

UNIVERSITY OF HEALTH SCIENCES LAHORE



M.Phil

BASIC DENTAL SCIENCES

2009

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INTRODUCTION

Dentistry is changing at an alarming rate, primarily driven by the results of modern research. Only by constantly updating our database will we be able to keep pace with current trends.

M. Phil in basic dental sciences i.e Oral Pathology, Oral Biology, Science of Dental Materials and Community Dentistry is offered by the University of Health Sciences Lahore. It can lead to PhD that is the highest qualification in these subjects. The primary objective of the course is to provide teachers, trainers, research scholars, and knowledgeable, compassionate, technically competent specialists in the field of basic sciences to provide diagnosis and high quality research, teaching and training of post-graduate scholars.

The role of this course is to enhance the trainee's capability to assimilate needed biological concepts and to increase his or her ability to understand new technologies. This program is designed to provide the trainee with an academic research background, and extensive practical experience extending in depth their knowledge at post-graduate level.

DURATION OF COURSE:

The minimum duration of M.Phil course is two years.

ADMISSION CRITERIA:

- i. B.D.S
- ii. One year House job
- iii. Entry Test / interview by the admitting institutions
- iv. Credits for marks in professional examinations, additional experience and published research.

COURSES FOR M. Phil IN BASIC DENTAL SCIENCES

Year I

- Oral Pathology
- Oral Biology
- Community Dentistry
- Science of Dental Materials

Compulsory minor subjects:

- General Pathology
- General Anatomy
- Biochemistry
- Microbiology

Year II

Minor II Elective subjects:

- General Pathology
- General Anatomy
- Oral Histology
- Oral Physiology
- Biochemistry
- Immunology
- Cytogenetic
- Microbiology
- Nutrition
- Biomaterials and Tissue Engineering
- Dental health education and planning
- Behavioral Sciences

TRAINING:

Part-I (First Year of Training)

- A) Major subject
- B) Compulsory minor subject

Part-II (Final- Second Year of Training)

- A) Minor II
- B) Research project (thesis)

The research project should have following considerations

- It must consist of reasonable and sample size and sufficient numbers of variables, to give training to the candidate to conduct research to acquire data, analyze data and reach results, discuss results and draw conclusions and thus test the hypothesis of research
- The research Project Protocol (Synopsis) should be submitted during the first four months of the course, to the University of Health Sciences, Lahore
- The Thesis recommended by the supervisor should be submitted in the minimum duration of 2- Years, after the approval of Synopsis

EXAMINATIONS

Part- I (Major subject– after One Year)

Paper I: MCQs	150 Marks	150 Items	03 Hours
Paper II: SEQs	150 Marks	15 Items	03 Hours
Viva Voce & Practical examination:	100 Marks		
Total:	400 Marks		

Compulsory minor subject

Paper III: MCQs	100 Marks	100 Items	02 Hours
Total (Primary examination):	500 Marks		

Part- II (Final Examination)

Minor II (Elective)

Paper: MCQs	100 Marks	100 Items	02 Hours
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Thesis Evaluation: **200** marks

Grand total: **800** Marks

DEGREE AWARDING

After the successful completion of the course M. Phil will be awarded to the candidate.

COURSE CONTENTS

For

M.Phil ORAL PATHOLOGY

ORAL PATHOLOGY

Compulsory subject:	General Pathology
Minor Elective subjects:	Oral Histology
	Microbiology
	Immunology
	Cytogenetic

COURSE OUTLINE:

A. DEVELOPMENTAL DISTURBANCES OF ORAL AND PARA ORAL STRUCTURES

- Developmental disturbance of the lips including congenital pits, fissures, double lips, cleft lips, cheilitis, glandularis, Puetz Jegher's syndrome.
- The developmental disturbances of palate including clefts of palate.
- Congenital disturbances of the oral mucosa including Fordyce granules, genodermatosis, leukoedema.
- Developmental anomalies of gingivae including fibramotosis gingivae.
- Developmental disturbances of the tongue including macroglossia, ankyloglossia, fissured tongue, median rhomboid glossitis, benign migratory glossitis, black hairy tongue, lingual varicosities.
- Developmental disturbances of lymphoid tissues
- Developmental disturbances of salivary glands like, absence of group of glands, atrasia of ducts, misplaced glands, developmental cysts of the salivary glands, Ranula etc.
- Developmental disturbances in size of teeth micro and macrodontia.
- Developmental disturbances in shape of teeth including germination, fusion, concrescence, dilacerations, Talon's cusps, dens in dente, taurodontism etc.
- Developmental disturbances in number of teeth like, anodontia, Ectodermal dysplasia, supernumerary teeth, and deciduous teeth.

- Developmental disturbances in structure of teeth like Amelogenesis imperfecta, enamel Hypoplasia due to systemic disturbances, enamel hypocalcification and enamel hypomaturations, Dentinogenesis imperfecta, dentinal dysplasia, Odontodysplasia.
- Disturbance in eruption of teeth like natal teeth, delayed eruption, embedded and impacted teeth, and ankylosis of teeth.

B. BENIGN AND MALIGNANT TUMOURS OF THE ORAL CAVITY

- Benign tumours of epithelial origin including papilloma, verruca vulgaris, kerato acanthoma.
- Pigmented cellular nevus and oral melanotic macules or freckle ephelis
- Classification (WHO) of relevant oral tissue tumours
- Benign tumours of connective tissue origin like Fibroma, peripheral giant cell Granuloma, pyogenic Granuloma, central giant cell Granuloma, aneurismal bone cyst.
- Tumours of adipose tissue like lipoma and tumors of vascular tissues like haemangiomas, Rendu-Osler-weber syndrome, Sturge Weber diseases, lymphangiomas.
- Tumours with calcified tissues like chondroid tumours, osteomas, tori, exostosis.
- Tumours of muscles like rhabdomyoma, granular cell myoblastoma, congenital epulis.
- Tumours of nerve tissue like traumatic neuroma Neuropolyendocrine syndrome, neurfibroma, neurofibromatosis, and schwannomas.
- Histopathological and clinical aspects of cellular hyperplasia, dysplasia, atypia, metaplastic lesion.
- Differences between benign and malignant lesions
- Status of premalignancy and its significance and to discuss in detail the premalignant lesions like leukoplakia, carcinoma in situ, erythroplakia, oral submucous fibrosis, junctional compound nevus, plummer-Vinson syndrome etc.

- Definitions, history, epidemiology, incidence in different areas, aetiology, pathogenesis, clinical signs and symptoms, histopathology, Broader's classification and grading, histological types and prognosis of oral cancers.
- Classification of malignant Mesenchymal neoplasms, fibrous tissue like fibrosarcoma, vascular tissue e.g. Kaposi's sarcoma and Ewing's sarcoma, cartilage chondrosarcoma, osteosarcoma, lymphomas, malignant diseases of blood cells and R.E system like leukemias, multiple myeloma, skeletal muscle e.g. Rhabdomyosarcoma and leiomyosarcoma, nerve tissue malignancies such as neurofibrosarcoma, malignant neuroma, metastatic tumours of jaws.

Diseases of the Salivary Glands

- Congenital anomalies, inflammatory lesions like parotitis, submandibular gland adenitis, sialolithiasis of salivary glands
- Cystic lesions like mucocoele, ranula of salivary glands
- Benign tumours of salivary glands - epidemiology and distribution in oral cavity like Pleomorphic adenoma, papillary cyst adenoma lymphomatosum, adenoma-oxyphilic and canalicular, oncocytoma, benign lymphoepithelial lesions like Sjogren's syndrome, Mickulicz disease.
- Malignant tumours of salivary glands-classifications, epidemiology, distribution in oral cavity, adenoid cystic carcinoma, mucoepidermoid carcinoma, adenocarcinoma, malignant mixed tumours, stromal and pseudo tumours.
- Classification of salivary gland tumours (WHO)

Cysts and Tumours of the Odontogenic Origin

- Fissured cysts of oral region (inclusion cysts), median anterior maxillary cysts (incisive canal cysts), medial palatal cyst, globulomaxillary cyst, median mandibular cysts, naso-alveolar cysts, Thyroglossal duct cysts, benign cervical lympho epithelial cyst, dermoid cyst.
- Odontogenic developmental cysts-classification, primordial cyst, dentigerous cyst, gingival cyst, odontogenic keratocyst, calcified odontogenic cyst, periodontal

radicular cyst, apical periodontal cyst, incisive canal cyst, nasopalatine cyst, median alveolar cyst, globulomaxillary cyst, nasoalveolar cyst.

