

STUDY GUIDE

| | |
|-----------------------------|---|
| PROGRAM | BDS |
| COURSE TITLE | Oral Biology |
| ACADEMIC YEAR | 1st Year |
| INTRODUCTION | Oral Biology is the study of embryology (pre- and post-natal growth), oral physiology, gross anatomy, histology, and development, with a focus on dental hard and soft tissue (enamel, dentin, pulp, and periodontium) and extra oral structures (salivary glands and TMJ). Tooth Morphology is a subfield of Oral Biology that studies the morphology of each tooth in the dentition as well as the development of occlusion. |
| RATIONALE | Oral Biology provides fundamental knowledge in the aforementioned areas, as well as clinical aspects and integration with other basic sciences subjects. Tooth Morphology is used in conjunction with Orthodontics and Operative Dentistry to help clinicians achieve the best clinical results when rearranging and restoring teeth. |
| OUTCOMES | By the end of this course, students will be able to differentiate among various intra and extra oral structures based on their development, histology and anatomical features. |
| DEPARTMENTS INVOLVED | Department of Oral Biology |
| COURSE OBJECTIVES | By the end of the course, the students will be able to: <u>INTRODUCTION TO STRUCTURES OF ORAL TISSUES</u> <ul style="list-style-type: none">• Discuss the clinical application of oral biology.• List all structures of a tooth.• Identify structures of a tooth on models.• Identify the supporting structures of a tooth on pictures and models.• Differentiate among the various supporting structures of a tooth.• Discuss the clinical relevance of enamel, dentine, cementum, periodontal ligament• Discuss age-related changes of the enamel, dentine, cementum, periodontal ligament |

GENERAL EMBRYOLOGY

- Discuss germ cell formation, fertilization and prenatal development.
- Describe Induction, Competence, and Differentiation.
- Discuss the development of three-layered embryo and the neural tube
- Describe the fate of germ layer.

EMBRYOLOGY OF HEAD FACE AND ORAL CAVITY

- List the derivatives of pharyngeal arches and pouches
- List the types of teratogens.
- Discuss the development of the following structures of the embryo:
 - Head
 - Face
 - Palate
 - Tongue
 - Skull
 - Maxilla
 - Mandible
 - Temporomandibular joint
- Differentiate between the following processes:
 - Intramembranous and cartilaginous ossification;
 - Development of maxilla and mandible.
- Discuss the various types of clefts of lip and palate.

CYTOSKELETON, CELL JUNCTIONS, FIBROBLASTS, AND EXTRACELLULAR

MATRIX

- Define the cytoskeleton.
- Differentiate among the various types of filaments
- Differentiate among the various types of intercellular junctions.
- Discuss fibroblasts and its secretory products.

DEVELOPMENT OF THE TOOTH AND ITS SUPPORTING TISSUES

- Discuss the development of the following structures:
 - Primary epithelial band;

- Dental lamina;
- Vestibular lamina;
- Hard tissues of tooth;
- Root.

- Differentiate among the various stages of tooth development;
- Differentiate between the single and multi-rooted tooth development.
- Discuss the theories of tooth type determination.

BONE

- Describe the composition and histology of bone.
- Describe the structure and functions of bone cells.
- Differentiate between endochondral and intramembranous bone formations.
- Explain the histology of endochondral and intramembranous bones.

ENAMEL: COMPOSITION, FORMATION, AND STRUCTURE

- Describe the composition, physical properties and histological features of enamel.
- Differentiate among the various stages of amelogenesis
- Identify the histological features of enamel on slides and pictures

DENTIN-PULP COMPLEX

- Describe the composition, formation and histological landmarks of dentine.
- Discuss the cells of dental pulp.
- Critically analyze theories of dentine sensitivity.
- Identify the various types of dentine, histological landmarks of dentine, and zones of dental pulp on models and pictures.

PERIODONTIUM

- Define periodontium.
- List the components of periodontium.
- Classify cementum.
- Discuss the formation and biochemical composition of cementum.

- Describe the structure of alveolar bone.
- Identify the histological features of alveolar bone on pictures.
- Classify the periodontal ligaments.
- Discuss the cells of periodontal ligament space.

PHYSIOLOGIC TOOTH MOVEMENT: ERUPTION AND SHEDDING

- Describe pre eruptive, post eruptive, abnormal and orthodontic tooth movements
- Discuss the shedding of teeth

SALIVARY GLANDS

- Describe the structures of various salivary glands.
- Discuss the composition of saliva.
- List age-related changes in various salivary glands.
- Discuss the diseases of various salivary glands.
- Relate the composition of saliva with its functions.

ORAL MUCOSA

- Define oral mucosa.
- Describe the boundaries of oral cavity.
- Discuss the structure of oral mucosa.
- Relate the structure of oral mucosa with its functions.
- Classify various types of oral mucosa.
- Differentiate between various types of oral mucosa on the basis of histology.
- Describe the cells of epithelium and connective tissue.
- Describe the clinical variations and age changes within the oral mucosa.

