



# **KENYA MEDICAL PRACTITIONERS AND DENTISTS COUNCIL (KMPDC)**

## BACHELOR OF DENTAL SURGERY CORE CURRICULUM







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**BACHELOR OF  
DENTAL SURGERY (BDS)**  
CORE CURRICULUM  
2022

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# Abbreviations and Acronyms

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<b>BDS</b>	Bachelor of Dental Surgery
<b>CUE</b>	Commission for University Education
<b>EACE</b>	East African Certificate of Education
<b>ICD</b>	International Classification of Diseases
<b>KCSE</b>	Kenya Certificate of Secondary Education
<b>KMPDC</b>	Kenya Medical Practitioners and Dentists Council
<b>MBChB</b>	Bachelor of Medicine and Bachelor of Surgery
<b>MCCOD</b>	Medical Certification of the Cause of Death
<b>MOE</b>	Ministry of Education
<b>MOH</b>	Ministry of Health
<b>WHO</b>	World Health Organization

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*These curricula focus on an outcome-based approach as opposed to an objective based approach that was the anchor of the reviewed curricula. The curriculum therefore, is the yardstick and blue print to be followed by all medical and dental schools in Kenya in the training of practitioners who possess the relevant knowledge, skills, professional development and attitudes*



# Preface

The Medical Practitioners and Dentists Act (Cap. 253, Laws of Kenya) provides that among other key functions, the Council has the mandate of establishing and maintaining uniform norms and standards on the learning of medicine and dentistry in Kenya. By virtue of this statutory mandate, the Council has a continuous obligation of ensuring that the training of medical and dental students is in line with the current global practice and standards of medicine and dentistry.

Over time and through numerous consultations, it has been noted that the current MBChB and BDS core curricula lack some key components and skills that are necessary for the training of an all-round doctor who not only possess the technical skills but is also equally well equipped with soft skills and life skills.

The reviewed core curricula in medicine and dentistry ensures a broader approach in training and this encompasses the training of Medical ethics, Leadership and strategic thinking, Digital technology & Innovation, Research, Critical thinking, Entrepreneurship, Patriotism, Gender, Soft skills and medical certification of death.

These curricula focus on an outcome-based approach as opposed to an objective based approach that was the anchor of the reviewed curricula. The curriculum therefore, is the yardstick and blue print to be followed by all medical and dental schools in Kenya in the training of practitioners who possess the relevant knowledge, skills, professional development and attitudes.

*Prof. Stanley O. Khaingwa*

**Chairperson**

Kenya Medical Practitioners And  
Dentists Council (KMPDC)

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*Dr David G. Kariuki*

**Chief Executive Officer/ Registrar**

Kenya Medical Practitioners And Dentists Council (KMPDC)



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.....  
*Alone we can do so little;  
together we can do so much*  
**Hellen Keller**

## Section 1.0

# General Programme Description

## 1.1 Introduction

It is expected that in Kenya, as in other parts of the world, the number of Dental Schools will increase to address the growing demand for training of dental practitioners. Against this background and in line with current international trends it is imperative to a system that will ensure that trainees get minimum Knowledge and skills required for efficient practice of medicine.

The core curriculum outlines the minimum requirements in any dental school must cover. However, the Council recognizes that most dental schools will exceed the minimum recommendations in many respects. Indeed, the schools are encouraged to add content to enrich their curriculum and adapt methods of teaching or delivery that will help trainees cope in a highly dynamic professional field. It is for this reason that four (4) units have been left to respective dental schools to decide what content they want to cover over and above the recommended core curriculum.

At the end of the course, the graduate should be able to practice safely and effectively as an intern and have a foundation for further training in various branches of dentistry.

## 1.2 Course Structure



### Course duration

- The programme should extend over a period of not less than five (5) years.
- An academic year could either be divided into semesters or terms.
- No student should spend more than double the prescribed duration on the course.



## Units / Credit system

- A unit course is defined as fifteen (15) hours of lectures, or thirty (30) hours of tutorials or forty-five (45) hours of practical/ clinical teaching.
- One (1) unit of dental core courses is equivalent to one (1) week of teaching.
- The end of year examination period should cover at least two (2) weeks.
- The programme should be weighted as one hundred and eighty-one (181) units in five (5) years.

## 1.3 Admission Requirements / Criteria

All candidates admitted to the degree programme must satisfy the following requirements:

### 1.3.1 General Requirements

Satisfy the common requirements for entry into the university;

Meet the requirements for the various courses which depend on the following subject cluster:

- Biology;
- Chemistry;
- Physics or Mathematics;
- English or Kiswahili.

### 1.3.2 Specific Requirements

#### KCSE Holders

The applicant should have the prevailing minimum university admission requirement. Additionally, **at least B plain in each of the four (4) cluster subjects** shown in (b) above.

## Advanced Level Holders

A minimum of **two (2) principal passes** in Biology and Chemistry, and a subsidiary pass in either Mathematics or Physics.

## International Baccalaureate (IB)

**Grade 5 and above** in the cluster subjects in (b) above.

## Diploma in Medical Sciences

The applicant should have a **three-year diploma from a medical training institution** recognized by the KMPDC in any of the following disciplines:

- Dental Technology,
- Dental Surgery Assistant,
- Dental Hygiene,
- Community Oral Health,
- Clinical Medicine,
- Laboratory Technology,
- Radiography,
- Pharmaceutical technology,
- Nursing,
- Other equivalent disciplines.

In addition, they must have attained a **minimum O-Level Division II pass (EACE) or, C+ (plus) mean grade** and **credit pass C+ (Plus)** in the cluster subjects in KCSE.

## Degrees in Biological Sciences

Holders of any degree in biological sciences or equivalent qualifications from a recognized university, subject to passing Graduate Record Examination (GRE).

## Other Qualifications

Holders of other qualifications deemed to be equivalent to i) to v) above from institutions recognized by the different institutional senates may also be admitted.

## Proficiency in the English Language

International students from non-English speaking countries shall provide evidence of competence in the English language by producing Test of English as a Foreign Language (TOEFL) certificate or its equivalent.

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## 1.4 Curriculum Design

Every dental school must have a written curriculum indicating programme outcomes, curriculum models and mode of delivery employed.

The curriculum should be based on sound learning principles that encourage students to be responsible for their learning process and prepare them for lifelong self-directed learning. It should aim at integrating basic and clinical sciences, reducing the factual burden (the need of memorization) on students and fostering ability to participate in the scientific development of dentistry.

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## 1.5 Learning/Instructional Methods

Each dental school must define its instructional methods that encompass diverse teaching and learning approaches including any of the following:

- Lectures/Overviews;
- Tutorials and Seminars;
- Practical classes/ Skills laboratories;
- Clinical demonstrations;
- Clinical Teaching: Includes bedside teaching, ward rounds, ambulatory care teaching, Operating theatre experiences, emergency and critical care;
- Post-mortem demonstrations;
- Laboratory practicals;
- Fieldwork and community-based learning;
- Self-directed learning; and
- eLearning complementary.

## 1.6 Modes of Assessment

The mode of Assessments should employ both formative and summative methods with emphasis on clinical aspects that encourage problem solving skills as far as possible.

### Continuous Assessment (Formative)

- Log of experiences and procedures done
- Case reports and portfolios
- Project reports
- Regular course examinations: written, practical, clinical and viva voce
- Attitudinal assessment

### University End of Year Examinations (Summative)

- Written
- Clinical
- Practicals
- Viva voce

### Examination Regulations

- Certification will be a Bachelor of Dental Surgery (BDS) degree;
- Distribution of marks will be specified by individual institutions. However, continuous assessment should cover at least thirty per cent (30%) of the final mark;
- The pass mark for each subject should be fifty per cent (50%);
- For clinical courses, a student must pass the clinical component of the examination in order to pass the course;
- BDS Degree is not classified.

### Grading

A (Distinction)	<b>75 - 100%</b>
B (Credit)	<b>65 - 74%</b>
C (Pass)	<b>50 - 64%</b>
F (Fail)	<b>0 - 49%</b>

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## 1.7 Credit Transfers

- Credit transfer will depend on the curriculum model or design between the institutions where the credit transfer will take place.
- Credits from the clinical disciplines are not transferable.
- Students seeking the transfer must have satisfied the requirements and passed all the relevant courses, with the results reflected in an official transcript.
- The student should present a letter from the Dean of their previous institution.
- The students seeking transfers should have taken the course not more than three years prior to their seeking of credit transfer
- Transfer of credits will be subjected to the availability of space in the institution.
- The Kenya Medical Practitioners and Dentists Council shall be concurrently notified of the credit transfers.