- Odontogenic tumours- classification, tumors of Ectodermal origin (meloma, ameloblastoma, calcifying epithelial odontogenic tumour).
- Tumours of mesodermal origin (central odontogenic Fibroma, odontogenic fibrosarcoma, peripheral odontogenic Fibroma, myxoma, periapical cemental dysplasia, central cementifying Fibroma, benign cementoblastoma, gigantiform cementoma).
- Tumors of Ectodermal & mesodermal origin (ameloblastic Fibroma, ameloblastic fibrosarcoma, compound odontoma, complex odontoma, ameloblastic fibroodontoma).
- Pseudodontogenic tumors (melanotic neuroectodermal tumor, ameloblastoma of long bones, craniopharyngioma, teratomas).

C. DISEASES OF THE MICROBIAL ORIGIN

Bacterial, Viral and Mycotic Infections of oral Tissues

- Major pathogenic organisms, related disease syndromes and their mode of spread with particular reference to dentistry.
- Oral microbial ecology and pathogenesis of dental caries and periodontal disease.
- Host-parasite relationship and immune system.
- Major clinical and biological factors with appropriate use of antimicrobial therapy
- Infectious diseases affecting the oral cavity
- Hospital acquired infectious and infection in the compromised host
- Appropriate collection and handling of specimens from oral lesions & root canals for microbiological examination

D. DENTAL CARIES

- Aetiological factors, pathogenesis, classification of the various lesions, complications and diagnostic methods of dental caries

E. DISEASES OF THE PULP AND PERIAPICAL TISSUES

- Diseases of pulp- classification, clinical features, pulp tests, histopathological features, non-vitality of teeth, regressive changes, sequelae.
- Gingival and periodontal diseases- classification, aetiology of chronic gingivitis, clinical and histopathological features, periodontal diseases-aetiology, periodontitis-chronic-clinical and histopathological features and sequelae
- Periapical pathosis-aetiology, acute periapical periodontitis, acute dentoalveolar abscess, chronic dentoalveolar abscess, periapical Granuloma, radicular cyst, recurrent abscess.

F. SPREAD OF ORAL INFECTIONS

Injuries and repairs

Physical and Chemical Injuries of the Oral Cavity

- Physical injuries of oral tissues- classification, injuries to teeth, injuries to bone, injuries to soft tissue, radio necrosis, burns, emphysema.
- Chemical injuries of oral tissue-classifications, chemical burns, non-allergic reactions to drugs used systemically, allergic reactions to drugs and chemicals.

Disturbance of Metabolism

Oral and maxillofacial aspects of metabolic diseases:

G. DISEASES OF SPECIFIC SYSTEM

Diseases of Bone and Joints

- Diseases of bone - classification, developmental disturbances, metabolic disorders, inflammatory diseases of bone (osteomyelitis, Osteoradionecrosis).
- Diseases of TMJ classification, developmental disturbances, traumatic disturbances, inflammatory disturbances, neoplastic disturbances, extra-auricular disturbances.

Diseases of Blood and Blood Forming Organs (Affecting oral tissues)

- Diseases of lymph reticular system i.e. lymphomas and multiple myelomas

Diseases of periodontium

Diseases of Skin

- Involving oral mucosa and gums etc.

Disease of Nerve and Muscles:

- Tissue affecting oral system

RECOMMENDED BOOKS

Neville -	Oral & Maxillofacial Pathology
Regezi -	Oral Pathology: Clinical Pathologic Correlations
Cawson -	Essentials of Oral Pathology and Oral Medicine
Soames -	Oral Pathology
Sapp	Contemporary Oral and Maxillofacial Pathology
Marx -	Oral and Maxillofacial Pathology: A Rationale for Treatment
Wood -	Differential Diagnosis of Oral and Maxillofacial Lesions
Barnes -	Surgical Pathology of the Head and Neck
WHO -	Pathology and genetics of Head and Neck Tumours
WHO -	Pathology and Genetics of Soft tissue and Bone tumours
Robbins & Cotran	Pathologic basis of disease
Nagi	Clinical pathology interpretations
Khan -	Thesis Writing

COURSE CONTENTS

For

M.Phil ORAL BIOLOGY

ORAL BIOLOGY

Compulsory subject:	General Anatomy
Minor Elective subjects:	General Pathology
	Microbiology
	Immunology
	Cytogenetic

COURSE OUTLINE:

Oral Biology is that area of knowledge that deals with the structure, development and function of the oral tissues, their relationships, and their relation to the other organ systems of the body. This subject has five basic components:

- Oral Anatomy
- Oral embryology
- Oral Histology
- Oral Physiology and Biochemistry
- Tooth Morphology

BASIC CONCEPTS AND TECHNIQUES IN

1. ANATOMY

A. General Anatomy

1. To know the principles of general anatomy with special reference to detail anatomy of head and neck
2. To know the basic knowledge of nerve and blood supply and lymphatic system of the oro-facial structures,
3. To understand the vascular diseases, disorders of growth, disorders of bone and calcium metabolism
4. To have the clear concepts of principles of growth and development of the body and with special reference to head and neck region
5. To have clear knowledge of systemic diseases in relation to dentistry, their oral manifestations, applied basic science relevant to clinical management
6. To have clear knowledge of Skin, Subcutaneous tissues, Bones, Cartilages & Ossification

7. To have clear knowledge of Muscles, Joints & related structures
8. systemic diseases in relation to dentistry, their oral manifestations, applied basic science relevant to clinical management

B. Gross Oral Anatomy

- Mandible, relations, attachments and structure passing through the mandibular canal.
- Maxilla, relations, attachments
- Vestibule, lips, cheeks, oral cavity
- Hard and soft palate, structure, blood supply, venous drainage and nerve supply. Movements and muscles of soft palate.
- Tongue, structure, relations, muscles, blood supply, venous drainage and nerve supply.
- Structure of tooth, blood supply & nerve supply of teeth.
- Nose and paranasal sinuses, structure, relations, blood supply, venous drainage and nerve supply.
- Larynx, structure, relations, muscles, blood supply, venous drainage and nerve supply.
- Pharynx, structure, relations, muscles, blood supply, venous drainage & nerve supply.
- Face, skin, superficial fascia, muscles of facial expression, blood supply, venous drainage & nerve supply.
- The parotid region including parotid gland its duct, relations, blood supply, venous drainage & nerve supply.
- Temporal & infratemporal region.
- TMJ, structure, relations, movements, muscles of mastication, blood supply, venous drainage and nerve supply
- Submandibular region, including submandibular and sublingual glands, their-structure, relations, blood supply, venous drainage and nerve supply.
- Blood vessels, course, branches & distribution. (Branches of internal carotid artery supplying in the region of oral cavity & major draining veins)

- Radiographic anatomy of tooth and its supporting structures.

C. Head & Neck

- Skull & cervical vertebrae.
- Joints of the head & neck.
- Scalp, its extent, structure, blood supply, venous drainage & nerve supply.
- Deep cervical fascia.
- Triangles of the neck, boundaries & contents.
- The cerebral dura mater, venous sinuses, their relations, tributaries & draining channels.
- Thyroid & parathyroid glands, structure, relations, blood supply, venous drainage & nerve supply.
- Cervical plexus.
- Prevertebral region & its muscles.
- Trachea, structure, relations, blood supply, venous drainage & nerve supply.
- Blood vessels, course, branches & distribution. (Branches of major vessels supplying in the head & neck region)
- Lymph nodes of head & neck. (Lymphatic drainage)

D. Neuro Anatomy

- Brief introduction of brain & spinal cord, its blood supply.
- Brief description of medulla, pons, mid brain with emphasis to cranial nerves nuclei.
- Basal ganglia.
- White matter, cerebral hemispheres.
- Functional areas of cerebral hemispheres.
- Introduction to autonomic nervous system.
- Cranial nerve nuclei, location, type, course & distribution including olfactory, trigeminal, facial, glossopharyngeal, accessory & hypoglossal nerves with special emphasis to the 5th and 7th cranial nerves.