TEMPOROMANDIBULAR JOINT

- Classify joints
- List examples of each type of joint
- Describe the macroscopic and microscopic structures of a joint
- Discuss the muscles of temporomandibular joint
- Describe the innervations and blood supply of TMJ

- Relate the muscle attachments with various movements of TMJ

FACIAL GROWTH AND DEVELOPMENT

- Discuss various facial types and profiles.
- Relate the facial profiles with gender and age.
- Describe facial growth

REPAIR AND REGENERATION OF ORAL TISSUES

- Discuss the various phases of bone healing in oral mucosa.
- Describe the bone healing act at dentinogingival junction.
- Discuss the repair of enamel, dentine-pulp complex and periodontium.

INTRODUCTION TO DENTAL ANATOMY

- Discuss the importance and clinical application of oral biology
- Discuss the primary, transitional and permanent dentition periods
- Discuss the various tooth numbering systems
- Describe the surfaces and landmarks of teeth
- Identify the primary, transitional and permanent dentition periods on pictures
- Identify the teeth on the basis of various tooth notation systems on models and pictures
- Identify the surfaces and landmarks of teeth on models.

DEVELOPMENT AND ERUPTION OF THE TEETH

- Describe the patterns of eruption of primary and permanent teeth.
- Estimate the dental age of an individual on images and models.

THE PRIMARY (DECIDUOUS) TEETH

- Identify various deciduous teeth on models and pictures
- Describe the landmarks and endodontic structures of various deciduous teeth

FORENSIC ODONTOLOGY

- Define forensic dentistry.
- Describe the methods of identification of unidentified individuals.
- Discuss application of forensic dentistry

OROFACIAL COMPLEX: FORM AND FUNCTION

- Describe the physiological form of the teeth and periodontium
- Describe contact areas, interproximal spaces and embrasures.
- Identify contact areas, interproximal spaces and embrasures on models and pictures.

THE PERMANENT MAXILLARY INCISORS

- Identify maxillary incisors on models and pictures.
- Describe the landmarks and endodontic structures of maxillary incisors.
- Compare the macroscopic structure of maxillary central incisor with that of the lateral incisor

THE PERMANENT MANDIBULAR INCISORS

- Identify mandibular incisors on models and pictures.
- Describe the landmarks and endodontic structures of mandibular incisors.
- Compare the macroscopic structure of mandibular central incisors with that of the lateral incisor

THE PERMANENT CANINES: MAXILLARY AND MANDIBULAR

- Identify canines on models and pictures.
- Describe the landmarks and endodontic structures of canines.
- Compare the macroscopic structure of maxillary canine with that of the mandibular canine

THE PERMANENT MAXILLARY PREMOLARS

- Identify maxillary first and second premolars on models and pictures.
- Describe the landmarks and endodontic structures of maxillary first and second premolars
- Compare the macroscopic structure of maxillary first premolar with that of the maxillary second premolar

THE PERMANENT MANDIBULAR PREMOLARS

| | |
|-------------------|---|
| | <ul style="list-style-type: none"> • Identify mandibular first and second premolars on models and pictures. • Describe the landmarks and endodontic structures of mandibular first and second premolars • Compare the macroscopic structure of mandibular first premolar with that of the mandibular second premolar <p><u>THE PERMANENT MAXILLARY MOLARS</u></p> <ul style="list-style-type: none"> • Identify maxillary first, second and third molars on models and pictures. • Describe the landmarks and endodontic structures of maxillary first, second and third molars • Compare the maxillary molars on the basis of their macroscopic structures <p><u>THE PERMANENT MANDIBULAR MOLARS</u></p> <ul style="list-style-type: none"> • Identify mandibular first, second and third molars on models and pictures. • Describe the landmarks and endodontic structures of mandibular first, second and third molars • Compare the mandibular molars on the basis of their macroscopic structures |
| PRACTICALS | <p>By the end of 1st year, Students will be able to;</p> <ul style="list-style-type: none"> • Identify the normal histological features of following on Multi-head Microscope; <ul style="list-style-type: none"> - Structure of Human tooth - Development of tooth and supporting structures - Bone and its types - Dentin and Pulp - Salivary glands - Oral Mucosa • Identify anatomical landmarks of both hard and soft tissue on Models |

| | |
|----------------------------|--|
| | <ul style="list-style-type: none"> • Identify deciduous and permanent teeth on models • Differentiate between various deciduous and permanent teeth based on anatomical differences using models • Draw permanent teeth on graph paper • Label permanent teeth on graph paper • Carve permanent teeth on wax/soap |
| INTERNAL ASSESSMENT | 10% (Pre-professional Examination, Midterm Examination, Assignments and Class Presentations) |
| ANNUAL EXAMINATION | 90% (MCQS, OSPE) |
| COURSE EVALUATION | Course evaluation will be conducted as per JSMU & HEC policies |