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## 1.8 Students with Medical Problems

In special circumstances, a learner shall be discontinued on medical grounds if medically unfit to qualify as a Dental Practitioner and the Kenya Medical Practitioners and Dentists Council shall be notified.

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## 1.9 Course Description Elements

Each course description should have the following elements:

- Course weighting
- Course purpose
- Expected Learning Outcomes
- Course content.

## Section 2.0



# Course Descriptions and Weightings

COURSE TITLE	UNITS
Medical Biochemistry	7
Medical Physiology	7
Human Anatomy	8
Oral Biology	7
General Human Pathology	9
Pharmacology and Therapeutics	5
General Medicine	5
Principles of General Surgery	5
Periodontology and Periodontics	10
Oral Medicine	3
Oral Pathology	5
Oral and Maxillofacial Surgery	10
Oral-Maxillofacial Radiology and Imaging	5
Oro-facial Pain and Anxiety Management	8
Paediatric Dentistry	7

<b>COURSE TITLE</b>	<b>UNITS</b>
Orthodontics	<b>7</b>
Dental Biomaterials	<b>6</b>
Restorative Dentistry (Conservative Dentistry and Endodontics)	<b>16</b>
Prosthodontics	<b>16</b>
Dental Public Health (Community Dentistry)	<b>6</b>
Research Methods and Research Project	<b>6</b>
Leadership, Management and Governance in Health Systems	<b>3</b>
Dental Ethics, Professional Conduct and Medico-Legal Issues	<b>3</b>
Information and Digital Technology in healthcare	<b>3</b>
Introduction to Entrepreneurship	<b>1</b>
Basic Life Support and Medical Emergencies	<b>2</b>
Communication Skills for Health Workers	<b>2</b>
Common Undergraduate Courses	<b>4</b>
Dental Electives	<b>8</b>
<b>TOTAL</b>	<b>181</b>



## 2.1 Medical Biochemistry

LEARNING MODULE	
	<p><b>Units</b> 7 (Seven)</p> <p><b>Course Purpose</b> To equip the learner with knowledge of the chemical composition and processes of the normal human body and their regulation</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the basic structure and functions of human biomolecules</li> <li>→ Outline the principles of the human metabolic processes</li> <li>→ Participate in appropriate laboratory practicals and demonstrations</li> </ul>

### 2.1.1 Basic Chemistry

- Physical Chemistry: Water, solutions and colloids; Ion producing substances; Acids, bases and salts; Acidity: detection, control, and measurement; Kinetic theory and chemical reactions; the periodic table and electrovalent bond formation. Concept of oxidation and reduction processes
- Organic Chemistry: The International Union of Pure and Applied Chemistry (IUPAC) nomenclature. Classification of organic compounds. Organic structure representation; structural diagrams, condensed formulas, bond line notation, Newman projection, Fischer projections, Haworth projection, stereo projection. Electrophiles, nucleophiles and their reactions. Nomenclature, structures. Physical and chemical properties and reactions of alkanes, alkyl halides, alkenes, alkynes, alcohols, aldehydes and ketones, ethers, esters. Covalent bond formation and molecular orbitals. Hydrogen, dative, hydrophilic and hydrophobic bonds. Carboxylic acids and amines. Aldol condensation and Claisen reactions.

## 2.2.2 Biomolecules

- Classification, function and structural formulas of amino acids, lipids, nucleic acids, carbohydrates. Peptide bond formation, protein structure and methods of separation
- Enzymes: classification, catalysis, inhibition, kinetics and units of measuring activity, covalent modification, role of cofactors and zymogen activation. Clinical enzymology
- **Vitamins:** Classification, structural formulas, mechanisms of action and assay methods hyper- and hypo- vitaminoses
- **Neurotransmitters:** Classification, synthesis, storage, transport and metabolism of neurotransmitters and other neurochemicals
- **Hormones:** synthesis, storage, release, transport, mode of action and degeneration of peptide, steroid, amino acid derived hormones and prostaglandins

## 2.2.3 Intermediary Metabolism

- Standard free energy change of a chemical reaction. Exogenic and endogenic reactions. ATP, NADPH and other high energy compounds
- Carbohydrate metabolism; glycolysis, tricarboxylic acid cycle, anaplerotic reactions and glyoxylate cycle, electron transport chain, oxidative phosphorylation, mitochondria shuttle system, gluconeogenesis, phosphogluconate pathway. Glycogen synthesis and glycogenolysis
- Lipid metabolism; fatty acid biosynthesis, beta-oxidation, ketone bodies synthesis and utilization. Cholesterol triacylglycerol synthesis and mobilization. Lipid digestion.
- Fate of amino acid carbon skeletons and urea synthesis; Special derivatives of amino acids; Special metabolism; Purine and Pyrimidine metabolism; Haem metabolism
- Disorders of metabolism
- Tissue metabolism: Differential metabolism in Liver, Muscle, Adipose, Brain and erythrocytes Integration of metabolism
- Steroid metabolism

## 2.2.4 Cell biology, Molecular Biology and Genetics

- Cell biology: Cell membranes, organelles, functions and disorders. Cell cycle, its regulation and disorders
- Molecular biology: DNA and RNA structure, replication and consensus sequences. DNA recombination and repair. Mutagens and their effect on DNA and suppressor mutations. Polymerase chain reaction and its application. Transcription and



translation. Post-translation modification of proteins. Protein targeting in the cell. Control of gene expression

- Molecular genetics: Organization of the human genome, structure of the human chromosomes and karyotypes. Satellite DNA and DNA families. C value of genome Cot Yz values of DNA and its relation to repetition. Gene structure, organization, and gene family. Nuclear and mitochondrial chromosomes, karyotypes. Mendelian laws of inheritance, Inheritance disorders and genetic diseases

## 2.2.5 Bio-chemical Techniques

- Introduction to basic bio-informatics and biotechnology
- Carbohydrates, protein and lipid isolation and identification

## 2.2 Medical Physiology

LEARNING MODULE	
	<p><b>Units</b> 7 (Seven)</p> <p><b>Course Purpose</b> To enable the learner to understand the normal functioning of the human body</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain physiological concepts and processes</li> <li>→ Explain the organization and functions of body tissues, organs and systems</li> <li>→ Participate in appropriate laboratory practicals and demonstrations</li> </ul>

## 2.2.1 Physiological Concepts and Processes

- Introduction to physiological concepts: Descriptive terms and units. Properties of physiological solutions; Concept of homeostasis and normal physiology. Cell structure and function; cell physiology and human genetics. Body fluids and compartments; Intravascular and extravascular compartments. Interstitial fluid composition, function and disorders. Functional organization of the body. Variability, homeodynamism and homeostasis. Human genetics: Nucleic acids; Chromosomes, genes, and gene expression; Genetic basis of inheritance; Genetic code; Alleles and genetic polymorphism; Sex-linked genes
- Physiological processes: Cellular communications, Membrane receptor physiology and ligand signalling; Electrical, endocrine, exocrine, autocrine and paracrine communications; Second messengers and amplification cascades; Exchange of materials across cell membranes

## 2.2.2 Body Tissues

- Nervous tissue: Neuronal types, structure and function, Membrane potentials, Bernstein's theory, Donan-Gibbs equilibrium, Nernst equation and the Goldman constant field equation. Action potential: generation' and propagation; subthreshold potentials; Peripheral nerve classification and properties, axoplasmic transport, nerve injury, degeneration and regeneration. Nerve growth factors. The synapse: types, functional organization; Neurotransmission, neurotransmitters and neurotransmitter receptors
- Muscular tissue: Muscle types, organization and functions. The theories of muscle contraction. Disorders of muscle structure and function. Normal and abnormal electromyogram
- Bone and Connective tissues: The physiology of connective tissue proper- cells, fibres and ground substance. Physiology of cartilage and bone: Functional organization, functions, metabolism and disorders. Composition and functions of synovial membranes and fluids
- Blood and blood components: Blood composition and functions; plasma, serum, formed elements and the immune system. Physiology of blood of blood group and blood group serology. Blood coagulation and haemostasis.
- Immune system: Physiology of lymphoid organs mucosa and vascular associated lymphoid tissues, and mononuclear phagocytic cell functions. Cellular interactions in body defence. Pathophysiology of HIV/AIDs and other immune disorders. Interaction between nervous, endocrine and immune systems
- Epithelial tissue: Functional organization, functions and disorders of lining epithelia, mucous and serous membranes. General physiology of exocrine and endocrine glands