2. TOOTH MORPHOLOGY

- Introduction and nomenclature.
- Anatomic & physiologic consideration of form & function.
- Anatomic consideration of dental arches
- Detailed description of individual deciduous teeth, their general characteristics, developmental and eruption table, crown & root morphology including variations & anomalies.
- Detailed description of individual permanent teeth their general characteristics, developmental and eruption table, crown & root morphology including variations & anomalies.
- Detailed description of pulp cavities, pulp cambers and pulp canals of individual permanent & deciduous teeth. Importance of deciduous dentition & comparison between permanent & deciduous dentition.
- Teeth and genetics
- Occlusion of primary teeth.
- Occlusion of permanent teeth.
- Mixed dentition
- Legal aspect of human dentition.
- Comparative dental anatomy

3. EMBRYOLOGY

A. General Embryology

- Gametogenesis.
- Ovulation.
- Fertilization.
- Implantation.
- Bilaminar germ disc.
- Trilaminar germ disc.
- Embryonic and Fetal developmental stages till birth.
- Placenta and Fetal membrane.
- Twin pregnancy.
- Hereditary and environmental causes of abnormal development

- Principles of prenatal diagnosis.

B). Oral Embryology

Development of:

- Craniofacial skeleton.
- Viscerocranium, chondrocranium & neurocranium.
- Naso-maxillary complex and Palate.
- Brachial arches, Pouches, & Clefts.
- Thyroid & parathyroid glands.
- Thymus.
- Salivary glands (Parotid, submandibular & sublingual glands)
- Mandible.
- Temporo Mandibular
Joint
- Oral cavity.
- Tongue.
- Tooth (Early & late development including crown and root)
- Occlusion and Dentition
- Enamel (Amelogenesis)
- Dentin (Dentinogenesis)
- Cementum (Cementogenesis)
- Pulp.
- Periodontal ligament.
- Oral mucosa & gums.
- Epithelial attachment or junctional epithelium.
- Age changes & clinical considerations in different dental tissues.
- Oesophagus & stomach briefly.
- Skin & muscles of face.
- Common anomalies associated with aforementioned topics.

4. HISTOLOGY

A. General Histology

- Basic histology and staining techniques, Slide preparation, Use & handling of light microscope,
- Basic concepts of animal selection, Animal laboratory procedures & their handling.
- Tissue preparation techniques
- Ground sectioning of teeth and bone,
- Cell structure and its organelles, The cell cycle & apoptosis,
- Epithelium & its types,
- Connective tissue & its types, Adipose tissue, Cartilage, Bone, Nerve tissue, Muscle tissue, Tissue components of the vascular wall, Blood cells & Lymphoid tissue

B. Oral Histology

- **Histology of oral mucosa, lip, tongue, palate, tonsils and pharynx**
 - Description of different types of Oral mucosa, various types of tongue papillae,
 - Basic process of Keratinization and epithelial cell turnover.
 - Histology of Gingival and epithelial Attachment
 - Description of the histological structure of the gingival & mechanism of attachment of the gingival to the surface of the tooth. Mucogingival mucocutaneous junction.
- **Histology of Enamel**
 - Description of the enamel rod configuration and its relation to other rods.
 - Inorganic and Organic components and its structural variations.
 - Changes in enamel in an acidic environment and the effects of fluoride on enamel surface, and are able to describe the coverings (natural cuticle/plastics sealants) and how they relate to this environment.
- **Histology of Dentine**
 - Classification of various types of dentin, their developmental origin, and composition, Composition & structural variations, including, incremental lines, dead tracts,

- Theories of dentine innervations, Dentinal fluid, its composition and role in dentine sensitivity.
- **Histology of pulp**
 - Description of the cells, extracellular matrix, and vascular and natural elements of mature dental pulp,
 - Responses of dental pulp to factors such as aging, trauma, and clinical treatment.
 - Describe various theories of pain transmission through enamel and dentine
- **Histology of the Periodontium and the Temporo mandibular joint**
 - Description of the Histological structures and function of the periodontal tissues, the root covered cementum, the alveolar bone and the intervening periodontal ligament.
 - Description of osseointegration in Dental Implants. Reasons of failure.
 - Description of typical Histological changes in the Periodontium that result from tipping, bodily movement, and intrusive and extrusive and rotational forces on the tooth root during clinical treatment, and the potential adverse changes from orthodontic tooth movement.
 - Understanding of the special healing cases associated in the healing adjacent to the tooth surface, in guided tissue regeneration, and in the extraction wound.
 - Description of physiological mesial drift & how it differs from pathological mesial drift.
 - Description of histology of the articulating surfaces, the intervening Disc and the function of TMJ in relation to the muscles of mastication to its action.
- **Histology of Salivary Gland**
 - Classification of salivary glands on morphological and functional criteria and histology at ultra structure level with innervations.
 - Description of general functions of these glands and cell biologic concepts, pathologic changes and age changes.
- **Histological differences and similarities between Primary and Permanent Teeth**

RECOMMENDED BOOKS

Regezi -	Oral biology: Clinical Pathologic Correlations
Cawson -	Essentials of Oral biology and Oral Medicine
Soames –	Oral biology

- Gray's Anatomy By Williams et al (40th edition)
- Last's Anatomy Regional & Applied by R.H.M McMinn (11 th Edition)
- Medical Embryology by Jan Langman (10th Edition)
- The Developing Human by Keith L. Moore (8th Edition)
- Basic Histology by Junqueira (11 th Edition)
- Oral Histology by Ten Cate (7th Edition)
- Oral Histology & Embryology by Orban's (11th Edition)
- Tooth Morphology by James L. Fuller (4th Edition)
- Wheeler's Dental Anatomy, Physiology & Occlusion by Ash (4th Edition)

COURSE CONTENTS

For

M.Phil COMMUNITY DENTISTRY

COMMUNITY DENTISTRY

Compulsory subject:	Microbiology
Minor Elective subjects:	Nutrition
	Immunology
	Behavioural Sciences
	Dental Health Education and Planning

COURSE OUTLINE:

BASIC CONCEPTS AND TECHNIQUES IN COMMUNITY DENTISTRY

- Introduction/ History of Community Dentistry
- Concepts of health and disease and understand the basic oral disease process in preparation for subsequent courses in diagnosis and treatment planning.
- Execute procedures in the treatment of oral diseases without causing iatrogenic injury.
- Be convenient in the terminology of Community Dentistry to permit continuous effective scientific discourse with members of the profession and to ensure facility in both comprehension and composition of biological literature.
- Gain working concepts and principles of epidemiology, pathogenesis and morphology of oral disease as preparation for subsequent courses.
- Identify, and know the incidence, etiology, and pathogenesis and treatment sequence of the presented entities.
- Indices for measurement of common dental diseases: DMFT, CPITN, caries activity test
- Examine and record the following as recommended in WHO, ICD, and DN:

Filling the standard WHO forms

- Infection control in dentistry, any oral lesion, caries, existing restorations, malocclusion
fluorosis, stains and malformations of dental structures and any need for prosthesis
- Public Health and Dental Health Education, health promotion, use of mass media, water fluoridation and other community health measures.
- Observation of input procedures for putting information concerning the oral and dental information into the computer

1. PUBLIC HEALTH

- **Health, disease and infection**
- **Practice of public health**
 - History of public health in Pakistan
 - Changing concepts in public health
 - Characteristics of public health methods and techniques
 - **Environment and health**
 - Water
 - Air
 - Noise
 - Disposals of solid wastes
 - Occupational hazards
- **Nutrition in health and disease**
 - Proteins
 - Fats
 - Carbohydrates
 - Vitamins
 - Minerals
 - Nutritional problems in public health
 - Oral manifestations
- **Health education**

- Objectives
- Principles of health education
- Practice of health education
- Planning a dental education programme
- **Health care delivery system**
 - Health system in Pakistan
 - National health policy
 - International health agencies

2. EPIDEMIOLOGY

- **Epidemiological Methods**
 - Aims
 - Measurement in epidemiology
 - Terminologies in epidemiology
 - Epidemiologic methods
 - Biostatistics
- **Epidemiology of oral diseases**
 - Epidemiology of dental caries and its prevalence in Pakistan
 - Epidemiology of oral cancer and its prevalence in Pakistan
 - Epidemiology of periodontal disease and its prevalence in Pakistan
 - Epidemiology of malocclusion
 - Prevalence studies

3. DENTAL PUBLIC HEALTH

- **Introduction to dental public health**
- **Indices of oral diseases**
 - Bacterial plaque Plaque Index (PI I)
Sillness and Loe
 - Plaque, Debris, Calculus Patient Hygiene Index (PHP)
Simplified Oral Hygiene Index (OHI-S)
 - Gingival Bleeding Sulcus Bleeding Index (SBI)

