



MODULE 1
FOUNDATION MODULE
1ST YEAR BDS

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Vision & Mission

Khyber Medical University (KMU) Vision:

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Medical University (KMU) Mission:

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

Institute of Health Professions Education & Research (IHPER) Mission:

To produce leaders, innovators and researchers in health professions education who can apply global knowledge to resolve local issues.

Teaching Hours Allocation

Table 2: Hours allocation for different subjects

S. No	Subject	Hours
1.	Anatomy	49
2.	Oral biology (oral histology and tooth morphology)	23
3.	Physiology	13
4.	Biochemistry	29
5.	Pathology	2
6.	Pharmacology	2
7.	Community & Preventive dentistry	4
Total		122

Themes for Foundation Module

S#	Theme	Duration in Weeks
1.	Orientation week	1 week
2.	Basic unit of life: The Cell	1 week
3.	Development of Human body & Human Dentition	1 week
4.	Organization of Human Body & Human Dentition	2 week
Total		5 weeks

Learning Outcomes

By the end of this module, the students should be able to;

Cognitive Domain

1. Familiarize with BDS Curriculum.
2. Recognize the role of different disciplines in studying human body.
3. Describe the various stages of pre embryonic human development.
4. Familiarize about basic Anatomical terms (General and Oral Anatomy).
5. Recognize various developmental stages of face and oral cavity.
6. Describe the structure, function and biochemical composition of cell.
7. Describe the cell division, its types and genetic material along with its clinical correlation.
8. Describe various cellular adaptations during cell growth, differentiation and cell injury.
9. Describe the basic organization of human body.
10. Explain the maintenance of homeostatic mechanism.
11. Describe the importance of buffer and PH system.

Psychomotor Domain

1. Perform the basic laboratory techniques and use of microscope.
2. Display steps of sterilization and disinfection.
3. Prepare assignment on MS office individually and in team.

Affective Domain

1. Follow the standard operating procedures of lab.
2. Follow preventive and safety measures in dental practices.
3. Participate individually and in team work efficiently.
4. Maintain discipline of the college.
5. Follow the norms of the college properly.

Theme I: Orientation Week

(White Coat Ceremony+ Departmental Visits)

1.	White coat ceremony (Day-01 Activity)
	Departmental visits (Day-02- 05)
2.	Visit to Basic Medical Sciences Departments (DME, Anatomy, Physiology, Biochemistry, Pathology, Pharmacology, Library, Digital Library, SAS, Hostels).
3.	Visit to Basic Dental Sciences Departments (Oral Biology, Science of Dental Materials, Oral Pathology, Community Dentistry, Phantom- Head Lab).
4.	Visit to Clinical Dental/ Medical Departments (Operative Dentistry, Periodontology, Orthodontics, Prosthodontics, Oral & Maxillofacial Surgery, Oral Medicine, Oral Radiology, Paediatric Dentistry, Diagnostic Department, General Medicine, and General Surgery).
5.	Introductory Lectures (Refer to Table of Specification below)

TABLE OF SPECIFICATION

Subject	Topic	Hours	Learning objectives
Anatomy	Anatomy and its sub-branches	1 hour	1. Define anatomy and its branches. 2. Describe purpose of study of anatomy and its branches.
Physiology	Physiology and its sub branches	1hour	4. Enumerate the branches of physiology. 5. Discuss functional organization of human body. 6. Control systems in the body.
Biochemistry	Introduction to biochemistry	1 hour	7. Define biochemistry. 8. Discuss the role of biochemistry in dentistry. 9. Discuss biochemistry of the cell. 10. Discuss carbohydrates, proteins, biological membrane 11. Discuss vitamins, mineral & trace elements.
Pathology	Introduction to pathology	1 hour	12. Define pathology. 13. Enumerate the different branches of pathology. 14. Identify different sampling and processing techniques in different branches of pathology.
Pharmacology	Intro to pharmacology	1 hour	15. Define pharmacology and its role in patient care.
Oral Biology	Introduction to oral histology and tooth morphology	1 hour	16. Define oral biology and its branches. 17. Define tooth morphology. 18. Recognize Anatomic and physiologic consideration of form and function of oro-dento-facial structures.
Community & Preventive Dentistry	Introduction to community dentistry and dental health	1 hour	19. Define public health, health and dental public health. 20. Enlist tools of public health. 21. Define illness. 22. Discuss the scope of dental public health. 23. Explain history of dental public health.