### 2.2.3 Systemic Physiology



- Cardiovascular system: Functional organization of the heart and the blood vessels, physics of flow in tubes and haemodynamics. Electrical activity of the heart and the electrocardiogram. Blood volume, cardiac output and blood pressure. Integrated control mechanisms. Response to exercise and training. Haemorrhage and shock. Foetal and neonatal circulation; Circulation through special regions.
- Respiratory system: Functional organisation. Gas laws and physical properties of gases. Breathing, ventilation, lung volumes and capacities. Lung morphometry; Alveolar function. Air-blood barrier. Pulmonary circulation and ventilation perfusion ratios. Integrated control mechanisms and acid base balance. Non one atmosphere respiratory functions. Non-respiratory functions of the lungs.
- Gastrointestinal system: Functional organization and design. Humoral and neuro-myogenic control of regional gut functions. Gut motility and secretion. Gastrointestinal intrinsic and extrinsic glands. Basic nutrition and regional metabolism. Appetite and satiety: regulation of food and water intake. Digestion, absorption, and assimilation. Liver and the biliary system.
- Renal system: Functional organization of the urinary system- kidney, cortex and medulla. The nephron and its functions-osmoregulation, acid-base and electrolyte balance and the kidney. Concept of glomerular filtration rate and renal clearance. Hormonal functions of the kidney. Integrated regulation of blood osmolality, volume and pressure. Autoregulatory control mechanisms. Functional organization of the urinary bladder and micturition reflex.
- The endocrine system: Location, organisation, functions and integrated control of discrete endocrine organs. The hypothalamus, hypothalamo-hypophyseal axis and the pituitary. Pineal gland and its functions. Thyroid hormones and iodine metabolism. Parathormone, calcitonin, vitamin D and calcium metabolism. Adrenal medulla and the catecholamines. The adrenal cortex and the corticoids. The gonads and the sex hormones. The endocrine pancreas and glucose homeostasis. Diffuse neuro-endocrine system. Other organs with endocrine or paracrine functions.
- Reproductive systems and human development: Functional organization and development of the reproductive system; puberty and the climacteric. Gametogenesis and semen formation. Testicular function and its regulation. Blood-testis barrier. Epididymal function and vas deferens. Physiology of glands of male reproduction system - prostate, seminal vesicles, bulbourethral glands. Penile tumescence and detumescence, potency. Ovarian functions, reproductive cycles, ovulation, coitus and fertilization. Uterine and fallopian tubular functions and cyclical changes. Pregnancy, foeto-placenta unit, foetal homeostasis and development. Parturition and foetal adaptation at birth. Lactation, breast-feeding and neuro-hormonal control. Milk composition and functions. Physiological basis of cellular and organ ageing.
- Nervous system: Somatosensory nervous system. Functional organization of sensory receptors and organs. Peripheral sensory mechanisms, coding and information handling. Sensory pathways. Pain and pain behaviour and its central processing at the brainstem reticular formation and thalamus.



Special senses: organs of vision, hearing, olfaction, balance and taste. Motor nervous system: Components of the spinal reflexes, the muscle spindle and Golgi tendon organs. Central motor mechanisms at the spinal cord, the brain stem, the cerebellum and cerebrum. Concept of upper and lower motor neurons. Vestibular function and balance. Sub cortical motor control.

- Higher neural functions: Regional cortical functions, language and speech, learning and memory, motivation and behaviour. Cortical dominance and lateralization. Reticular formation mechanisms of sleep and arousal. Cerebral blood flow regulation, physiological blood brain barrier, cerebral-spinal fluid-formation, composition and function. Blood-CSF barrier. Autonomic Nervous system: Sympathetic, parasympathetic and enteric nervous systems. Hierarchical organization and their regulation. Control of visceral functions; the hypothalamic nuclei, functions and connections. Integration of autonomic reflexes, vital centres and vegetative functions. Body temperature regulation and skin function
- Integument system. Physiology of the skin and its appendages; nails, hair and breast. The skin in body immunity, metabolism and homeostasis
- Musculoskeletal system: Physiology of bone and muscle as a system (functional organization). Musculoskeletal disorders.

## 2.3 Human Anatomy

LEARNING MODULE	
	<p><b>Units</b> 8 (Eight)</p> <p><b>Cell and Tissue Biology, Genetics and Embryology</b> To enable the learner to describe the normal microscopic and developmental anatomy of tissues and organs of the human body as a foundation for dental training</p> <p><b>Systemic Anatomy</b> To enable the learner to describe the normal topographic, microscopic and developmental anatomy of tissues and organs of the human body as a foundation for dental training</p>
EXPECTED LEARNING OUTCOMES	
	<p><b>Cell and Tissue Biology, Genetics and Embryology</b></p> <ul style="list-style-type: none"> <li>→ Describe cell and tissue structure and function</li> <li>→ Explain the principles and concepts of human genetics</li> <li>→ Describe development of the human embryo</li> </ul> <p><b>Systemic Anatomy</b></p> <ul style="list-style-type: none"> <li>→ Describe the development, gross anatomy and histology of the head and neck structures.</li> <li>→ Outline the development, gross anatomy and histology of the other body systems.</li> <li>→ Participate in appropriate laboratory practicals, dissection and demonstrations</li> </ul>

### 2.3.1 Cell and Tissue Structure and Function

- Cell: cell theory, cell structure and organelles; cell functions and functional specialization, cell cycle regulation and disorders.
- Supporting tissue: Classification, cell types, structure, functions of fibrous tissue, cartilage, bone and blood and applied anatomy.
- Propulsion tissue: classification, structure, characteristics, regeneration, distribution and functions.
- Nervous tissue: structural features of neurons and neuroglial cells; organization of peripheral nerves and ganglia.
- Epithelial tissue: characteristics, structural features, classification, distribution, functions and applied anatomy.

### 2.3.2 Principles and Concepts of Human Genetics

- Genetic code and chromosomes; gene expression, genetic drift and polymorphism, multifactorial traits and polygenic inheritance patterns, polymorphism and linkage disequilibrium.

### 2.3.3 Development of the Human Embryo

- Reproductive cycles and female reproductive system
- Gametogenesis. Gamete viability and transport. Fertilization: definition, events and results. Formation and transport of the morular. Blastula, normal and abnormal implantation. Bilaminar germinal disc, gastrulation, neurulation.
- Embryonic folding and organogenesis. Placenta and foetal membranes. Umbilical cord and twinning. Teratology and teratogenesis.
- Neural tube formation, derivatives and anomalies.
- Pharyngeal arches, origin, derivatives and anomalies. Morphogenesis and defects of the face, nose, palate, maxilla, mandible and tongue.
- Development and anomalies of the cardiovascular, reticulo-endothelial, endocrine, respiratory, musculo-skeletal, digestive and uro-genital systems. Specialised sensory organs and the integuments.



### 2.3.4 Gross and Applied Anatomy

- Head and neck: Osteology, innervation, lymphatics and blood supply, musculature and their relationships.
- Oral cavity; organization of the lips, tongue, palate, teeth, gingivae and the salivary glands.
- Outline of osteology, innervation, lymphatics and blood supply, musculature and their relationships in neural system, the thorax, abdominal cavity, pelvic region and upper and lower limbs.

## 2.3.5 Microscopic Organization of Human Body Organs

- Introduction to histological techniques
- Skin: structure appendages, adaptations and functions
- Respiratory system: structure of the nasal cavity; larynx, trachea, the bronchial tree and alveoli.
- Circulatory and lymphatic systems; organization of the blood vessels and the heart, lymph nodes, tonsils, thymus and the spleen.
- Nervous System: Structural and functional organization of the spinal cord, brain, peripheral nerves, ganglia, receptors of general and special sensation.
- Propulsion tissue (muscle and bone): microscopic organization, cell types and features of skeletal, smooth, cardiac muscles and bone.
- Digestive system: major mucosal cell types, hepato-biliary structures and pancreas.
- Endocrine system: microscopic organization, cell types and their features of pituitary, pineal thyroid, parathyroid, endocrine pancreas, adrenal glands.
- Genito-urinary system.