- Gingival Changes/Gingivitis Gingival Index(GI)
- Periodontal diseases Periodontal Index (PI) Russell
 Periodontal Diseases Index (PDI) Ramfjord
 Community Periodontal Index of Treatment
 Needs (CPITN)
- Dental caries
 - Permanent teeth Decayed, Missing and Filled teeth (DMFT)
 Decayed, Missing and Filled Surfaces (DMFS)
 - Primary teeth Decayed and Filled teeth (dft)
 Decayed and Filled surfaces (dfs)
 - Mixed dentition dft and DMFT
 dfs and DMSF
- Mobility Index
- Malocclusion Angles classification
- Dental flourosis Dean’s Flourosis Index
 Community Flourosis Index (CFI)

- **Planning, survey and evaluation**
- **Dental Auxiliaries** Classification
- **School Dental Health**
 - Components
 - Comprehensive dental care
 - School dental health programmes
- **Ethical issues**
 - Principles
 - Consumer protection act
 - Forensic dentistry

4. PREVENTIVE DENTISTRY

- **Prevention of oral diseases**
 - Levels of prevention
 - Prevention of dental caries

- Prevention of periodontal diseases
- Prevention of oral cancer
- Prevention of orofacial defects
- **Primary preventive services**
 - Plaque control
 - Disclosing agents
 - Caries activity tests
 - Pit and fissure sealants
 - Caries vaccine
- **Fluorides in caries prevention**
 - Natural occurrence of fluorides
 - Historical background
 - Systemic fluorides their mechanism of action
 - Topical fluorides their toxicity
 - Defluoridation

5. SOCIAL SCIENCES

- **Behavioral sciences**
- **Behavior management**
- **Cultural taboos in dentistry**

6. ORAL HEALTH FOR SPECIAL GROUPS

- **Oral health care for special groups**
 - Pregnant mother
 - Handicapped child
- **Atraumatic restorative dentistry (ART)**
 - Principles
 - Indications and contraindications

7. DENTAL JURISPRUDENCE

COURSE CONTENTS

For

M.Phil SCIENCE OF DENTAL MATERIALS

SCIENCE OF DENTAL MATERIALS

Compulsory subject:	Biochemistry
Minor Elective subjects:	Biomaterials and Tissue engineering
	Microbiology
	Oral Physiology
	Immunology

COURSE OUTLINE:

BASIC CONCEPTS AND TECHNIQUES

This course will cover materials used in dentistry, along with the good knowledge of field of biomaterials and tissue engineering. The course will also cover topics related to general properties and characterization of materials.

1. FUNDAMENTALS OF DENTAL MATERIALS

The objective of this course is to broaden the knowledge of dental graduate in the field of dental materials, involving detail of materials composition, properties and the way they interact with the environment in which they are placed.

- 1) Gypsum materials
- 2) Polymers
- 3) Acrylic
- 4) Resin restorative materials (composites)
- 5) Impression materials
 - Polysulphide
 - Polyether
 - Silicon
 - Polysaccharides
 - Agar
 - Alginate
- 6) Cements and liners
 - Zinc oxide eugenol

- Zinc phosphate
- Zinc polycarboxylate
- Glass ionomer cement
- Calcium hydroxide
- Cavity varnish
- Root Canal Filling Materials

7) Amalgam

8) Metals I: Structure

- Freezing
- Crystal structure
- Grain structure

9) Metals II: Constitutions

- Segregations
- Metallography
- Eutectic
- Phase diagram conversion and layout
- Copper and tin system

10) Waxes

11) Procedures

- Cutting
- Abrasion
- Polishing
- Soldering
- Welding
- Casting

12) Porcelain

13) Artificial teeth

2.

BIOCOMPATIBILITY OF DENTAL MATERIALS

It is a primary requirement of any dental material that it should be harmless to the patient and to those involved in its manufacture and handling and provide detailed knowledge of the biocompatibility of different materials used in dentistry.

1) Determination of Biocompatibility

- Evaluation of Materials
- Principles of Biocompatibility Testing
- Strategies for Evaluating Biocompatibility
- Test Materials
- Systemic Toxicity
- Local Toxicity and Tissue Compatibility
- Cell Cultures
- Implantation Tests
- Pulp Damage and the Pulp/ Dentin Test
- Mucosal Damage and Mucosa Usage Tests
- Periapical Tissue Damage and Endodontic Usage Test
- Intraosseous Implant Test
- Allergenic Properties
- Mutagenicity
- Teratogenic Effects and Influence on Reproduction
- Prick Test
- Radioallergosorbent Test (RAST)
- Immunotoxicological Test Methods
- Measurement of Intraoral Voltage
- Evaluation of Pulp Sensitivity
- Analysis of Intraoral Alloys
- Analysis of Metals in Saliva and Biopsies

2) Dental Amalgam

- Mercury Emission and Corrosion Products

- Systemic Toxicity
- Metabolism, Distribution, and Excretion of Mercury
- Release and Uptake
- Proposed Threshold Values
- Deposition in Organs

3) **Resin-Based Composites**

- Release of Substances
- Biodegradation of Monomers
- Systemic Toxicity
- Local Toxicity and Tissue Compatibility
- Cytotoxicity
- Influence on Cell Metabolism
- Antimicrobial Properties
- Implantation Tests
- Pulp Reactions
- Diffusion Through Dentin
- Usage Tests

4) **Cements and Ceramics**

- *Zinc Phosphate Cements*
 - Systemic Toxicity and Allergies
 - Local Toxicity and Tissue Compatibility
 - Cytotoxicity
- **Glass Ionomer Cements**
 - Systemic Toxicity and Allergies
 - Local Toxicity and Tissue Compatibility
 - Cytotoxicity
 - Antimicrobial Properties
- **Zinc Oxide and Eugenol Cements**
 - Systemic Toxicity and Allergies
 - Preclinical Allergy Studies
 - Allergic Reactions of Patients

- **Calcium Hydroxide Cements**
 - Systemic Toxicity and Allergies
 - Alternatives to Calcium Hydroxide
 - Local Toxicity and Tissue Compatibility
- **Dental Ceramics**
 - Systemic Toxicity and Allergies
 - Local Toxicity and Tissue Compatibility
 - Cell Cultures
 - Implantation Studies

5) **Root Canal Filling Materials**

- Clinical Data and Biocompatibility
- Mandibular Nerve Injuries
- Rubber Dam
- **Gutta-Percha**
 - Systemic Toxicity and Allergies
 - Local Toxicity and Tissue Compatibility.
 - Antimicrobial Properties
- **Root Canal Sealers**
 - **Zinc Oxide Eugenol Sealers**
 - Local Toxicity and Tissue Compatibility
 - Aspergillosis .
 - Antimicrobial Properties
 - **Polyketone-Based Sealers.**
 - Systemic Toxicity and Allergies
 - Local Toxicity
 - **Epoxy-Based Sealers**
 - Systemic Toxicity and Allergies
 - Local Toxicity
 - **Calcium-Hydroxide-Based Sealers**
 - Systemic Toxicity and Allergies.
 - Local Toxicity and Tissue Compatibility

- **Mineral Trioxide Aggregate**
 - Systemic Toxicity and Allergy
 - Local Toxicity and Tissue Compatibility
- **Calcium Phosphate Cement Silicones**
 - Systemic Toxicity and Allergy
 - Local Toxicity and Tissue Compatibility
- **Resin-Based Sealers**
 - Degradation and Release of Substances
 - Local Toxicity and Tissue Compatibility
- **Materials for Retrograde Root Canal Fillings**
 - Systemic Toxicity and Allergies
 - Local Toxicity and Tissue Compatibility

6) **Dental Alloys**

- Analysis of Dental Alloys
- Corrosion and Release of Elements
- Systemic Toxicity
- Local Toxicity
- Allergies

7) **Polymethylmethacrylate Resins**

- Release of Substances and Degradation
- Systemic Toxicity
- Local Toxicity and Tissue Compatibility
- Cytotoxicity

3. **ADVANCED DENTAL MATERIALS**

This course aims to provide advance knowledge of dental materials covering a wide and in-depth knowledge of new developments in dental materials. This course will also give an in depth analysis of several aspects of modern biomaterials.

A.