Medical Education	Curriculum structure Teaching learning strategies	1 hours	24. Discuss the curriculum and modules. 25. Describe the use of study guides. (not to be assessed) 26. Differentiate between various teaching & learning strategies. 27. Enlist various assessment tools & assessment policy. 28. Explain the role of teacher. 29. Discuss the responsibilities of the student. 30. Apply Study skills.
	Role of Regulatory Bodies (PMDC And HEC)	1 hour	31. Describe the structure and functions of Pakistan Medical and Dental Council (PM&DC). 32. Discuss the role of World Federation Medical Education (WFME). 33. Describe the structure and functions of Higher Education Commission (HEC). 34. Describe the role of Higher Education Commission (HEC). 35. Discuss the relevant policies related to educational institutes. e.g., policy on protection against sexual harassment in higher education institutions, policy on drug and tobacco abuse in higher education institutions etc.
Self-Learning Resource Centre (SLRC)	Importance of IT skills	1 hour	36. Define IT and its importance. 37. Introduction to library/e-library. 38. Intro to AI tools in academics and research. 39. Discuss policy of institute regarding social media usage.
	MS word skills PowerPoint skills Excel sheet	1 hour	40. Prepare the assignment on MS word with insertion of tables and flowchart. 41. Prepare the presentation on power point. 42. Draw tables on the excel sheet using formulas.

Theme II: Basic Unit of Life: The Cell

Subject	Topic	Hours	Learning Outcomes
Histology	Cell	2 hours	43. Describe the cell as a living unit of body. 44. Describe the structure of cell and its organelles. 45. Describe the structure of cytoplasmic organelles of the cell & correlate it with their functions.
	Nuclear structure & components	1 hour	46. Describe the structure of the nucleus, nucleolus & chromosome and their functions in cell integrity.
	Cell junction		47. Define cell junction. 48. Describe the structure and functions of the junctions. 49. Discuss the junctions on the basal and lateral surfaces of the cell. 50. Enlist the junctional complex.
	Cell division Mitosis and meiosis	2 hours	51. Explain the process of cell division. 52. Describe mitotic cell division with its stages. 53. Explain the process of Meiosis. 54. Describe karyotyping. 55. Explain the non-disjunction of chromosomes. 56. Correlate the process of non-disjunction with chromosomal abnormalities.
Oral Biology	Tooth structures & cells of oral cavity	1 hour	57. Define and recognize tooth structures. 58. Identify different cells in the oral cavity.

Physiology	Homeostasis	2 hours	59. Define homeostasis. 60. Describe the Homeostatic mechanism of major functional systems. 61. Describe the characteristics of control systems with examples.
	Membrane potential	2 hours	62. Define membrane potential. 63. Describe ionic conc. differences across cell membrane. 64. Explain the Nernst equation. 65. Explain origin of normal resting membrane potential.
	Movements of cell	1 hour	66. Explain the amoeboid movement of cells. 67. Describe the ciliary movements.
	Depolarization & Repolarization	1 hour	68. Explain the role of voltage gated Na ⁺ and K ⁺ channels in action potentials. 69. Discuss the changes in conductance of Na and K channels with changes in membrane potentials.
Biochemistry	Biochemical structure of cell and its organelles	2 hours	70. Explain the Bio-chemical composition of cell organelles and cytoplasm. 71. Describe the chemical structure of cytosol 72. Describe the chemical structure and importance of mitochondrial membrane.
	Nucleus	2 hours	73. Describe Bio-chemical structure of nuclear membrane and its functions. 74. Define and explain nucleotides and nucleosides. 75. Describe the components of nucleotides. 76. Describe the functions of Nucleotides. 77. Describe the types of nucleic acids. 78. Differentiate between RNA and DNA. 79. Describe the Structure of nucleic acids. 80. Describe biochemical functions.
	Cell transport mechanism	1 hour	81. Explain membrane transport. 82. Discuss passive diffusion, active transport, and facilitated transport via a channel or carrier.

