • Discuss the mobilization of triacylglycerols along with its regulation • Define activation of fatty acid. • Discuss the translocation of fatty acyl CoA into mitochondrial matrix. • Describe the reactions of β oxidation of saturated and unsaturated fatty acids along with its energy yield • Outline fate of acetyl CoA • Describe all the other types of fatty acid oxidation (α oxidation, Ω oxidation and oxidation of odd carbon fatty acids • Discuss the reactions of hepatic ketogenesis and utilization of ketone bodies by extrahepatic tissues • Describe ketoacidosis and regulation of ketogenesis • Discuss the synthesis of eicosanoids along with its regulation and biologic importance of eicosanoids. • Outline the cyclooxygenase and lipoxygenase pathway. • Discuss Inhibitors of COX-1 and COX-2 • Highlight the synthesis of phospholipids (phosphatidylcholine and phosphatidylethanolamine), synthesis of glycerol and ether phospholipids (cardiolipin and platelet activating factor) • Discuss degradation of phospholipids • Describe biosynthesis of ceramide, sphingomyelin and gangliosides • Explain degradation of sphingolipids • Elaborate the reactions and regulation of cholesterol biosynthetic pathway • Identify the fate and functions of cholesterol in the body • Highlight the biosynthesis and fate of bile acids in the body and their significance in health and disease		

		• Discuss the synthesis, transport and fate of chylomicrons, VLDL, IDL, LDL and HDL • Explain the effects of deficiency of lung surfactant. • Identify Sphingolipidoses • Enlist the disorders related with impairment of lipoprotein metabolism • Highlight the atherogenic effect of oxidized LDL		
17	**Metabolism of proteins**	**Knowledge** • Highlight the process of protein turnover in the body • Discuss nitrogen balance • Explain the removal of nitrogen from amino acids by transamination and deamination • Identify the sources of ammonia in the body. • Discuss the fate of ammonia • Describe the reactions and regulation of urea cycle • Give an overview of amphibolic intermediates formed from the carbon skeletons of amino acids • Outline the concept of glucogenic and ketogenic amino acid • Discuss metabolism of individual amino acids like glycine, cysteine, arginine, proline, phenylalanine, tyrosine, histidine, tryptophan and methionine • Describe the metabolism of epinephrine and norepinephrine, creatine, creatinine, histamine, gamma aminobutyrate serotonin, melatonin and melanin • Identify ammonia toxicity • Highlight the disorders of the urea cycle. • Outline the causes and salient features of important metabolic defects in amino acids metabolism like phenylketonuria, maple syrup urine disease, histidinemia, alkaptonuria, cystathioninuria,	Interactive lectures, / SGD	MCQs, SEQs, VIVA

		homocystinuria, hyperprolinemia, cystinuria, cystinosis, tyrosinemias and albinism		
18	**Integration and regulation of metabolic pathways**	**Knowledge** • Highlight basic concepts of intermediary metabolism • Give an Introduction to anabolic and catabolic pathways • Give an overview of regulation and integration of various metabolic pathways	Interactive lectures, / SGS	MCQs, SEQs, VIVA
		Skill • Collection and storage of urine samples for laboratory analysis, and physical and chemical analysis of urine to detect normal and abnormal constituents • Writing a urine report and interpretation of urine analysis	Practical	OSPE/ Practical Performance
19	**Metabolism of nucleotides**	**Knowledge** • Discuss the de novo synthesis of purines and pyrimidines • Identify Salvage pathways • Describe degradation of purine and pyrimidine nucleotides • Explain disorders associated with purine and pyrimidine metabolism like adenosine deaminase deficiency, gout, purine nucleoside phosphorylase deficiency, Lesch Nyhan syndrome	Interactive lectures, / SGD	MCQs, SEQs, VIVA
20	**Biochemical Genetics**	**Knowledge** • Identify the structural basis of cellular information. • Discuss the reactions of DNA replication in eukaryotes and prokaryotes • Discuss types of damage to DNA and DNA repair • Describe the steps in the transcription of eukaryotic and prokaryotic genes • Explain reverse transcription in retroviruses	Interactive lectures/ SGD	MCQs, SEQs, VIVA