In Vivo Aging of Dental Material

- 1) Effect of exposure to biological fluids on biomaterials surface.
- 2) Prosthodontics and implants materials
 - Aging of casting alloys used in Prosthodontics
 - Ceramic behaviour under different environmental and loading conditions
 - Characterization of retrieved implants: titanium, titanium alloys.
- 3) Restorative materials
 - Alterations of dental amalgam
 - Aging of glass-ionomer cements
 - Degradation mechanisms of dental resin composites
- 4) Orthodontic materials
 - Disintegration of orthodontic appliances
 - Characteristics of used orthodontic brackets
 - Aging of orthodontic utilities and auxiliaries
- 5) Endodontic materials
- 6) Materials used in oral and maxillofacial surgery
 - Aging of stainless steel oral and maxillofacial surgical implants
 - Leaching of metallic ions from plates and screws used in jaw fracture fixation.
- 7) Periodontal materials
 - Sutures in the oral cavity
 - Aging of bioactive glass bone-grafting materials

B). Dental Hard Tissues and Bonding

1. Etched Enamel Structure and Topography: Interface with Materials
 - The Enamel Smear Layer: A Potential Problem in Bonding to Cut Enamel
 - Application of Total-Etch Adhesives to Enamel
2. Bonding of Resinous Materials on Primary Enamel
3. Bond Strength to Enamel

- Measurement of Bond Strength
 - Experimental Models for Evaluating Bond Strength
4. Bonding to Enamel: In Vivo Studies
 - Veneers
 - Pit-and-Fissure Sealants
 - Orthodontic Bonding
 5. Orthodontic Bonding to Wet Enamel with Water-Insensitive and Water-Activated Orthodontic Adhesive Resins
 6. Bonding to Dentin: Smear Layer and the Process of Hybridization
 1. Dentin Substrate: Smear Layer
 2. Interfaces and Hybridization
 7. In Situ Photo-Polymerisation and Polymerisation-Shrinkage Phenomena
 - Potential Clinical Consequences of Shrinkage Phenomena
 - Clinical Management of Shrinkage Phenomena
 8. Bonding in Prosthodontics with Cements
 - Bonding to Tooth Structure
 - Bonding to Ceramic
 - Bonding to Pre-Processed Composite Restorations

RECOMMENDED TEXT BOOKS

- Applied Dental Materials by John F. McCabe & W.J. Walls 8th edition, 1998.
- Dental materials and their selection, by William J.O' Brien. Third edition. Publisher Quintessence, 2002.
- Introduction to Dental Materials, by Richard Van Noort. 2nd or 3rd edition, Mosby
- Restorative Dental Materials, by R.G. Craig, Publisher Mosby 12th edition, 2006.
- Phillip's Science of Dental Materials. Edited by K.J. Anusavice, Publisher Saunders, 11th edition, 2003.
- Materials Science for Dentistry, by B W Darvell, 7th edition 2002.
- Biomaterials An Introduction, by Joan Park & R.S. Lakes, Springer, 3rd Edition , 2007.
- Biocompatibility of Dental Materials by Gottfride Schmalz & Dorthe Arenholt, Spriger, 2009
- Dental Materials in Vivo; aging and related phenomena by George Eliades, Quintessence Publications 2003
- Dental Hard Tissue and Bonding by G.Eliades, D.C Wates and T. Eliades, Springer, 2005.

MINOR ELECTIVES

Minor II Elective subjects:

- General Pathology
- General Anatomy
- Oral Histology
- Oral Physiology
- Biochemistry
- Immunology
- Cytogenetic
- Microbiology
- Nutrition
- Biomaterials and Tissue Engineering
- Dental health education and planning
- Behavioral Sciences

COURSES OF STUDIES IN GENERAL PATHOLOGY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. CELL INJURY AND ITS CAUSES

- **Mechanisms .of cell injury**
 - a. ischemic and hypoxic cell injury (reversible and irreversible cell injury)
 - b. cell death
 - c. free radical mediated cell injury
 - d. ischemia/reperfusion cell injury
 - e. chemical mediated cell injury
- **Cellular adaptations to injury**
 - a. atrophy
 - b. hypertrophy
 - c. hyperplasia
 - d. metaplasia
- **Intracellular accumulation**
 - a. fatty change
 - b. cholesterol and cholesterol esters
 - c. proteins
 - d. glycogen
- **Pathologic Calcifications**
 - a. Dystrophic
 - b. Metastatic
- **Necrosis**
- **Apoptosis**
- **Radiation affect on tissues**

2. ACUTE AND CHRONIC INFLAMMATION

1. Definition and general features
2. Acute inflammation with vascular and cellular events
3. Mediators of inflammation
4. Chronic inflammation
5. Granulomatous inflammation

3. TISSUE HEALING & REPAIR: REGENERATION:

4. HEMODYNAMIC DISORDERS, THROMBOEMBOLI

1. Oedema
2. Hyperemia/congestion
3. Haemorrhage
4. Haemostasis
5. Thrombosis
6. Embolism
7. Infarction
8. Shock

5. GENERAL IMMUNOLOGY, DISEASES OF IMMUNITY (ORAL)

1. General features of immune system
2. Cell/humoral immunity
3. Disorders of immune system
4. Hypersensitivity reactions
5. Autoimmune disorders
6. Immunologic Deficiency Syndrome including AIDS
7. Amyloidosis

6. NEOPLASIA

1. Nomenclature
2. Benign and malignant tumours

3. Features of cancer
4. Molecular Basis of cancer
5. Oncogenes
6. Biology of tumour growth
7. carcinogenic agent and their cellular interactions
8. Grading and staging of tumours
9. Paraneoplastic syndromes
10. Tumour and immune response
11. Laboratory diagnosis of cancer

7. GENETIC DISORDERS

- a. Mutations
- b. Mendelian disorders
- c. Disorders multi-factors inheritance
- d. Cytogenic disorders
- e. Single gene disorders
- f. Diagnoses of genetic diseases

8. ENVIRONMENTAL AND NUTRITIONAL DISORDERS

- Tobacco
- Alcohol
- Drug abuse
- Pollution
- Industrial exposure
- Radiations
- Physical injuries
- Nutritional marasmus
- Kwashiorkor
- Anorexia
- Obesity

- Vitamin deficiency

9. INFECTIOUS DISEASES.

COURSES OF STUDIES IN GENERAL ANATOMY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. BASIC ANATOMY

- Principles of general anatomy with special reference to detail anatomy of head and neck
- Basic knowledge of nerve and blood supply and lymphatic system of the oro-facial structures,
- Concepts and principles of growth and development of the body with special reference to head and neck region
- Skin, Subcutaneous tissues, Bones, Cartilages and Ossification
- Muscles, Joints and related structures

2. BASIC STRUCTURE

- Skin
- Fasciae
- Muscle
- Joints
- Ligaments
- Burse
- Synovial Sheath
- Blood Vessels
- Lymphatic System
- Nervous System
- Mucous Membrane

- Serous Membrane
- Bone
- Cartilage
- Effects of Sex, Race, and Age on Structure

3. RADIOGRAPHIC ANATOMY

COURSES OF STUDIES IN ORAL HISTOLOGY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. HISTOLOGY OF ORAL MUCOSA, LIP, TONGUE, PALATE, TONSILS AND PHARYNX

- Description of different types of Oral mucosa, various types of tongue papillae,
- Basic process of Keratinization and epithelial cell turnover.
- Histology of Gingival and epithelial Attachment
- Description of the histological structure of the gingival & mechanism of attachment of the gingival to the surface of the tooth. Mucogingival muco cutaneous junction.

2. HISTOLOGY OF ENAMEL

- Description of the enamel rod configuration and its relation to other rods.
- Inorganic and Organic components and its structural variations.
- Changes in enamel in an acidic environment and the effects of fluoride on enamel surface, and are able to describe the coverings (natural cuticle/plastics sealants) and how they relate to this environment.

3. HISTOLOGY OF DENTINE

- Classification of various types of dentin, their developmental origin, and composition, Composition & structural variations, including, incremental Fens, dead tracts,
- Theories of dentine innervations, Dentinal fluid, its composition and role in dentine sensitivity.

4. HISTOLOGY OF PULP

- Description of the cells, extracellular matrix, and vascular and natural elements of mature dental pulp,
- Responses of dental pulp to factors such as aging, trauma, and clinical treatment.
- Describe various theories of pain transmission through enamel and dentine

5. HISTOLOGY OF THE PERIODONTIUM AND THE TEMPORO MANDIBULAR JOINT

- Description of the Histological structures and function of the periodontal tissues, the root covered cementum, the alveolar bone and the intervening periodontal ligament.
- Description of osseointegration in Dental Implants. Reasons of failure.
- Description of typical Histological changes in the Periodontium that result from tipping, bodily movement, and intrusive and extrusive and rotational forces on the tooth root during clinical treatment, and the potential adverse changes from orthodontic tooth movement.
- Understanding of the special healing cases associated in the healing adjacent to the tooth surface, in guided tissue regeneration, and in the extraction wound.
- Description of physiological mesial drift & how it differs from pathological mesial drift.
- Description of histology of the articulating surfaces, the intervening Disc and the function of TMJ in relation to the muscles of mastication to its action.