## 2.4 Oral Biology

LEARNING MODULE	
	<p><b>Units</b> 7 (Seven)</p> <p><b>Course Purpose</b> To enable the learner to understand the development, structure and functions of the oro-facial tissues</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the development, gross anatomy and histology of the dental and periodontal tissues</li> <li>→ Describe the development, gross anatomy and histology of the para-oral tissues and structures</li> <li>→ Explain the physiological processes of the oral and para-oral tissues and structures</li> <li>→ Participate in appropriate laboratory practicals and demonstrations</li> </ul>

### 2.4.1 Introduction

- Terminologies and nomenclature used in Oral Biology.
- Techniques: Preparation of tissues for gross and microscopic examination, fixation, and embedding, staining use of microtome. Microscopes, light, polarizing, electro (scanning, transmitting). Guidelines on dental histology, decalcified sections, ground sections.

### 2.4.2 Development and Histology of the Dental and Paradental Tissues

- Amelogenesis, dentinogenesis, cementogenesis and the development of the pulp.
- Development and histology of the periodontium: Gingivae, oral mucosa, periodontal ligament, alveolar bone and cementum.
- Development and histology of the face, jaws, salivary glands and palate

### 2.4.3 Structure of the dental and periodontal tissues



- Enamel dentine, pulp, periodontium, periodontal ligament, cementum, alveolar bone and gingiva.
- Tooth morphology eruption and chronology: Features of crown and root, general characteristics of deciduous and permanent dentition. Arrangement of teeth in arches. Eruption and shedding of teeth.

### 2.4.4 Physiological Processes of Oral and Para-oral Tissues and Structures

- Calcium and Phosphate Metabolism
- Chemical Composition of Teeth: Chemical and structure of enamel; amelogenesis, enamel matrix. Microscopy (SEM, TEM) of calcium hydroxyl phosphate (Apatite) crystallites and their clinical correlations. Chemical structural and function of dentine dentinogenesis, dentine matrix.
- Collagen metabolism and mineralisation of dental structures
- Repair and regeneration of dental structures
- Permeability and age changes in dental and oral tissue:
- Permeability processes, relative permeability of enamel, dentine, cementum, and oral mucosa.
- Fluorides and fluorosis
- Mastication and swallowing
- Speech sound, phonation: physiology, resonance, stammering and snoring.

- Influence of diet and hormones on oral structures.
- Integuments of teeth
- Nasmyth's membrane cuticles, pellicle, plaque and calculus.
- Physiology of saliva
- Defence mechanisms of the oral cavity
- Sensation arising from the oral cavity
- Introduction to occlusion
- Applied oral biology

## 2.5 General Human Pathology

LEARNING MODULE	
	<p><b>Units</b> 9 (Nine)</p> <p><b>Course Purpose</b> To enable the learner understand the aetiology and mechanisms of human diseases</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the basic principles of pathology and host response to disease</li> <li>→ Demonstrate knowledge of microorganisms and their role in health and disease</li> <li>→ Describe the structure, functional organization and pathologies of the immune system</li> <li>→ Describe anatomy, functional organization and pathologies of the haemopoietic and reticuloendothelial tissues</li> <li>→ Describe the biochemical basis of disease</li> <li>→ Explain the principles of determination and certification of the cause of death</li> <li>→ Participate in appropriate laboratory practicals and demonstrations</li> </ul>

### 2.5.1 Principles of Pathology

- Terminology, definitions and concepts.
- Cell types, growth and differentiation, cell and tissue injury.
- Inflammation, tissue repair and regeneration.
- Neoplasia: Classification of neoplasms, carcinogenesis; pathogenesis of neoplasms; tumour immunology; paraneoplastic manifestations; cancer epidemiology and prevention.
- Congenital and acquired disorders of: Central and peripheral nervous systems; Skin, bone and connective tissue; Respiratory system; Cardiovascular system; Gastrointestinal system; Renal/urinary system; Reproductive system; Endocrine system.
- Principles of determination and certification of the cause of death

### 2.5.2 Microbiology

- Classification and taxonomy of bacterial, parasitic, fungal, prions and viral agents. Culture of microorganisms. Virulence of microbiological agents. Principles of diagnostic procedures in bacteriology, parasitology, mycology and virology. Asepsis and use of anti-microbial agents.

### 2.5.3 Immunology

- Functional organization of the immune system: Innate and acquired immunity; active, passive and adaptive immunity; humoral and cellular immunity; diversity of immune response; damaging effects of the immune response; regulation of Immune response.
- Host defence against pathogens: Innate and adaptive immune defence mechanisms used by pathogens to evade the immune response.
- Vaccine production, schedules, administration and associated complications. Immunodiagnostic tests.

### 2.5.4 Haematology



- Erythrocyte and leukocyte disorders, haemostasis and coagulation, blood neoplasms and blood transfusions.

### 2.5.5 Clinical Chemistry

- Specimen collection, processing and analysis; interpretation of results; predictive values and efficiency of a test, test selection; quality assurance in clinical chemistry.



## 2.6 Pharmacology and Therapeutics

LEARNING MODULE	
	<p><b>Units</b> 5 (Five)</p> <p><b>Course Purpose</b> To equip learners with knowledge in principles of basic and clinical pharmacology</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the general principles of pharmacokinetics and pharmacodynamics</li> <li>→ Describe the classification of drugs and other therapeutic agents</li> <li>→ Apply knowledge of therapeutic principles of drugs and other therapeutic agents</li> </ul>



### 2.6.1 Principles of Pathology

- Introductory pharmacology. Pharmacokinetic and pharmacodynamic concepts in drug therapy including drug interactions.
- Antimicrobials: Introduction to antimicrobials. Antibiotics, antifungals, Antiparasitic and antivirals.
- Analgesics: Non-narcotic and Narcotic drugs
- Anaesthetics: Local and general anaesthetics; Muscle relaxants; Sedative-hypnotics
- Systemic Pharmacology: Drugs used for disorders of the cardiovascular, renal, alimentary, respiratory, endocrine, nervous, musculoskeletal, dermatological and haemopoietic systems.
- Vitamins: clinical pharmacology of endogenous and exogenous vitamins.
- Anticancer Agents

### 2.6.2 Therapeutics

- Evidence based use of drugs and modes of drug administration.



## 2.7 General Medicine

LEARNING MODULE	
	<p><b>Units</b> 5 (Five)</p> <p><b>Course Purpose</b> To enable the learner understand the aspects of medical conditions relevant to dentistry</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Apply the principles of comprehensive medical history taking and general physical examination</li> <li>→ Diagnose common medical conditions and institute appropriate management including referral</li> <li>→ Diagnose medical emergencies and offer basic life support</li> <li>→ Participate in the management of patients with common medical conditions</li> </ul>

### 2.7.1 General Course Content

- Medical history, physical examination and investigations.
- Disorders of the cardiovascular system, respiratory system, endocrine, nervous, alimentary canal, musculoskeletal and connective tissue and renal systems.
- Disorders of haemostasis and haematopoiesis.
- Infectious diseases: TB, HIV, emerging viral diseases, etc.
- Overview of medical emergencies and their management.