			83. Describe and evaluate the role of ion gradients, co transporters, and ATP in active transport mechanisms.
Pathology	Cell injury	1 hour	84. Enumerate the various causes of cell injury. 85. Describe the response of a normal cell to stimuli. 86. Describe the mechanisms of cell injury. 87. Enumerate the different types of cellular adaptations.
Pharmacology	Routes of administration of drugs	1 hour	88. Enlist the route of administration of a drug. 89. Explain how drugs are transported across cell membrane and factors affecting it. 90. Describe different types of drug receptors and enzyme inhibition as a mechanism of action of drugs.
	Drug distribution and bioequivalence		
	Receptor and cellular basis		
Lab Work			
Physiology Practical	The Microscope	1 Hour	91. Identify parts of microscope. 92. Demonstrate operation of microscope. 93. Describe the method of focusing slide using different powers and magnifications. 94. Identify the equipment used in Labs. 95. Follow SOPs (standard operating protocols) for every LAB. 96. Perform lab techniques. 97. Display safety measures in performing lab techniques. 98. Display methods of sterilization and disinfection
	Lab Equipment And techniques	2 Hours	
Community & Preventive Dentistry	Cross infection control	2 Hours	99. Demonstrate hand washing technique. 100. Demonstrate use of Personal Protective Equipment.

Theme III: Development of Human Body & Human Dentition

Subject	Contents	Hours	Learning Outcomes
Embryology	Introduction to Embryology	1 hour	101. Discuss embryologic terminology. 102. Explain significance of embryology.
	Gametogenesis	1 hour	103. Describe the process of Gametogenesis. 104. Enlist the differences between spermiogenesis and spermatogenesis 105. Describe the morphological changes during maturation of gametes. 106. Describe oogenesis and its correlation with meiosis. 107. Compare oogenesis and spermatogenesis.
	Female reproductive cycle	1 hour	108. Describe the ovarian cycle. 109. Discuss the process of follicular development. 110. Explain the process of ovulation. 111. Correlate with the phases of menstrual cycle
	Fertilization	1 hour	112. Define fertilization. 113. Describe the process of fertilization. 114. Describe the outcome of fertilization.
	First week development Cleavage & Blastocyst Formation	1hour	115. Describe the process of cleavage of zygote. 116. Discuss the formation of blastocyst. 117. Summarize the events of first week of development normal and abnormal.
	Bilaminar Germ Disc	1 hour	118. Describe the formation of amniotic cavity. 119. Discuss the development of embryonic disc 120. Explain the development of Chorionic sac.

	3 rd week of development.	3 hours	121. Describe Formation of three germ layers. <ul style="list-style-type: none"> ○ Derivatives of Ectoderm. ○ Derivatives of Mesoderm(A. Paraxial mesoderm,B. Intermediate mesoderm, C. Lateral plate mesoderm.) ○ Derivatives of endoderm
	3 rd to 8 th week the embryonic period 4 th to 8 th week of development.	2 hours	122. Describe the formation of different organo-genetic period with a process of folding. 123. Define fetal period. 124. Enlist the important changes that occur during the fetal period. 125. Enumerate the factors affecting the fetal period.
	Third month to birth: The fetus and placenta fetal membrane	2 hours	126. Describe str.of placenta. 127. Describe chorionic frondosum and decidua basalis. 128. Discuss fetal membranes in twins. 129. Describe parturition. 130. Enlist the development of different types of fetal membranes. 131. Describe the formation and function of amniotic fluid. 132. Enumerate teratogens. 133. Describe the effects of teratogens on fetus.

Biochemistry	Carbohydrates	2 hours	<p>134. Explain carbohydrate and its Bio-chemical structure.</p> <p>135. Classify carbohydrate and give their Bio-chemical importance.</p> <p>136. Relate the structure of polysaccharides with its clinical importance.</p> <p>137. List the functions of carbohydrates in cell membrane, energy provision and nutrition supply to different parts of body.</p> <p>138. Describe the different isomers of monosaccharides Galactose, mannose, fructose, dextrose.</p> <p>139. Describe the role of dextrose in I/V infusion.</p> <p>140. Describe the role of mannitol in cerebral edema.</p> <p>141. Describe the structure of disaccharides and oligosaccharides.</p>
	Polysaccharides	1 hour	<p>142. Define and discuss Polysaccharides.</p> <p>143. Discuss structures and types of Polysaccharides.</p>
	Monosaccharide's		<p>144. Define Monosaccharide's.</p> <p>145. Discuss structure and types.</p>
	Reducing and non-reducing Sugars	1 hour	<p>146. Define reducing sugars, types.</p> <p>147. Discuss the structure and types of reducing sugars.</p>
Oral Biology	Development of the head face and oral cavity	4 hours	<p>148. Define Neural crest cells and its derivatives.</p> <p>149. Define pharyngeal arches.</p> <p>150. Enumerate derivatives of pharyngeal arches.</p> <p>151. Illustrate the process of face development.</p> <p>152. Enumerate the processes taking part in the development of the maxilla and mandible.</p>
	Tooth development	4 hours	<p>153. Discuss the stages of tooth development.</p> <p>154. Discuss the cells involved in tooth development.</p> <p>155. Explain single and multiple root formation.</p> <p>156. Discuss clinic consideration</p>