		• Describe post transcriptional modifications (processing) of RNA • Explain AIDS • Identify the genetic code and components required for translation • Outline composition of eukaryotic and prokaryotic ribosomes • Discuss steps in protein synthesis • Explain post translational modifications • Identify the genetic basis of disease and mutations • Discuss the regulation of gene expression in prokaryotes and eukaryotes • Highlight gene amplification • Identify oncogenes and their role in carcinogenesis • Highlight the mechanism of activation of protooncogenes. • Elaborate the mechanism of action of oncogenes, oncogenic viruses & tumor markers • Discuss basic information and biomedical importance of molecular biology techniques. • Highlight DNA isolation, recombinant DNA technology, cloning, polymerase chain reaction, hybridization and blotting techniques • Identify the role of biotechnology in screening, diagnosis, therapeutics and forensic evidence		

RAHBAR COLLEGE OF DENTISTRY

DEPARTMENTAL INVOLVEMENT IN INTEGRATED TEACHINGS

CORE SUBJECT: BIOCHEMISTRY

	1ST YEAR	2ND YEAR	3RD YEAR	4th YEAR	EXTRA COURSES
Subject	**Oral Biology**				
Topic	Saliva				
SLOs	• List down the biochemical composition of saliva • Enlist the functions of saliva				
Subject	**Oral Biology**				
Topic	Cytoskeleton				
SLOs	• Classify collagen • Discuss the synthesis & degradation of collagen • Enlist inherited diseases involving collagen				

List of Resource Books

- Harper's Illustrated Biochemistry by Murrary RK, Granner DK and Rodwell VW, latest edition, McGraw Hill
- Lippincott's Illustrated Reviews: Biochemistry by Harvey R and Ferrier D, Latest edition, published by Lippincott Williams & Wilkins
- Clinical Chemistry and Metabolic Medicine by Martin A. Crook, latest edition, Edward Arnold (Publishers) Ltd
- Practicals and Viva in Medical Biochemistry by Dandekar SP and Rane SA, latest edition, published by Elsevier.

ISLAMIYAT & PAKISTAN STUDIES

A. ISLAMIYAT

1. Fundamental Beliefs and Practices of Islam.
    - Tauheed (unity of Allah), Risalat (Finality of the Prophet hood), Akhirat (Day of judgement).
    - Salat, Soum, Zakat, Hajj and Jehad
2. Need of religion and its role in human life.
3. Morality in Islam
    - Concept of morality
    - Concept of morality and faith
    - Islamic principles and methods of character- building
4. Rights of individuals in Islam.
5. Quran as a guide for the modern society and scientific development.
6. Holy prophet (PBUH) and his life.
7. Islamic concept of state.
8. Islam and society
9. Importance of Rizk-e-Hilal.
10. Contribution of Islamic scholars in science and medicine.

B. PAKISTAN STUDIES

1. Ideology of Pakistan
    - Definition and elucidation.
    - Historical aspects
    - Ideology of Pakistan in the light of speeches and sayings of Allama Iqbal and Qaid-e Azam
2. Pakistan movement
    - Basis for the creation of Pakistan
    - Historical developments: 1857-1947.
3. Political developments in Pakistan since 1947.
4. Land and people of Pakistan.
    - Geography
    - Society
    - Culture
    - Natural resources
    - Health and education with reference to characteristics trends and problems.

List of recommended books:

Pakistan Studies:

- Ideological orientations of Pakistan by Sharif Al Mujahid.
- Struggle of Pakistan by I.H.Qureshi.
- The making of Pakistan by Richard Symond.

Islamiyat & Pakistan Studies

Islamiyat:

- Introduction to Islam by Dr. Hamidullah
- Islam: Its meaning and message by Dr Khursheed Ahmed.

Teaching & Training Schedule:

Planner document, being given separately, details day to day teaching & training schedule for the Academic Year.

ASSESSMENT POLICY AND PLAN

Assessment Policy & Plan

Aim: To provide a comprehensive and fair assessment system that accurately reflects student learning, development, and preparedness for professional practice in dentistry.

Objectives:

- Ensure assessments are aligned with learning objectives and curricular outcomes.
- Utilize a variety of assessment methods to evaluate different competencies.
- Maintain high standards of fairness, consistency, and transparency in assessments.

1. Responsibility

All faculty and staff involved in administering and supervising examinations and assessments are responsible for:

- Ensuring adherence to assessment procedures.
- Conducting examinations and assessments under conditions that are consistent and fair to all students.