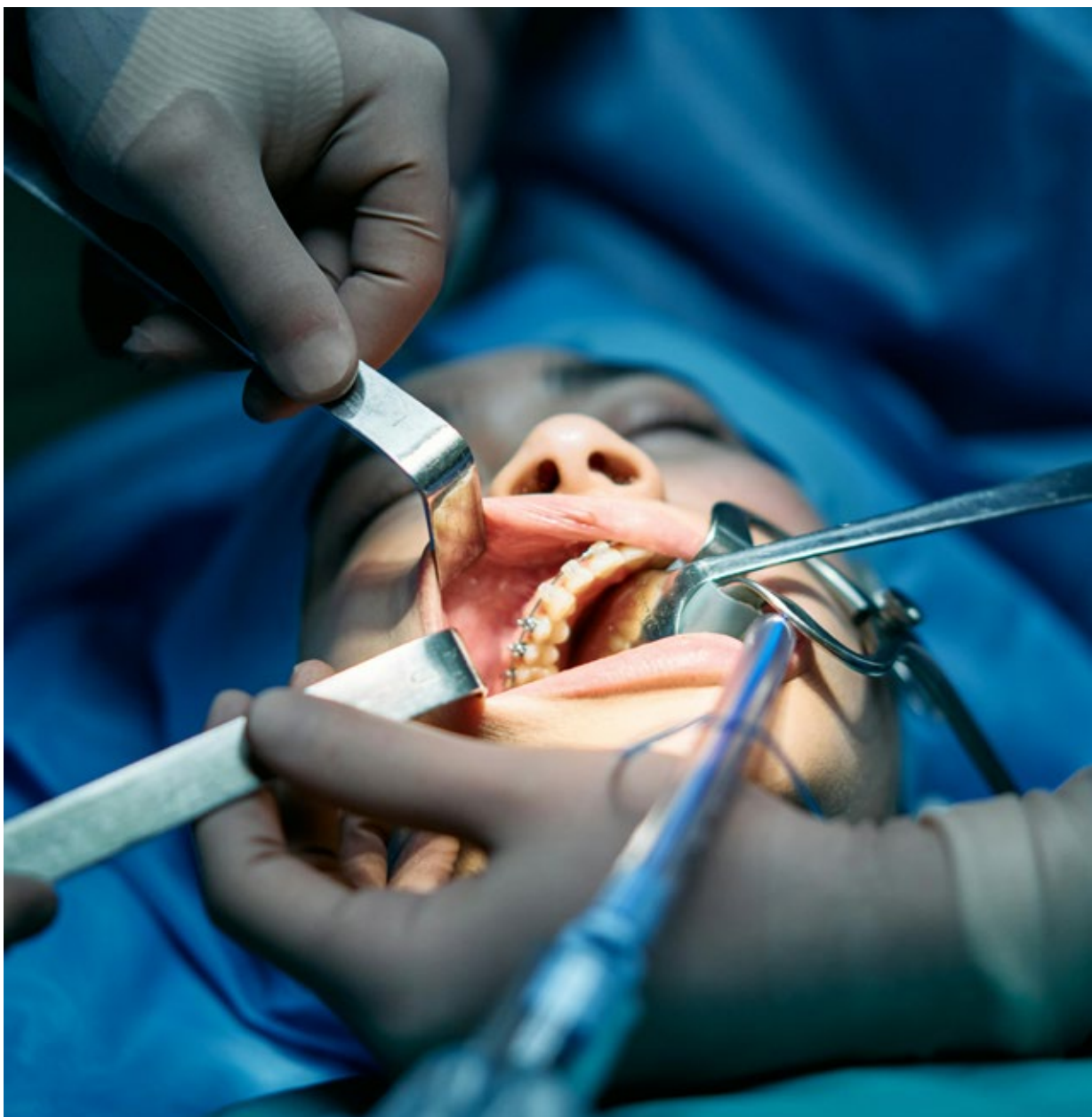
## 2.8 Principles of General Surgery and Anaesthesia

LEARNING MODULE	
	<p><b>Units</b> 5 (Five)</p> <p><b>Course Purpose</b> To equip the learner with knowledge of principles of general surgery and anaesthesia</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain basic principles of general surgery and anaesthesia</li> <li>→ Obtain relevant surgical history, perform physical examination and request appropriate investigations</li> <li>→ Diagnose common surgical conditions and refer accordingly</li> <li>→ Diagnose surgical emergencies and perform basic life support</li> <li>→ Participate in the management of patients with common surgical conditions</li> </ul>



### 2.8.1 General Course Content

- Principles of surgical treatment, Inflammation and wound healing.
- Surgical Diagnosis: History taking and assessment of patients with surgical conditions.
- Trauma: Head injury. Thermal and chemical injuries. Soft tissue injuries, fractures and Joint Injuries, bone healing, complications of bone healing.

- Tumours and cysts.
- Haemorrhage and Shock.
- Blood transfusion, fluid and electrolyte balance.
- Ulcerations, gangrene, sinuses and fistulae.
- General and local anaesthesia.
- ENT: surgical anatomy, infections and neoplasm of the ear, nose and throat. Tracheostomy, its indications, techniques and complications.
- Ophthalmology: surgical anatomy, optical system, infectious and surgical conditions of the eye.
- Surgical emergencies and Cardiopulmonary resuscitation.



## 2.9 Periodontology and Periodontics



LEARNING MODULE	
	<p><b>Units</b> 10 (Ten)</p> <p><b>Course Purpose</b> To enable the learner to effectively manage diseases and conditions affecting the tooth and implant supporting structures</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain the pathophysiology of periodontal diseases and conditions</li> <li>→ Explain principles of periodontal diagnosis and treatment</li> <li>→ Diagnose and manage common periodontal and implant diseases and conditions and refer when appropriate</li> <li>→ Provide oral health education</li> <li>→ Effectively communicate the treatment plan and obtain an Informed Consent</li> <li>→ Perform straightforward implant placement and refer appropriately</li> <li>→ Provide supportive periodontal therapy</li> </ul>

### 2.9.1 General Course Content

- The normal periodontium (anatomy, and aging of the periodontium)
- Classification of periodontal diseases and conditions
- Fundamentals of periodontal disease epidemiology
- Periodontal pathology
- Masticatory system disorders with periodontal bearing
- Aetiology of periodontal diseases (Pathogenesis, role of dental calculus and other local predisposing factors, periodontal microbiology, genetic factors, molecular biology of the host-microbe interaction in periodontal disease, smoking and periodontal disease, periodontal-systemic inter-relationships)

- Treatment of periodontal disease (diagnosis, prognosis and treatment planning and communication to the patient, treatment of periodontal emergencies, non-surgical and surgical therapy, periodontal-restorative interrelationships and maintenance)
- Principles of dental implantology: patient evaluation and case selection, placement of implants



## 2.10 Oral Medicine

LEARNING MODULE	
	<p><b>Units</b> 3 (Three)</p> <p><b>Course Purpose</b> To enable the learner to diagnose and manage oro-facial diseases and disorders</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain principles of diagnosis and treatment of common orofacial diseases and disorders</li> <li>→ Obtain and record an accurate and comprehensive history and perform appropriate physical examination</li> <li>→ Institute appropriate investigations where indicated</li> <li>→ Diagnose and treat common orofacial diseases and disorders and refer as appropriate</li> <li>→ Effectively communicate the treatment plan and obtain an Informed Consent</li> <li>→ Provide appropriate supportive therapy</li> </ul>

### 2.10.1 General Course Content

- Oral Diagnostics: History taking, clinical examination, orofacial assessment, use of diagnostic aids in the diagnosis of orofacial diseases and disorders.
- Management of orofacial infections and disorders

## 2.11 Oral Pathology



LEARNING MODULE	
	<p><b>Units</b> 5 (Five)</p> <p><b>Course Purpose</b> To enable the learner to diagnose and manage oro-facial diseases and disorders</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the common orofacial diseases and disorders, their aetiology, progression and/or propagation</li> <li>→ Classify common orofacial diseases and disorders and discuss their clinico-pathological features</li> <li>→ Interpret the results of appropriate clinical, radiological and laboratory investigation</li> <li>→ Carry out basic diagnostic procedures and treatment for common orofacial diseases and disorders and refer when appropriate</li> </ul>

### 2.11.1 General Course Content

- Dental caries, diseases of the pulp and periapical periodontitis, and diseases of the periodontium: regressive changes in the dental tissues.
- Malformation and developmental changes in the face, jaws, dentition and oral soft tissues odontogenic neoplasm.
- Disorders of the oral mucosa. Ulcerative, vesicular and bullous lesions of the oral mucosa. Miscellaneous disorders of the oral mucosa.
- Infective conditions of the oral mucosa.
- Benign tumour and fibrous connective tissue hyperplasias of the oral mucosa.
- Oral cancer and pre-cancer and other malignant neoplasms of the oral mucosa.
- Diseases and disorders of the salivary glands. Diseases of the jawbone, osteodystrophies affecting the jaw and diseases of the temporomandibular joint, oral aspects of blood and metabolic diseases.

- Cysts and cyst-like diseases. Immunological aspects of oral diseases. Oral manifestation of systemic diseases and therapy.
- Introduction to forensic odontology. Diagnosis of physical and chemical injuries to the face and jaws, components of a basic forensic odontology examination and police/legal report.