Community & Preventive Dentistry	Determinants & Dimensions of health	1 hour	157. Explain the determinants of health. 158. Explain the dimensions of health.
Lab Work			
Physiology Practical	Capillary blood sampling	2 hours	159. Identify the sites for obtaining blood sample with different methods and discuss the indication for their use. 160. Obtain capillary blood sample for hematological investigation through prick method.
Biochemistry Practical	Detection of Polysaccharides in a given Solution	2 hours	161. Perform Iodine test.
	Detection of Monosaccharide's	2 hours	162. Perform Barford's Test.
	Detecting of Reducing and non-reducing Sugars	2 hours	163. Perform the Benedicts test.

Theme IV: Organization of Human Body & Human Dentition

Subject	Topic	Hours	Learning Outcomes
Anatomy	Anatomical terms	1 hour	164. Describe the anatomical terms for planes, position, and movements.
	General anatomy of bones cartilage and joints	1 hour	165. Describe the structure and function of bone. 166. Classify bones on the basis of length and shape. 167. Identify the markings on bone.
		1 hour	168. Describe cartilage. 169. Classify the types of cartilage. 170. Describe the types of cartilages.
		1 hour	171. Classify joints on the basis of structure. 172. Describe the mechanism of movements of joint.
	Muscles	1 hour	173. Describe various muscle types along with structure.
	Integumentary system Skin	2 hours	174. Describe layers of epidermis and dermis 175. Discuss skin creases, Nails, Hairs, Glands (Sebaceous & sweat) 176. Discuss the anatomical structures of Skin / Integumentary system.
	General anatomy of circulatory system	1 hour	177. Describe Various types of Arteries and veins. 178. Describe capillaries.

	Lymphatic system	1 hour	179. Describe organization of the lymphatic system. 180. Explain the functions of lymphatic system. 181. Explain the mechanisms for the movement of lymph in the body. 182. Identify lymph nodes of head and neck.
	Nervous system Divisions (central & peripheral and somatic & autonomic)	1 hour	183. Define the organization of nervous system. 184. Describe the divisions of nervous system. 185. Describe the formation of spinal nerve and concept of dermatome and myotome. 186. Describe the formation of nerve plexus.
Anatomy		1 hour	187. Describe the organization of autonomic nervous system. 188. Differentiate between sympathetic and parasympathetic nervous system on the basis of structure.
Maxillofacial surgery	Membranes: Fascia, ligaments and raphe	1hour	189. Describe the structure of membranes of human body. 190. Describe the anatomy and significance of fascia, ligaments and raphe.
	Radiological anatomy in dentistry	1 hour	191. Identify various anatomical landmarks on radiograph. 192. Describe commonly used radiographs. 193. Describe various view used for obtaining radiographs.
Autonomic nervous system (physiology)		1 hour	194. Describe the functions of the autonomic nervous system . 195. Compare and contrast the functions of sympathetic and parasympathetic nervous system. 196. Classify autonomic receptors.

Histology	Basic Body tissue	1 hour	197. Define tissue. 198. Describe the basic tissues in human body. Definition of tissue <ul style="list-style-type: none"> • Epithelial tissue • Connective tissue • Muscular tissue • Nervous tissue
	Epithelial tissues	2 hours	199. Define epithelium. 200. Classify epithelium. 201. Describe the general features of epithelium. 202. Explain the specialized functions of different types of epithelial cells. 203. Describe the structure of main types of cell junctions.
	Glandular Epithelium	1 hour	204. Enlist glandular epithelia. 205. Classify them on the basis of morphology, nature of secretion and mode of secretion. 206. Differentiate between exocrine & endocrine glands on the basis of structure and function.
	Epithelial Cell Surface Specialization	1 hour	207. Describe the surface specialization of epithelia. 208. Correlate their structure, with their location and function.
Oral Biology	Basement Membrane	1 hour	209. Describe the structure of the basement membrane & correlate it with its function.
Anatomy	Bone	1 hour	210. Enumerate different cells of bone tissue. 211. Describe histological structure of bone. 212. Classify bone on the basis of histological feature.
Biochemistry	Chemistry of Acids and Bases	1 hour	213. Define acids, bases, strong acids, and weak acids. 214. List different types and sources of acids and bases in our body.