2. Principles

- Assessments in the BDS program at RCoD will be aligned with student learning objectives and course activities, including both formative and summative assessments.
- These assessments will follow the examination regulations of the University of Health Sciences (UHS).
- The university shall appoint an external examiner for the concerned exam.
- The institute will manage in-house assessments, while professional examinations will be conducted by UHS.
- Marks allocation to internal and external examiner shall be as per the university instructions of the concerned subject.
- Standardized procedures will be applied across all courses.

3. Scope

This policy applies to all undergraduate students registered in the BDS program at RCoD

4. Assessment Policy

- Each student must appear in the yearly professional exam of all subjects specific for that particular, to qualify for the successive year.
- There is continuous assessment throughout each year through (end of term) block exam, send-ups and professional Exam.
- Assessment procedures are as follows;

Types of Assessment Procedures (Table 1)

1. **Formative Assessments:**

    - Formative assessments, conducted regularly throughout the term, provides feedback to students with the aim of enhancing their learning and improving their performance in summative evaluations.
    - It is carried out informally and as required during and after lectures (e.g., 1- minute feedback, problem-based questions, quizzes), tutorials (e.g., question and answer sessions), case-based discussions, written assignments, and class presentations.
    - Log books contain rubrics for continuous self-assessment of the practical /Clinical sessions, as well as formative assessments.
    - Portfolio development is also promoted and assessed as part of the formative evaluation process.
    - Reflection is a mandatory part of all laboratories, pre-clinical and clinical exposures
    - Regular feedback sessions are held after each term examination (block exam) to aid in improving student performance.

2. **Summative Assessments:**

    - Conducted as end term exam (Block Exam) carrying 4% weightage to be included in a total of 10% within internal assessment. Each exam shall consist of theory and practical examination.
      The division of weightage shall be as follows.

  - Written exam consists of MCQs & SEQs, carrying 50% weightage.
  - Practical exam consists of OSPE/OSCE and structured viva, carrying 50% weightage.
- Marks of each exam (End term) are included in internal assessment.
- Research carries 1% weightage in internal assessment.
- Send up carries 1% weightage in internal assessment
- Attendance carries 2% weightage in internal assessment, with equal contribution of (1%) each, of lecture & practical/clinical sessions.
  - Minimum required attendance = 85% = 2% weightage int assessment.
- Generic competencies carry 2% weightage in internal assessment. (Table 2)
- The passing percentage for each exam is 50%.
- Candidates failing to gain passing scores in annual and supplementary exam, shall be detained in the existing year

3. Islamic Studies/ Civics and Pakistan Studies

- Islamic Studies/Civics and Pakistan Studies will be assessed in first professional examination.
- The paper will carry 100 marks in total. Islamic Studies contains 60 marks and Pakistan Studies carries 40 marks.
- In Islamic studies part, there will be three LEQ to be attempted out of five LEQs, carrying 20 marks each.
- In Pakistan studies part, there will be two LEQ to be attempted out of four LEQs, carrying 20 marks each.

Note: Islamic studies is for Muslims and civics is for non-Muslims.

	Block - 1	**Block – II**	**Block - III**	**Send up Examination**
Subject 1				
Subject 2				
Subject 3				
Subject 4				

4. Research Assessment Plan (Table 1)

- A research coordinator of each year shall submit a report in each block about the progress of each student of the given research project.
- Completion of each step in respective year shall score for each respective year.
- Research coordinator of each year shall submit the report to Director, Research & Development cell & Department of dental education.
- Department of dental education shall communicate the report to each internal examiner for inclusion in respective internal assessment of each year

Table 1: Research Assessment Plan

Sr. No.	Status	Code	Year of completion	Score
1	Group formation, Topic Selection, Synopsis Writing	Code 1	1ST Year	(0.33, 0.33, 0.33) = 1
2	Proposal submission & approval by ERC & TRC with certificates.	Code 2	2nd year	(0.33, 0.33, 0.33) = 1
3	Data Collection & Analysis	Code 3	3rd year	(0.50, 0.50) = 1
4	Manuscript writing, Reviewing and Editing	Code 4	Fourth year	(0.50, 0.50) = 1
5	Article submission & Publication	Code 5	House job	(0.50, 0.50) = 1

5. **Assessment of Generic Competencies (Table 2)**
   Total weightage in internal assessment = 2%

Table 2: Assessment of Generic Competencies*)