## 2.12 Oral and Maxillofacial Surgery



LEARNING MODULE	
	<p><b>Units</b> 10 (Ten)</p> <p><b>Course Purpose</b> To enable the learner to manage common surgical oral and maxillofacial conditions</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the general principles of oral and maxillofacial surgery</li> <li>→ Diagnose and manage common surgical oral and dento-alveolar conditions and refer as appropriate</li> <li>→ Effectively administer local anaesthetics and sedation</li> <li>→ Effectively communicate the treatment plan and obtain an informed consent</li> </ul>

### 2.12.1 General Course Content

- Basic principles of oral and maxillofacial surgery; Infection prevention and control, waste management. Flap design, suture materials and dressings.
- Patient evaluation, diagnostic aids, diagnosis and treatment planning, review of oral and craniofacial anatomy.
- Exodontia and minor oral surgical procedures, wound healing and care of surgical wounds.

- Oral and maxillofacial infections and their management.
- Management of cysts of the head and neck region; craniomaxillofacial skeletal dysplasias; neoplasms of the head and neck region; vasoformative disorders in the head and neck, salivary gland disease, craniomaxillofacial trauma, dysplastic and metabolic skeletal disorders in the head and neck, craniofacial congenital anomalies, temporomandibular joint disorders.
- Surgical aspects of prosthodontics, orthodontics and implantology.
- Therapeutics in dental and oral surgical practice.

## 2.13 Oral-Maxillofacial Radiology and Imaging

LEARNING MODULE	
	<p><b>Units</b> 5 (Five)</p> <p><b>Course Purpose</b> To enable the learner to understand the use of radiological techniques and imaging in the diagnosis of oral and maxillofacial conditions</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the basic principles of diagnostic imaging</li> <li>→ Describe and practice radiation protection and safety</li> <li>→ Obtain Informed Consent</li> <li>→ Perform and interpret basic oral and maxillofacial radiographic examinations</li> <li>→ Take oral and dental photographs</li> <li>→ Effectively communicate the findings to the patient and other health professionals</li> </ul>



### 2.13.1 Physics of Radiology

- The Dental X-ray machine
- Production and properties of X-rays
- Interaction of X-rays with matter
- Image receptors (radiographic film and digital sensors)
- Radiation biology and dosimetry
- Radiation protection and safety
- Image production in X-rays, Ultrasound, CT, MRI, CBCT, etc.

### 2.13.2 Radiography and Imaging



- Radiation geometry
- Bitewing techniques
- Intraoral periapical techniques
- Occlusal techniques
- Dental panoramic tomography
- Extraoral radiographic techniques relevant to dentistry
- Radiographic quality assurance

### 2.13.3 Radiology and image interpretation

- Radiological investigation and diagnosis of caries, periodontal disease, endodontic lesions; periapical, developmental disorders; cysts, tumours, fibro- osseous lesions, infections malignancies, systemic diseases manifested in the oro-facial region
- Localisation of impacted teeth. Radiological diagnosis of dental, mandibular and maxillofacial trauma.
- Radiology of salivary glands, the skull and TMJ, sinuses
- Forensic radiology
- Roles of Ultrasonography, CT, MRI and radioisotope scanning in management of dental and oro-facial lesions

### 2.13.4 Oral and Dental Photography

## 2.14 Oro-Facial Pain and Anxiety Management



LEARNING MODULE	
	<p><b>Units</b> 8 (Eight)</p> <p><b>Course Purpose</b> To enable the learner to manage oro-facial pain and anxiety in patients</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the aetiology, physiology and pathology of oro-facial pain</li> <li>→ Describe the origins and manifestation of anxiety in dental patients</li> <li>→ Assess and manage pain and anxiety in the dental patient</li> </ul>

### 2.14.1 General Course Content

- Philosophy of anxiety and pain control and patient management, including the nature and purpose of pain.
- Review of physiologic and psychologic aspects of anxiety and pain.
- Review of airway anatomy and physiology.
- Physiologic monitoring of central nervous respiratory and cardiovascular systems: observation, oxygenation and ventilation, and monitoring equipment.
- Pharmacologic aspects of anxiety and pain control. Routes of drug administration. Sedatives and anxiolytics. Local anaesthetics. Analgesics and antagonists. Adverse side effects. Drug interactions. Drug abuse.
- Control of preoperative and operative anxiety and pain. Patient evaluation: Psychological status, ASA physical status, type and extent of operative procedure.
- Nonpharmacologic methods of anxiety and pain management
- Local anaesthesia: Review of related anatomy, and physiology, pharmacology, dosing, toxicity, and selection of agents.

- Techniques of administration: topical, infiltration (supraperiosteal), and nerve blocks. Alternative injections-to include periodontal ligament and intraosseous injections.
- Prevention, recognition and management of complications and emergencies.

## 2.15 Paediatric Dentistry



LEARNING MODULE	
	<p><b>Units</b> 7 (Seven)</p> <p><b>Course Purpose</b> To equip the learner with knowledge and skills required in the management of oral conditions in the paediatric patient</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe common paediatric dental conditions</li> <li>→ Investigate, diagnose and manage the common paediatric oral health conditions</li> <li>→ Demonstrate skills in behaviour management of paediatric dental patients</li> <li>→ Apply preventive methods and oral health promotion plan for the patient</li> <li>→ Demonstrate proficiency in the selection and utilization of biomaterials</li> </ul>

### 2.15.1 General Course Content

- Definition and scope of paediatric dentistry.
- Review of development and morphology of the primary and permanent dentition.
- Common oral health conditions in paediatric dentistry: congenital and developmental anomalies, dental caries, dental fluorosis, trauma, periodontal disease, tumours and cysts.
- Child development and psychology including children with special needs.

- Techniques of behaviour management (pharmacological and non- pharmacological).
- History-taking, investigations (clinical, radiographic, histological) diagnosis, comprehensive treatment planning and communication.
- Preventive management of the child and adolescent patient: oral health education, diet counselling, fluoride therapy, pit and fissure sealants.
- Local anaesthesia, tooth isolation, restorative procedures and application of biomaterials in paediatric dentistry. Endodontic therapy in paediatric patients.
- Management of traumatic injuries.
- Atraumatic restorative techniques.
- Child abuse and neglect. Law and ethical issues in the management of the paediatric dental patient.
- Multidisciplinary management e.g. cleft palate and lip.

## 2.16 Orthodontics



LEARNING MODULE	
	<p><b>Units</b> 7 (Seven)</p> <p><b>Course Purpose</b> To equip the learner with competencies in preventing and correcting dental malocclusions</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Manage patients with simple cases of malocclusions</li> <li>→ Demonstrate skills in preventive and interceptive orthodontics</li> <li>→ Design and fabricate removable orthodontic appliances</li> <li>→ Planning and placement of fixed orthodontic appliances for simple malocclusion</li> <li>→ Effectively communicate the treatment and follow up plans, and obtain Informed Consent</li> </ul>



### 2.14.1 General Course Content

- Orofacial and psychological growth and development of children.
- Occlusion and malocclusion: Aetiology, classification, investigations, diagnosis, and treatment planning.
- Principles of biological and biomechanical tooth movement.
- Interceptive orthodontics and prevention.
- Management: Impression taking, study models, removable appliances and habit breakers.
- Laboratory procedures for orthodontics Wire bending, biomaterials and techniques. Welding and soldering.
- Management of malocclusion and retention.
- Functional and myofunctional appliances and space management
- Introduction to fixed and surgical orthodontics.
- Introduction to cephalometrics.

## 2.17 Dental Biomaterials



LEARNING MODULE	
	<p><b>Units</b> 6 (Six)</p> <p><b>Course Purpose</b> To equip learners with knowledge and skills in the use of dental biomaterials</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Discuss dental biomaterials used in the management of patients</li> <li>→ Manipulate appropriately dental biomaterials</li> <li>→ Demonstrate skills in handling of dental biomaterial waste</li> </ul>

### 2.17.1 General Course Content

- Introduction to dental biomaterials.
- Structure and properties: Metals, ceramics, polymers and resins.
- Application of dental biomaterials and evaluation methods.
- Biological screening and biocompatibility.
- Laboratory materials: Gypsum products; formulation, setting reactions, properties, applications, Plaster of Paris, dental stone and die stone.
- Alternative materials: epoxy, silicophosphate, dental amalgam and phase-down, metal plated dies. Dental waxes; Sources, chemistry, applications.
- Clinical materials: Dental acrylic polymers; Classification, composition, setting reactions, properties, handling and applications.
- Heat, cold and light cured resins.
- Artificial teeth materials: Acrylic, porcelain, and glass ceramic.
- Impression materials: Requisites, classification, properties, manipulation and applications.
- Elastic Impression Materials: hydrocolloids, polyvinyl siloxanes, condensation silicones, polyethers and polysulphides.