6. HISTOLOGY OF SALIVARY GLAND

- Classification of salivary glands on morphological and functional criteria and histology at ultra structure level with innervations.
- Description of general functions of these glands and cell biologic concepts, pathologic changes and age changes.

7. HISTOLOGICAL DIFFERENCES AND SIMILARITIES BETWEEN PRIMARY AND PERMANENT TEETH

COURSES OF STUDIES IN ORAL PHYSIOLOGY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

Description of basic principles of oral physiology, understanding of structural & metabolic biochemical processes related to:

- Teeth
- Saliva
- Pain
- Taste
- Smell
- Speech
- Oral mucosa
- Mastication and Swallowing
- Gingival and periodontal ligament
- Dental plaque
- Effects of hormones, vitamins & micro-nutrients on oral tissues
- Repair of oral tissue, wound healing and aging
- Orthodontic tooth movement
- Mechanism of tooth eruption
- Bone: growth and development of craniofacial skeleton and healing of bone fractures
- Immunology
- Stress and anxiety

COURSES OF STUDIES IN BIOCHEMISTRY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. GENERAL BIOCHEMISTRY

- This comprehensive study of biologically active compounds and their metabolism, biosynthesis and relationship to biological system includes a detailed presentation of bioenergetics enzyme kinetics and buffer systems.

2. ADVANCED BIOCHEMISTRY

- This course offers advanced insight into major areas of Biochemistry. Hypothesis and theories are viewed with an orientation to application in modern medicine and clinical research.
- This course presents a biochemical approach to integration and correlating the analytical determinations performed in clinical biochemistry laboratory with physiological and pathological processes.
- The topics includes disorders related to
 - Carbohydrate metabolism
 - Lipid metabolism
 - Protein metabolism
 - Fluid and electrolyte balance
 - Acid- base physiology
 - Pathophysiology of blood gases
 - Renal and urinary system
 - Hepatobiliary system
 - Endocrine system
 - Cardiac markers in myocardial infarction
 - Diagnostic enzymology

- Body fluids
- Body chemical analysis
- Tumor markers
- Therapeutic drug monitoring

COURSES OF STUDIES IN IMMUNOLOGY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. INNATE AND ADAPTIVE IMMUNITY

- Introduction
- Component of non-specific immune system
 - Mechanical barriers to infection
 - Chemical and biochemical inhibitors
 - Phagocytosis
 - Opsonization
 - Non-specific humoral factors
 - Lymphocytic-cell contributing to non-specific immunity

2. ANTIGENS AND IMMUNOGENICITY

- Definitions
 - Antigens
 - Haptens
 - Epitopes
 - Adjuvants
- Properties of Immunogenicity
 - General considerations
 - Foreignness
 - Chemical complexity
 - Molecular size
 - Use of immunogens in vaccination
 - Basis of antigen specificity
 - Forces of antigen-antibody attraction
 - Thymus dependence and immunogenicity

3. IMMUNOGLOBULINS

- Introduction
 - Immunoglobulin structure
 - Biological and chemical properties of Immunoglobulins
 - Antibody diversity

4. COMPLEMENT SYSTEM

- Introduction
- Pathways of complement activation
 - Overview
 - Classic pathway
 - The alternative pathway

- Regulatory mechanisms
- Biological consequences of complement activation

5. THE IMMUNE RESPONSE SYSTEM/SPECIFIC ACQUIRED IMMUNITY

- Introduction
- The lymphoid system
- Cells involved in the immune response
 - Antigen presenting cells
 - T Lymphocytes
 - B Lymphocytes
 - Introduction to the immune response
- Antigen processing and presentation
- Collaboration between cells
- Epitope recognition
- MHC restriction
- T cell activation
- B cell activation and antibody synthesis
- Phases of humoral immune response
- Principle of vaccination
- Cell mediated component of immunity
- Immunopathology

6. SPECIMEN COLLECTION AND HANDLING

- Blood collection techniques
- Use of anticoagulants and preservatives
- Sample processing, separation, storage
- Preservation of samples during transit
- Requirements for transport of sample to referral laboratories
- Result interpretation and reporting
- Quality control and laboratory management in immunodiagnosis

7. LABORATORY HAZARDS:

- Biological hazards
- Precautions against infectious diseases e.g, hepatitis & AIDS etc
- Handling of toxic, corrosive and radioactive materials
- Disposal of hazardous waste materials

8. IMMUNOHISTOLOGICAL TESTS

- Detection of antigens, antibodies, immunoglobulins
- Detection of components deposited in pathological lesions, particularly in the kidney and skin
- characterization of plasma cells and lymphocyte types in relevant tissue biopsies using immunofluorescent and enzyme-labeled techniques.

9. BASIC PRINCIPLES AND APPLICATIONS OF IMMUNOLOGICAL AND SEROLOGICAL TECHNIQUES:

- General consideration

- Agglutination reactions
- Precipitation reactions
- Immunodiffusion techniques
 - Double diffusion
 - Single radial Immunodiffusion
 - Immunoelectrophoresis
- Complement fixation test
- Immunofluorescence
 - Direct
 - Indirect
- Enzyme immunoassay (EIA)
- Radio immunoassay
 - General considerations
 - Liquid phase (RIA)
 - Solid Phase (RIA)

10. CLINICAL IMMUNOLOGY

- Autoimmunity
- Hypersensitivity
- Immunodeficiency
- Transplantation Immunology
- Cancer Immunology

COURSES OF STUDIES IN CYTOGENETICS

MINOR COURSE

MCQS 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. GENES AND HEREDITY

- Cell division
- Mendelian Genetics
- Quantitative genetics

2. STRUCTURE OF DNA AND RNA

- Nucleotides and their chemical composition
- Base composition of DNA & RNA
- Helical structure of DNA
- DNA replication
- DNA repair

3. SEX DETERMINATION AND DIFFERENTIATION

4. STRUCTURE AND EXPRESSION OF HUMAN GENES

- Genetic code
- Organization of a gene (sequence organization)
- Transcription
- Translation and post translation modifications

5. DNA BIOTECHNOLOGY AND GENOMICS

- Recombinant DNA technology
- Applications and ethics of genetic technology

6. MUTATIONS AND POLYMORPHISMS

- Non-synonymous mutations
 - Missense mutations
 - Nonsense mutations
 - Frameshift mutations
- Splicing mutations
- Loss of function mutations
- Gain of function mutations
- Dominant negative mutations

7. MODE OF INHERITANCE

- Autosomal Dominant mode of inheritance
- Autosomal Recessive mode of inheritance

- Sex linked mode of inheritance
- Mitochondrial mode of inheritance
- Multi-factorial mode of inheritance
- Variations in mode of inheritance

8. STRUCTURE OF CHROMOSOME

- Parts of a chromosome
- Types of chromosome
- Chromosome banding techniques
- Nomenclature of banded chromosomes

9. CHROMOSOMAL DEFECTS

- Numerical Defects
 - Trisomies
 - Monosomies
 - Polyploidy
- Structural Defects
 - Translocation
 - Deletion
 - Inversion
 - Duplication

10. TECHNIQUES OF MOLECULAR BIOLOGY AND CYTOGENETIC DIAGNOSIS

- Polymerase chain reaction and gel electrophoresis
- Other molecular technique
- Conventional cytogenetic
 - Karyotyping
 - Banding
- Molecular cytogenetics
- Florescent In situ Hybridization
- Somatic cell hybridization
- Flow cytometry/ FACS

11. PROBABILITY

12. POPULATION AND GENETICS

- Genetics and evolution
- Conservation genetics

13. GENE REGULATION, DEVELOPMENT AND CANCER

- Developmental genetics
- Genetics of cancer
- Genetics of Behavior

14. OROFACIAL DEFECTS

- Cleft lip

- Cleft palate
- Tooth agenesis
- Oral cancer
- Other diseases

COURSE OF STUDIES IN MICROBIOLOGY

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

1. BACTERIOLOGY

i). General bacteriology

- Difference b/w Eukaryotes & Prokaryotes
- Structure of Bacteria
- Physiology of Bacteria
- Bacterial Genetics
- Normal Flora
- Bacterial Pathogenesis
- Sterilization & disinfection
- Lab diagnosis
- Normal flora
- Antibiotics action/ Resistance

ii). Clinical bacteriology

- **Gram positive cocci**
 - Staphylococcus
 - Streptococcus

- **Gram positive rods**
 - Clostridium
 - Corynebacterium diphtheriae
 - Diphtheroids