Competencies	Weightage in competencies assessment (2%)	Components	Score
Professionalism	3	Communication skill	0.50
		Time management	0.50
		Ethics & integrity	0.50
		Teamwork	0.50
		Problem solving skills	0.50

		Empathy in patient Care	0.50
Critical thinker	2	Analysis	1
		Inference	1
Creativity	1	Innovation	1
Leadership	1	Vision & Strategy	0.5
		Decision making	0.5
Emotional intelligence	1	Self-regulation	1
Life-long learner	2	Curiosity	1
		Self-directed learning	1

- Marks obtained to be divided with 10 to get score (Y) out of 100
- In case the total marks of exam are different from 100 use the following formula
- (Y/100)x Total marks

Table 3: Key for assessment of generic competencies

Criteria	**Unsatisfactory**	**Needs Improvement**	**Satisfactory**	**Exemplary**
Communication Skills	Incoherent, unclear, or inappropriate communication	Communication is often unclear or lacks clarity	Communicates effectively and professionally	Communicates with exceptional clarity, persuasiveness, and adaptability
Time Management	Frequently misses deadlines, fails to prioritize tasks	Occasionally misses deadlines, struggles with prioritization	Meets deadlines consistently, manages time effectively	Excels at time management, consistently exceeds expectations
Ethics and Integrity	Demonstrates unethical behavior, lacks integrity	Occasionally exhibits questionable behavior, may compromise integrity	Adheres to ethical standards, maintains integrity	Exemplifies ethical behavior and integrity in all interactions
Teamwork	Reluctant to collaborate, works independently	Contributes to the team but may have difficulty working with others	Works effectively as part of a team, contributes positively	Leads and inspires the team, fosters a collaborative environment
Problem-Solving	Avoids challenges, unable to find solutions	Struggles to solve problems independently, needs guidance	Solves problems effectively with occasional guidance	Consistently identifies and solves complex problems creatively and efficiently

Patient Care	Neglects patient needs, provides substandard care	Provides adequate patient care but may lack empathy or compassion	Delivers high-quality patient care, demonstrates empathy	Excels at patient care, consistently goes above and beyond
Critical thinker: Analysis	Unable to identify key components or relationships	Identifies some components but struggles to analyze relationships	Analyzes information effectively, identifies key components and relationships	Excels at analysis, breaks down complex information into its constituent parts and evaluates their significance
Critical thinker: Inference	Makes unfounded or illogical conclusions	Draws some inferences but may lack supporting evidence	Draws logical inferences based on evidence	Excels at inference, draws insightful and well-supported conclusions
Creativity/Innovation	Lacks innovative ideas, relies on	Shows some innovation but may	Demonstrates innovation, presents	Excels at innovation, generates

6. Complete Assessment Criteria (Table 4)

Types of Assessment		**Weightage**	**Frequency and Time**	**Methods/ Tools for Assessment**
Formative		-	Informally during and after the session.	Class tests (MCQs, SEQs), Class presentations, Assignments,Tutorials, Case Based Discussions, Problem Based Learning, Portfolios
Summative	Internal Assessment	10 %	Block exam (4%) Research (1%) Send up score. (1%) Attendance (2%) Lecture Clinical/ Lab	MCQs (one best answer), SEQs, OSPE (non-clinical years), OSCE (clinical years), Simulated patients and Phantom head lab procedures, Viva Voce, Logbook and

			Generic competencies (2%)	clinical quotas. Assessment of generic competencies through rubrics
	Univ e rsity Exam	90 %	Once at the end of academic year	MCQs (one best answer), SEQs, OSPE (non-clinical years), OSCE (clinical years), Logbooks and Clinical cases quotas,Viva Voce

7. Assessment Format

Each end of term (block exam) written and practical/clinical exam assessment format will be as follows:

Written assessment:

End of term (Block) assessment format:

MCQs	20 MCQs(20mins)	20 marks
SEQs	10 SEQs of 3 marks each	30 marks
Total marks	50	

Send-up and Prof Assessment format:

Major Theory Exam: 3 hours

MCQs	45 MCQs (45 mins)	45 marks
SEQs	15 SEQs of 3 marks each (2 hour 15min)	45 marks
Total marks	90 marks	

Minor Theory Exam: 2 hour 30 min

MCQs	21 MCQs (30 mins)	21 marks
SEQs	8 SEQs of 3 marks each (2 hour)	24 marks

Total marks 45 marks

a. MCQs format

- MCQs in all exams will be single best type.
- There will be five options in each MCQ.
- There will be no negative marking.
- MCQs will be of C2 and C3 level.