- Dental cements: Zinc oxide eugenol; resin, Ortho ethoxy benzoic acid, vanillate ester reinforced. Zinc polycarboxylate, zinc phosphate, silicophosphate, silicate, and calcium hydroxide.
- Resin cements: Glass ionomer cements, Compomers, amalgomer and Polyphosphonate modified.
- Dental alloys; Principles of casting, classification, composition, properties, manipulation, applications, current modifications. Cast alloys; gold, nickel chromium, cobalt chromium, titanium.
- Implant Biomaterials: Pure commercial titanium, titanium-Vanadium alloy, zirconium and stainless steel.
- Vulcanised silicone rubber, latex, Polymethyl and methacrylate.
- Ceramics: bioglass, aluminium oxide, hydroxyl apatite. Combined titanium and ceramics.
- Quality control in dental biomaterials.

## 2.18 Restorative Dentistry (Conservative Dentistry and Endodontics)

LEARNING MODULE	
	<p><b>Units</b> 16 (Sixteen)</p> <p><b>Course Purpose</b> To equip the learner with knowledge and skills in the restoration of teeth</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Diagnose and manage patients requiring restorative procedures</li> <li>→ Perform operative dentistry procedures</li> <li>→ Perform basic endodontic procedures</li> <li>→ Effectively communicate the treatment and follow up plans</li> </ul>



## 2.18.1 Operative Dentistry

- Introduction, definition and scope.
- Lesions affecting calcified tooth structure. Cavity classification and nomenclatures.
- Instruments and instrumentation: General classification, instruments for diagnosis, cavity preparation and restoration.
- Principles of tooth preparation: Definition. Need and objectives of restorations. Principles of cavity preparation.
- Patient assessment, examination, diagnosis and treatment planning.
- Moisture and pain control. Aseptic techniques, Lining and restorative materials, (amalgam and tooth coloured materials)- clinical application and techniques.
- Selection of suitable restorative material: Requirements of an ideal restorative material. Factors influencing selection of restorative material.
- Tooth form and occlusion: Inter-proximal relationship. Occlusal relationship.
- Aesthetic Dentistry: Principles of colour: hue, chroma and value.
- Discoloured teeth: Causes and management.
- Composite and Porcelain Veneers: preparation techniques, impression and cementation.

## 2.18.2 Endodontics

- Anatomy and diseases of dental pulp.
- Diagnostic aids: Radiographs and vitality tests.
- Instruments and instrumentation techniques
- Pulp capping, pulpotomy, mummification, apexogenesis, apexification and pulpectomy.
- Techniques and Materials: Access cavity, Pulp extirpation. Determination of working length. Chemico-mechanical Preparation. Irrigants and medicaments. Obturation (techniques and materials).
- Root resorption, perio-endo lesions, endodontic emergencies, endodontic complications and management.
- Surgical Endodontics: Principles, indication, techniques, incisions, Apicectomy, hemisection and root amputation.
- Restoration of root treated teeth.

## 2.19 Prosthodontics

LEARNING MODULE	
	<p><b>Units</b> 16 (Sixteen)</p> <p><b>Course Purpose</b> To equip the learner with knowledge and skills in the diagnosis and management of edentulousness and orofacial defects using prostheses</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Diagnose and manage edentulousness and oro-facial defects</li> <li>→ Perform basic fixed prosthodontic procedures</li> <li>→ Restore straightforward dental implants</li> <li>→ Maintain dental and implant prostheses</li> <li>→ Perform laboratory procedures relevant to prosthetics</li> <li>→ Effectively communicate the treatment and follow up plans</li> <li>→ Participate in multidisciplinary care of patient</li> </ul>

### 2.19.1 Dental technology

- Laboratory equipment, instruments and materials. Anatomical changes associated with loss of teeth. Anatomical landmarks of edentulous mouth. Diagnosis and treatment planning.
- Impression trays, stock trays and special trays. Impressions taking from demonstration cast (models). Boxing impression. Base plates: types, material and their requirements, methods of constructing base plates. Articulators.
- Occlusion and articulation: definition, brief principles of balanced articulation, methods of obtaining balanced articulation, occlusal grinding.
- Occlusal rims: materials used, types and application. Laboratory procedures: waxing up dentures, processing and finishing denture. Introduction to implant crown fabrication.

## 2.19.2 Removable Prosthetics

### Complete Denture

- Investigation, diagnosis and treatment planning. Impression: types, techniques, mouth preparations and materials. Selection of teeth. Maxilla-mandibular relation and jaw registration. Principles of teeth arrangement in reference to jaw relations. Complete denture occlusion. Try in stage and denture insertion.
- Retention: Definition and contributing factors, occlusal surface; muscular forces, impression surface; physical forces, role of saliva, area of impression surface, accuracy of fit, border seal and gravity.
- Support: Definition, quality and quantity of denture bearing area, mucosa, residual alveolar ridge and arch form.
- Stability: Definition, factors contributing to instability of denture.
- Dentist-technologists communications.
- Difficult cases, complications and their management.
- Immediate and overdentures, single complete denture, dental implant prosthesis, denture duplication, relining, rebasing and repair

### Partial Dentures



- Introduction and classification, occlusion, patient selection and evaluation, diagnosis and treatment plan.
- Components, impressions, dental surveying, mouth preparations, wax pattern, investment techniques, casting technology, devesting, finishing and polishing, try-in framework, jaw registration, try-in framework with teeth, insertion and aftercare, provisional prosthesis, patient counselling/ communication.

## 2.19.3 Fixed Prosthodontics

- Introduction, patient selection and evaluation.
- Principles of occlusion and occlusal equilibration.
- Dental and implant crowns, partial veneers, endocrowns, three quarter crowns, labial veneers, onlays and inlays: Shade selection. Preparation techniques. Impression materials and technique. Tissue management and temporary crowns. Cementation – materials and techniques.
- Bridges: Types of bridge, components, clinical and laboratory techniques. Temporary bridge preparation – direct and indirect technique and cementation. Care and maintenance of fixed restoration. Complications and their management.



## 2.20 Dental Public Health (Community Dentistry)

LEARNING MODULE	
	<p><b>Units</b> 6 (Six)</p> <p><b>Course Purpose</b> To equip the learners with knowledge and skills in the prevention of oral and dental diseases/ conditions; promotion of good oral health, and conducting oral health research</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the underlying principles of Dental Public Health (DPH)</li> <li>→ Discuss the epidemiology of oral disease/conditions</li> <li>→ Implement strategies of Oral health promotion (OHP), disease prevention and oral health education in the community</li> <li>→ Design and conduct population-based studies to answer oral health questions</li> </ul>

### 2.20.1 Principles of Dental Public Health:

- Definition of DPH and a public health problem.
- Essential Dental Public Health functions.
- Community structure and function.
- Demography.
- Determinants of health; socio-cultural, political, environmental, behavioral.
- Global health, role of other sectors (e.g. water and sanitation, agricultural sectors, etc) in oral health.
- Emerging issues / Trends in dental public health.

## 2.20.2 Behavioural Sciences

- Concept and Role of psychology, sociology and anthropology in dentistry, psychosocial and intellectual development, structure and personal determinants of personality and self-determination, health seeking behaviour, intelligence, thinking, learning and memory, motivation, emotions and behaviour change, fear and anxiety.
- Theories of human behaviour: Abraham Maslow's hierarchy of needs.
- Socio-cultural habits and practices that influence oral health, diet, culture and oral diseases, awareness of ethnodentistry, alternative dentistry and biomedicine, social formation of the individual.
- Group and group behaviour; classification of groups, functions of groups to members, group dynamics
- Pain and pain behaviour: definition, psychosocial and cultural factors that influence pain and pain behaviour.

## 2.20.3 Demography

- Demographic variables: Mortality, fertility and migration,
- Sources and uses of demographic data, census, vital statistics, demographic transition theory, population structure and its effects on planning for health services.

## 2.20.4 Epidemiology

- Concepts and types of epidemiology, sources and uses of epidemiological data, patterns of disease, "person, place and time" model, "host-agent-environment" model.
- Epidemics; definitions and control.
- Natural history of a disease and its importance in disease prevention.
- Measures of association (risk, relative risk, attributable risk, odds ratio).
- Prevalence, Risk factors and Indices for Dental caries, Periodontal diseases, Dental fluorosis, Malocclusion, Oral and Maxillofacial tumours and cysts, Head and neck trauma.