- **Gram negative rods**
 - Related to enteric tract
 - Escherichi,
 - Salonella,
 - Shigella,
 - Vibrio
 - Campylobacter,
 - Providencia
 - Klebsiella,
 - Proteus
 - Helicobacter,
 - Enterobacter

- Morgnella
 - Serratia
 - Related to animal source
- Brucella
 - Fracisella
 - Pasteurela
 - Yersinia
 - Related to Respiratory tract
 - Pseudomonas
 - Haemophilus
 - Bordetella
- **Mycobacteria**
 - Typical mycobacterium
 - Atypical mycobacterium
- **Other bacteria important for oral diseases**
 - Fusobacterium
 - Lactobacillus
 - Actinomyces and Nocardia
 - Spirochetes
 - Prevotella
 - Bacteriodes
 - Bifidobacterium
 - Eikenella

2. VIROLOGY

i). Basic virology

- Structure, Replication& Classification
- Pathogenesis& Lab Diagnosis,Collection And Transport
- Antiviral drugs
- Host defenses

ii). Clinical virology

- Herpes viruses
- Hepatitis viruses
- Measles, mumps, rubella
- Rabies
- HPV
- HIV
- Adenovirus
- Pox virus
- Human T cell lymphotropic virus
- Chicken pox virus

- Para-influenza virus
- Influenza virus

3. MYCOLOGY

- Mucormycosis
- Candida
- Pneumocystis carinii
- Cryptococcus
- Cutaneous and Subcutaneous mycosis
 - Aspergillous
 - Blastomycosis
 - Histomycosis
 - Coccidiomycosis

4. PARASITOLOGY

- Toxoplasmosis
- Giardia
- Blood and tissue protozoa
- Cestodes
- Trematodes
- Nematodes

Suggested Book:

Review of medical microbiology and immunology By Warren Levinsons 10th Edition

COURSES OF STUDIES IN NUTRITION

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS:

I. DIET AND NUTRITION

- General physiological functions of the six nutrient classifications of foods.
- Description of general functions of each digestive organ
- Formulation of a dietary treatment plan for a dental problem influenced by nutrition.
- Nutritional counseling to control dental caries, promote postsurgical healing and tissue regeneration, reduce incidence of bone loss due to osteoporosis and osteopenia, or achieve optimal health.
- Importance of a thorough health, social, and dental history.

2. NUTRITIONAL REQUIREMENTS THROUGH THE LIFE CYCLE

- Introducing solid foods, after the initial stage of feeding by bottle or breast.
- Ways to handle nutritional problems that occur in infants, young children, school-age children, and adolescents.
- Familiarity with dental hygiene aspects related to nutritional needs during infancy, early childhood, elementary school years, and adolescence.
- Physiological changes that alter the infant's and adolescent's nutritional status.
- Food additives.

3. CARBOHYDRATES

- Major carbohydrates in foods and in the body.
- Dietary sources of lactose, other sugars, and starches and why glucose can be used by the body.
- Role of carbohydrate in the caries process

- Functions of dietary carbohydrate

4. PROTEINS

- Classification of foods as sources of high-quality or lower quality proteins.
- Problems associated with protein deficiency or excess.
- Assess a client's protein consumption in terms of deficiency or excess.

5. LIPIDS

- Basic structural units of dietary lipids.
- Describe how fatty acids affect the properties of fat
- Essential fatty acid and some of its functions.
- Functions of fats in the body.
- Dietary sources for saturated, monounsaturated, polyunsaturated, omega-3, and trans-fatty acids and cholesterol.

6. VITAMINS

- Physiological sources of energy.
- Factors affecting the basal metabolic rate.
- Factors affecting energy balance.
- Effects of inadequate energy intake.
- Comparison and characteristics of water-soluble vitamins with those of fat soluble vitamins.
- Functions, deficiencies, and toxicities, and oral symptoms for vitamins A, D, E, K, and C.
- Food sources for vitamins A, D, E, K, and C.
- Oral soft tissue changes that occur in a B-complex deficiency.
- Comparison and contrast of function, sources, and deficiencies or toxicities and associated symptoms of vitamins and minerals important for healthy oral soft tissues.
- Dental hygiene considerations for vitamins involved in maintaining healthy oral soft tissues.
- Prominent oral signs or iron-deficiency anemia.

7. MINERALS

- Minerals found in collagen, bones, and teeth and describe their main physiological roles and sources.
- Role of water fluoridation in the prevention of dental caries.
- Advantages and disadvantages of mineral supplementation.
- Dental hygiene considerations for clients regarding calcium, phosphorus, magnesium, and fluoride.
- Physiological roles and sources of copper, selenium, chromium, and manganese.

8. WATER AND MINERALS REQUIRED FOR ORAL SOFT TISSUES AND SALIVARY GLANDS

- Process of osmosis.
- Fluid and electrolyte balance.
- Roles, imbalances, and sources of water, sodium, potassium, iron, zinc, and iodine.
- Oral signs and symptoms of fluid and electrolyte imbalances, as well as iron, zinc, and iodine deficiencies.

9. NUTRITIONAL REQUIREMENTS AFFECTING ORAL HEALTH IN FEMALES

- Nutrients supplemented during pregnancy and lactation.
- Dental hygiene considerations for clients who are pregnant or breastfeeding.
- Dental hygiene considerations of nutritional needs that occur in older clients.
- Recognize various diseases, conditions, and treatments that usually have oral signs and symptoms.
- Recognize diseases, conditions, and treatments that are likely to affect nutritional intake.
- Discuss appropriate dental hygiene interventions for clients with systemic diseases or conditions with oral manifestations.

10. NUTRITIONAL ASPECTS OF DENTAL CARIES: CAUSES, PREVENTION, AND TREATMENT

NUTRITIONAL ASPECTS OF GINGIVITIS AND PERIODONTAL DISEASE NUTRITIONAL ASPECTS OF ALTERATIONS IN THE ORAL CAVITY

- Roles the tooth, saliva, food, and plaque play as factors in the caries process.
- Foods that stimulate salivary flow.
- Characteristics of some foods that are non-cariogenic or cariostatic.
- Dietary counseling to a client who is at risk for dental decay.
- Role of nutrition in periodontal health and disease.
- Etiological factors associated with gingivitis and periodontitis.
- Common signs and symptoms of xerostomia and glossitis.
- Appropriate dietary and oral hygiene recommendations for a client with orthodontics, xerostomia, root caries, dentin hypersensitivity, temporomandibular disorder, and removable appliances.
- Dietary guidelines for a client undergoing oral surgery and a client with a new denture, both pre and post insertion.
- Process of alveolar osteoporosis.

COURSES OF STUDIES IN BIOMATERIALS AND TISSUE

ENGINEERING

MINOR COURSE:

MCQs 100 Marks 100 Items 02 Hours

COURSE CONTENTS:

It is designed to provide a good level of understanding and appreciation of the principles and applications of biomaterials. Review of physical and chemical structural and mechanical properties of different materials used in biomaterial industry and their relation to medical application.

1) THE STRUCTURE OF SOLIDS

- Atomic Bonding
- Crystal Structure
- Imperfections in Crystalline Structures
- Long-Chain Molecular Compounds (Polymers)
- Super cooled and Network Solids
- Composite Material Structure

2) METALLIC IMPLANT MATERIALS

- Stainless Steels
- Co-Based Alloys
- Ti and Ti-Based Alloys
- Dental Metals
- Other Metals
- Corrosion of Metallic Implants

3) CERAMIC IMPLANT MATERIALS

- Structure–Property Relationship of Ceramics
- Aluminum Oxides (Alumina)

- Zirconium Oxides (Zirconia)
- Calcium Phosphate
- Glass-Ceramics
- Other Ceramics
- Carbons
- Deterioration of Ceramics

4) **POLYMERIC IMPLANT MATERIALS**

5) **POLYMERIZATION AND PROPERTIES**

- Effect of Structural Modification and Temperature on Properties
- Polymeric Implant Materials
- High-Strength Thermoplastics
- Deterioration of Polymers

6) **COMPOSITES AS BIOMATERIALS**

- Structure
- Mechanics of Composites
- Applications of Composite Biomaterials
- Biocompatibility of Composite Biomaterials

7) **STRUCTURE–PROPERTY RELATIONSHIPS OF BIOLOGICAL MATERIALS**

- Proteins
- Polysaccharides
- Structure–Property Relationship of Tissues

8) **TISSUE RESPONSE TO IMPLANTS**

- Normal Wound-Healing Process
- Body Response to Implants
- Blood Compatibility
- Carcinogenicity