	Buffers	4 hours	<p>215. Describe the mechanism of their normal balance and biochemical importance.</p> <p>216. Explain PH of acids Buffer pairs.</p> <p>217. Define Buffer and its role in maintenance of body PH.</p> <p>218. Differentiate between good chemical and physiologic buffers Intracellular and extra cellular buffers, chemical buffers of plasma, chemical buffers of urine.</p> <p>219. Explain Role of other buffers e g Bones GIT Lungs CSF Liver Anion GAP.</p> <p>220. Explain Mechanism of Acidosis and alkalosis and compensation.</p> <p>221. Define colloidal state and Henderson Hasselbalch equation.</p> <p>222. Define adsorption and how it occurs.</p> <p>223. Explain ion exchange resin.</p>
	Connective tissue	2 hours	<p>224. Explain different cells of connective tissue.</p> <p>225. Describe composition of the ground substance.</p> <p>226. Describe components of connective tissues.</p> <p>227. Discuss loose and dense connective tissue.</p>
	Solutions	1 hour	<p>228. Define normal solution.</p> <p>229. Define standard solution.</p>
Oral Biology	Introduction To tooth morphology/ nomenclature	6 hours	<p>230. Classify human dentition on the basis of types of teeth and sets of dentitions.</p> <p>231. Define dental formula.</p> <p>232. Indicate sequence and age of eruption of teeth.</p> <p>233. Describe numbering system (FDI, universal and palmer notation system).</p> <p>234. Describe various morphological structures on tooth surfaces</p> <p>235. Enumerate line and point angles of anterior and posterior teeth.</p> <p>236. Describe various morphological on tooth surfaces.</p>
	Anatomic and Physiologic considerations	4 hours	<p>237. Discuss number and significance of lobes in permanent teeth.</p> <p>238. Define and discuss inter-proximal spaces, contact areas, embrasures, cervical line and height of contour.</p> <p>239. Describe crown surface form in terms of general shape and its significance to specific function of tooth.</p>

	of form and function of teeth		240. Describe proper location and form of marginal ridges and facial line angles and their relationship to embrasure form. 241. Identify the number, length and distribution of roots and their influence on tooth form and function of both anterior and posterior teeth.
Lab Work			
Histology	Tissue Processing	2 hours	242. Demonstrate the process of tissue processing for histo-pathological examination.
	H& E staining	2 hours	243. Perform H & E staining of tissue slides under supervision in the laboratory.
	Epithelia	2 hours	244. Identify and describe simple epithelia under Microscope. 245. Identify different types of epithelia based on histological features under Microscope such as simple squamous epithelium, simple cuboidal, simple columnar, pseudostratified columnar, stratified squamous, stratified cuboidal, stratified columnar, transitional epithelium.
	Cartilage	1 Hour	246. Differentiate different types of cartilages based on histological structure such as Hyaline cartilage, Fibrocartilage, Elastic cartilage.
	Bone	1 Hour	247. Differentiate different types of bones based on histological structure such as compact bone and spongy bone.
Biochemistry	Solutions	2 hours	248. Prepare of 0.9% NaCl. 249. Measure the PH of given solution.
Community & Preventive Dentistry	Cross Infection Control/ Needle Prick Injury	1 hour	250. Enlist Causes of NPI. 251. Identify people at risk. 252. Discuss management of needle prick injury. 253. Discuss Prevention of NPI. 254. Discuss Importance of infection control practices while handling needles & sharp objects e.g., lancet.
	Examination instruments	1 hour	255. Identification and handling of examination instruments.
	Ergonomics		256. Define dental ergonomics. 257. Discuss importance of ergonomics in dentistry.

			<p>258. Discuss the posture of dentist in sitting and standing position with respect to the patient and unit.</p> <p>259. Discuss position of dental assistant.</p> <p>260. Describe ergonomics of 4 handed dentistry.</p> <p>261. Enumerate ergonomics hazards.</p>
Tooth Morphology	Introduction to tooth morphology/ nomenclature	2 hours	<p>262. Identify on tooth models/images different morphological structures present on tooth surface.</p> <p>263. Draw and label the diagram of all tooth surfaces (anterior and posterior teeth).</p>