b. SEQ Format

- SEQs will be based on major content areas of the respective subject.
- Each SEQ carries 3 marks.

c. Oral/ Practical/ Clinical Exam format in Send Up

Major Subjects

Oral and practical Examination shall have 90 marks

Minor Subjects

Oral and Practical Examination shall have 45 marks

Practical/Clinical assessment will be done with OSPE/OSCE stations with the weightage as mentioned above.

d. Marks Distribution

Major Subjects

- Total marks of each major subject = 200
- Written assessment marks = 90
- Oral/Practical marks = 90
- Internal Assessment marks = 20

Minor Subjects

- Total Marks of each minor subject=100
- Written assessment marks= 45
- Oral/Practical marks= 45
- Internal Assessment marks=10

5. Assessment

Planning A:

Planning Process

- **Coordinator Responsibility:** Session coordinators will develop consensus among subject heads for block tests and (send-up) at the session's start, with final approval by the Principal of RCoD, to be included in the Academic calendar.
- **No Overlap:** Ensure that no overlap of class tests occurs between different subjects.
- **Learning Objectives:** Each course will outline learning objectives and give details on how students' achievement of objectives will be assessed.
- **Syllabus Assessment Plan:** Each department will develop a plan according to the Table of Specification, including methods, timing, and contributions to the final mark of all assessments.
- **Table of Specification:** Each department will follow the ToS created by the university UHS.
- **Discussion with Specialists:** Discuss assessment planning documents with Subject Specialists to ensure appropriate curricular representation.

6. Examination Development and Administration

Development Process

- **Question Pool:** Course directors, with teaching faculty, will develop a departmental assessment question pool.
- **Revisions:** Course directors will revise question items before submitting in a password protected flash drive to department of dental education. The questions will be checked and transferred to a computer with no internet connectivity.
- **Finalization:** Department of dental education shall approve the formatting of reviewed questions, two weeks prior to the assessment date.
- **Question paper printing & Answer sheets:** Course directors will collect the printed papers with answer sheets in sealed envelopes from department of dental education on the day of examination.
- **Conduct of exam:** The seals of papers shall be opened in the examination halls in the presence of candidates and two invigilators. The whole activity shall be monitored.

- **Post-Item Analysis:** Post-item analysis of MCQs will be done using OMR, based on the analysis, the MCQs will be modified or eliminated from future exams. Also, re- scoring if a significant number of items are problematic.
- **Results Notification**: Results will be notified to the students within two weeks of the examination.
- **Post-Examination Feedback**: Test discussions and feedback after each assessment will be provided.

7. Eligibility Criteria

A. Attendance

- Minimum 85% attendance of all educational activities i.e. lectures, SGDs/tutorials, practical/clinicals, official symposia, co-curricular/extra-curricular activities including sports day and community visits.
- Leave is considered an absence unless supported by valid documentation

B. Supplementary Students

- Supplementary students must attend classes of the new academic session for better subject orientation.
- Lecture attendance will be 80%, counted immediately after the supplementary theory exam

C. Detained Students

- Must pass all end of term (block exams) and send-up tests and attend planned lectures.
- Detained hostel students' lecture policies may vary with the Principal's permission

8. Assessment

- Pass mark is 50% of total test scores for each subject.
- Send-ups must be passed.
- Academic evaluations will ensure consistent assessment and feedback processes.

9. Individual Assessment Criteria

- Faculty will review individual assessments regularly to determine student progression.
- The academic coordinator will offer remediation for underperforming students.
- Remediation should occur in the summer break after summative assessments.
- Parent-teacher meetings will be held for underperforming students at designated times.

10. Feedback

Faculty will provide feedback after each block and at conclusion of an academic year.

- Formative feedback during each preclinical course/module.
- Mandatory feedback for major exams (like end of term) block exams.
- Clinical test feedback at the end of each rotation.

Students should review assessments by contacting the course director.

11. Appeal Mechanism for Results

- Students can apply for rechecking of results (block exam) within two working days of result declaration
- The application will be submitted to the Department of Dental Education and will be approved by the principal RCoD.
- Applications received after that will not be entertained.
- The answer sheet will only be shown to the student.
- Response after the appeal of the result rechecking will be declared within one week.
- The rechecking of professional exam will be according to UHS policy.