9) SOFT TISSUE REPLACEMENT

- **sutures**
 - Sutures, Surgical Tapes, and Adhesives
- **skin**
 - Per Cutaneous and Skin Implants
- **maxillofacial implants**
 - Maxillofacial and Other Soft-Tissue Augmentation

10) HARD TISSUE REPLACEMENT

- Wires, Pins, and Screws
- Fracture Plates
- Intra medullary Devices
- Acceleration of Bone Healing
- Dental Restorations and Implants
- Interface Problems in Orthopaedic and Dental Implants

11) TISSUE ENGINEERING MATERIALS AND REGENERATION

- Substrate Scaffold Materials
- Sterilization of Scaffolds
- Regeneration Stimulated Electrically
- Cellular Aspects, Viability, Stem Cells
- Bone Regeneration

COURSES OF STUDIES IN DENTAL HEALTH EDUCATION AND PLANNING

MINOR COURSE:

MCQs 100 Marks

100 Items

02 Hours

COURSE CONTENTS

- **DENTAL HEALTH EDUCATION IN THE HEALTH CARE SYSTEM**
- **HEALTH EDUCATION**
 - Objectives
 - Principles of health education
 - Practice of health education
 - Planning a dental education programme - lesson plan and teaching strategies
 - Indices - Utilize, interpret, and analyze indices for patient assessment
- **HEALTH CARE DELIVERY SYSTEM**
 - Health system in Pakistan
 - National health policy
 - International health agencies
 - Evolution of dental hygiene in other countries.
- **HEALTH, DISEASE AND INFECTION**
- **ORAL HEALTH AND PREVENTION OF ORAL DISEASE IN A COMMUNITY**
 - Oral health needs of the community and the quality and availability of resources and services.
- **PRACTICE OF PUBLIC HEALTH**
 - History of public health in Pakistan
 - Changing concepts in public health
 - Characteristics of public health methods and techniques

- Preventive modalities in dental public health practice.
- Primary prevention programs, including fluoridation, sealants, and oral health education and its importance as a public health measure.
- Cultural diversities.

- **ENVIRONMENT AND HEALTH**
 - Water, Air, Noise
 - Disposals of solid wastes
 - Occupational hazards

- **NUTRITION IN HEALTH AND DISEASE**
 - Proteins
 - Fats
 - Carbohydrates
 - Vitamins
 - Minerals
 - Nutritional problems in public health
 - Oral manifestations

- **BIOSTATISTICS AND EPIDEMIOLOGY OF DENTAL DISEASES**
 - Descriptive and inferential statistics and use of appropriate measures and tests, frequency distributions and graphs.
 - Publications reporting oral epidemiology
 - Oral epidemiology and its relationship to dental hygiene.
 - Current epidemiological issues of disease.
 - Evaluation of published clinical basic science research and integration of this information to improve the oral health of the patient.
 - Solving problems and make decisions based on accepted scientific principles

- **GERIATRIC AND PEAODONTIC HEALTH STRATEGIES**
 - Age-related oral changes commonly found in the older adult.

- Oral changes that occur as a result of diseases or medications.

- **CAREERS IN PUBLIC HEALTH; POSITIONS IN THE PUBLIC HEALTH SETTING**
 - Governmental opportunities.
 - Dental hygienist positions
 - Dental hygiene services in a variety of settings, including offices, hospitals, clinics, extended care facilities, community programs, and schools.

COURSES OF STUDIES IN BEHAVIOURAL SCIENCES

MINOR COURSE:

MCQ's 100 Marks 100 items 02 Hours

COURSE CONTENTS:

Sr. No.	Topic	Contents
1.	Introduction to Behavioral Sciences and its importance in health.	Bio-Psycho-Social Model of Health Care and the Systems Approach Normality vs Abnormality Link of Health with Behavioural Sciences (Psychology, Sociology, Anthropology) Importance of Behavioral Sciences in health Correlation of brain, mind and Behavioural Sciences Roles of a doctor Desirable Attitudes in Health Professionals
2.	Understanding Behaviour <ul style="list-style-type: none"> • Sensation and sense organs • Perception • Attention and concentration • Memory • Thinking • Communication 	Describe sensation, sense organs/special organs Define perception, what factors affecting perception Define attention and concentration. What factors affecting them Define memory and describe its stages, types and methods to improving it Define thinking; describe its types and theories What is cognition and levels of cognition? Discuss problem solving and decision making strategies Define communication. What are types, modes and factors affecting it. Describe ways to recognize non-verbal cues. Characteristics of a good communicator
3.	Individual differences <ul style="list-style-type: none"> • Personality • Intelligence 	What are the stages and characteristics of psychological growth and development? Define personality. What are cognitive and psychodynamic theories of personality? What factors affect personality development? How personality can be assessed? Influence of personality in determining reactions during health, disease, hospitalization, stress Define intelligence and the various types of intelligence. Relevance of IQ and EQ in the life of a doctor. Methods of enhancing EQ and effectively using IQ What factors affect it and how it can be assessed?

Sr. No.	Topic	Contents
4.	<ul style="list-style-type: none"> Emotions Motivation/need/drive 	<p>Define emotions. What are the various types of emotions?</p> <p>Emotional Quotient (EQ)- concept & utility, Emotional Literacy</p> <p>Define motivation and what are the types of motivation?</p> <p>Use of motivational theory in improving learning, treatment adherence</p>
5.	Learning	<p>Define learning, Principles of learning, modern methods and styles of learning, types of learners, cognitive theory of learning and its use in enhancing learning</p> <p>Strategies to improve learning skills</p>
6.	Stress and stressors Stress management	<p>Define and classify stress and stressors</p> <p>Relationship of stress and stressors with illness</p>
7.	Life events	Concept of life events and their relationship with stress and illness
8.	Stress management	<p>What are coping skills?</p> <p>What is psychological defense mechanism?</p> <p>What is conflict and frustration?</p> <p>What is concept of adjustment and maladjustment?</p>
9.	Interviewing / Psychosocial History Taking	<p>Collecting data on psychosocial factors in Medicine / Surgery / Reproductive Health / Paediatrics and other general health conditions</p> <p>Define, types of interview and listening</p> <p>Skills of interviewing and listening</p>
10.	Doctor-Patient Relationship	<p>Discuss the doctor-patient relationship.</p> <p>What is the concept of boundaries and psychological reactions in doctor patient relationship (such as transference and counter transference).</p>
11.	Medical/Dental Ethics	<p>Hippocratic oath- Do's and Don'ts</p> <p>What is the concept of medical/dental ethics?</p> <p>Common ethical dilemmas in doctor-patient relations ,interaction with families, teachers, colleagues, pharmaceutical industry</p> <p>Rights of patients and doctors (in international law, constitution of Pakistan, PM&DC, Islam)</p>
12.	Culture and medical / dental practice	<p>Concept of group, its dynamics</p> <p>Attitude, value, belief, myths, social class, stigma, sick role and illness, health belief models</p>

Sr. No.	Topic	Contents
13.	Psychological Reactions	Grief and bereavement, Family and illness, Dealing with difficult patients Symptoms presentation and culture Illness and Behavior (sick-roles, stigma, Somatization), Treatment Adherence (Compliance) What are the psychosocial aspects of illness, hospitalization, rape, torture, terminal illness, death and dying?
14.	Breaking bad news	Introduction, Models, Methods, Death of the patient, abnormal baby, intractable illness
15.	Psychosocial aspects of Health and Diseases	Psychosocial correlates of hospitalization, illness behaviour, sick-roles Psychosocial issues in Emergency Departments, Intensive Care and Coronary Care Units, Operating Theatres, Cancer wards, Transplant Units, Anaesthesia
16.	Pain, Sleep, Consciousness	Concept of pain Physiology of pain, Psychosocial assessment and management of chronic / intractable pain. Stages of Sleep Physiology of consciousness, Altered states of consciousness. Psychological influences on sleep and consciousness, Non-pharmacological methods of inducing sleep, changes in consciousness
17.	Communication skills, Counseling, Crisis Intervention, Conflict Resolution, Informational Care	Principles of effective communication, active listening, the art of questioning, the art of listening. Good and bad listener. Counseling: Scope, Indications and Contraindications, Steps, Do's and Don'ts, How to deal with real life crisis and conflict situations in health settings Informational Care: A practical method of communication between the doctor and patient on about diseases, drugs, prognosis etc