12. Quality Control

- Collaborating closely with the Student Affairs and Quality Assurance Committee can facilitate the resolution of any issues, contributing to successful outcomes.
- Data from assessments will be leveraged to improve the effectiveness of academic staff, the performance of students, the quality of courses, and the

institution's overall operations.

The Department of Dental Education will carry out frequent evaluations of academic activities and ensure the implementation of this policy by keeping comprehensive records of assessment data.

Rahbar College of Dentistry

Research Methodology Teaching Schedule For BDS

RAHBAR COLLEGE
OF DENTISTRY

DIRECTOR RESEARCH & DEVELOPMENT
PROF. DR. HINA ZAFAR RAJA
RAHBAR COLLEGE OF DENTISTRY

No. 38/RCoD/R&D/ 07 /2024 Dated:11th November, 2024

To: Principal Rahbar College of Dentistry, Lahore

Info: All HODs

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Research Methodology Teaching Schedule for BDS

S. No.	Topics	Learning Objectives	Facilitator	Level of Students	Instructional Strategy	
1	Introduction to Research Methodology	• Discuss the importance of research in dentistry • Describe the components of research paper	Prof. Dr. Hina Zafar Raja Dr. Fahad Mehtab Dogar	1st Year	Interactive Lecture SGD	
2	Literature Review	• Perform Literature Search • Perform Review of Literature	Dr. Maira Mubashar Dr. Shaher Bano	1st Year	SGD	
3	Ethical Considerations in Research	• Comprehend the importance of informed consent and confidentiality in research. • Describe the Ethical approval process	Dr. Muhammad Saad Ullah Dr. Hajra Talat	1st Year	Interactive Lecture	
4	Types of Research	• Describe types of research • Compare Descriptive and Experimental studies	Dr. Ehsan Rathore Dr. Hira Anjum	1st Year	Interactive Lecture	
5	Study Designs	• Describe Cross-sectional, Longitudinal and Case-Control studies. • Describe Randomized Controlled Trials (RCTs)	Dr. Bushra Mazhar Dr. Maira Mubashar	1st Year	Interactive Lecture/ SGD	Synopsis Writing
6	Formulating Hypotheses	• Develop clear, measurable research questions/ objectives • Develop null and alternative hypotheses	Prof. Dr. Hina Zafar Raja Dr. Fahad Mehtab Dogar	1st Year	Interactive Lecture	
7	Inclusion & Exclusion Criteria	• Establish selection criteria of a research paper	Dr. Shaher Bano	1st Year	Interactive Lecture	
8	Sampling Techniques	• Describe the importance of sampling methods. • Determination of Sample size and its importance.	Dr. Muhammad Saad Ullah Dr. Hajra Talat	1st Year	Interactive Lecture	
9	Reference Manager	• Utilize End-Note referencing software	Dr. Ehsan Rathore	1st Year	Interactive Lecture &	

					Workshop	
10	Plagiarism Management	• HEC Policy for plagiarism • Interpret TURNITIN reports	Dr. Hira Anjum Dr. Bushra Mazhar	1st Year	Interactive Lecture	
11	Research Instrument Development Process	• Develop a research instrument • Assess the reliability and validity of data collection tools (data process, scope, specificity, anonymity)	Prof. Dr. Hina Zaafar Raja Dr. Fahad Mehtab Dogar	2nd Year	Assignments	Research Project
12	Statistical Analysis	• Describe basic concepts of Biostatistics • Utilize the basic tools of SPSS software for data analysis (SPSS) • Perform the basic statistical tests (Descriptive, Experimental; Chi-square & ANOVA)	Dr. Muhammad Saad Ullah Dr. Maira Mubashar Dr. Shaher Bano	2nd Year	Hands on Workshop	
13	Results	• Deduct the results of descriptive study designs		3rd Year	SGD/Assignments	
14	Discussion	• Interpret results and write discussion of a research project		3rd Year	SGD Assignments	
15	Types of Publication	• Describe the hierarchy of scientific publications		3rd Year	SGD/Assignments	
16	Manuscript	• Writing of well-structured manuscript and reviewing & editing it		4th Year	SGD/Assignments	
17	Article submission & Publication	• Comprehend the article submission & publication process • Identify target journals		4rth year	SGD/Assignments	

Prof. Dr. Hina Zafar Raja
Director Research & Development Cell
Rahbar College of Dentistry