## 2.20.5 Oral Health Education and Promotion

- Health education and promotion: Definition, principles, rationale. Strategies including the common risk factor approach. Planning, monitoring and evaluation of Community health education including school health programmes.
- Methods and communication media used in oral health education, preparation of oral health education materials.
- Role of Oral health policies and legislations.
- Oral health care financing
- Oral Health care for vulnerable groups – (Children, handicapped, elderly, prisoners, refugees),

## 2.20.6 Oral Disease prevention

- Concepts of primary, secondary and tertiary prevention.
- Methods of oral disease prevention at individual and community level;
- Public health approaches to the prevention of dental caries (role of diet, fluoride, fissure sealants), periodontal disease, oral cancer and traumatic dental injuries, dental fluorosis.



## 2.20.7 Occupational Hazards, Infection Prevention and Control, and Waste Management

- Protection of the patient and the public
- Occupational hazards in dentistry and methods of their prevention and control
- Ergonomics
- Infection prevention and control in dentistry
- Waste management and environmental protection.
- Physician/Practitioner Wellnes

## 2.20.8 Oral Health Research

- Rationale and significance of research, Criteria and factors to consider when selecting a research topic in dental public health
- Steps in development of a research proposal
- Carry out research
- WHO Oral Health Survey Basic methods.
- Critique and synthesize scientific literature

## 2.21 Research Methods and Research Project

LEARNING MODULE	
	<p><b>Units</b> 6 (Six)</p> <p><b>Course Purpose</b> To equip the learners with knowledge and to undertake a scientific research and utilize research findings</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain the scope of scientific enquiry</li> <li>→ Write a research proposal</li> <li>→ Collect data, analyse and interpret results</li> <li>→ Discuss and disseminate research findings</li> </ul>

### 2.21.1 Research

- Definition; nature of; use and application; scientific enquiry; concept, nature and process.
- Types of research: Basic; Applied; Operational; Evaluative.

### 2.21.2 Research Designs and Methods

- Descriptive; cross sectional; analytical; longitudinal; cohort retrospective; case control; experimental; clinical trials; quasi-experimental
- Research methods: Qualitative: focus groups, key informants, case studies, Interviews, Quantitative-descriptive and analytical
- Sampling methods: simple random; stratified; cluster; same size determination
- The role of institutional research and ethics committee: Processing the research protocol through the right channels; Confidentiality; Consent; Intervention; incentives and inducement.



### 2.21.3 Proposal Design

- Research instruments: questionnaires, interview guides; characteristics and application
- Proposal development: identification of problem; problem statement; introduction background information; rationale/justification; study objectives; literature review; methodology; data management; budget and time frame; appendix; bibliography.

### 2.21.4 Disseminating of Findings

- Report writing:
- Dissemination of research findings: methods of dissemination – scientific paper, reports, seminars, use of findings.

## 2.22 Leadership, Management and Governance in Health Systems

LEARNING MODULE	
	<p><b>Units</b> 3 (Three)</p> <p><b>Course Purpose</b> To equip the learner with knowledge and skills required for effective leadership, management and governance of health care systems</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Demonstrate skills in leadership and management of healthcare systems</li> <li>→ Demonstrate skills in health information management and communication</li> <li>→ Describe skills in quality management in health service delivery</li> <li>→ Describe the governance structures, systems and their operations</li> <li>→ Discuss the principles of project management</li> </ul>



## 2.22.1 Research Principles and Theories of Leadership and Management

### Leadership and Management Concepts

- Introduction to Leadership and Management; concepts, theories, styles, practices; Relationship between leadership and management; Roles and functions; Mission and Vision.
- Managing change.
- Operations management.

### Human Resource Management

- Concepts and principles; Practices in human resource management;
- Human Resource Development.

### Commodity and Supplies Management

- Commodity Management Cycle including: Distribution and storage;
- Inventory management procedures including; Procurement procedures;
- Ethical and legal implications in commodity and supplies management.

### Financial Resource Management

- Sources of health care financing
- Financial accounting systems and mechanisms
- Accounting documents; Imprest, vouchers, per diem, Facility Improvement Fund (FIF), Salary, Allowances, Vote Books.

### Organizational Structures

- Organizational structure of the health care system; structures, functions.
- Health services delivery; levels of service, health services at each level, actors, cadres, referral system.

### Quality Assurance in Health Services

- Quality assurance; concepts, principles.
- Quality assurance in the healthcare setting
- Methods and tools of measuring quality;
- Standards in measuring quality.

## Health Information Systems

- Health Information; Sources, types, systems.
- Data collection methods and analysis
- Information utilization; applications, policy development, decision making.

### 2.22.2 Governance



- Governance policy and operational documents, constitution, structures, operations;
- Strategic management, health reforms, national health plans;
- Performance appraisal

### 2.22.3 Project Management and Monitoring and Evaluation

- Project Management: Principles, concepts, the importance of planning; Project Planning: Types of plans; planning process.
- Monitoring and Evaluation: Concepts, types, processes; tools; logical framework approach (LFA); Reports.



## 2.23 Dental Ethics, Professional Conduct and Medico-Legal Issues

LEARNING MODULE	
	<p><b>Units</b> 3 (Three)</p> <p><b>Course Purpose</b> To equip the learner with the knowledge of ethical and medico-legal issues and professional conduct of the practice of dentistry</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Discuss the ethical principles and values which underpin the practice of good dentistry and medical research</li> <li>→ Demonstrate understanding of the knowledge of healthcare legislation and regulation in Kenya</li> <li>→ Discuss the concept of Life, Death, Dying and Killing and Recognize vulnerabilities created by the duties of doctors and medical student</li> <li>→ Demonstrate ethical knowledge in the care of special/vulnerable groups</li> <li>→ Demonstrate appropriate ethical behaviour in professional practice</li> </ul>

### 2.23.1 Ethical Principles and Values

- Definitions: ethics, morality, professionalism; characteristics of the medical profession
- Informed consent and refusal of treatment: Why respect for autonomy is so important; adequate information and comprehension, non-coercion; treatment without consent and proxy consent competence;
- The clinical relationship: truthfulness, trust, and good communication- Ethical limits of paternalism; building trust; honesty, courage, and other virtues in clinical practice;
- Confidentiality: Clinical importance of privacy: compulsory and discretionary disclosure; public v private interests; importance of cultural, gender, inter-generational, religious, and racial sensitivity.

### 2.23.2 Ethics in Vulnerable Groups

- Children's rights and interests; age in the determination of competence to consent to or refuse treatment; legal boundaries of consultation with younger and older children as regards consent to treatment; doctor/ parent relationship: proxy decision making and protecting children's interests; child abuse, battery and negligence
- Mental disorders and disabilities: Ethical and legal justifications for detention and treatment without consent; conflicts of interests between patient, family, and community
- Prisoners and people in detention.

### 2.23.3 Emerging Issues

- The 'New Genetics': Legal, moral and ethical issues; Gene therapy; cloning; genetic versus personal identity implications; transplantation.

### 2.23.4 Life, Death, Dying and Killing

- Palliative care, length and quality of life and good clinical practice. The duty of care and ethical and legal justifications for the non-provision of life prolonging treatment and the provision of potentially life shortening palliatives:
- Euthanasia and assisted suicide concepts and principles
- Organ donation and harvesting – legal and social issues
- Death certification in patients who are brain dead

### 2.23.5 Medical Research

- Individual rights, moral dilemma, and the interests of others. Therapeutic and non-therapeutic research; Professional and legal regulation of medical research; Ethical distinctions between research, audit and innovative and standard therapy, patients and healthy volunteers;
- Ethical and legal tensions in doing medical research on patients, human volunteers, vulnerable groups, and animals; the need for effective regulation; Helsinki declaration; Hippocratic oath.



### 2.23.6 Professional Vulnerabilities

- Public expectations of a medical doctor; the need for teamwork; the health of doctors and students in relation to professional performance; responding appropriately to clinical mistakes; whistle blowing.
- The law of negligence, KMPDC complaints and disciplinary procedures; risks, sources of help and duties to disclose; human rights; medical ethics and the involvement of doctors in police interrogation, torture and capital punishment.



### 2.23.7 Patient Rights

- Human rights bill, Constitution of Kenya, Article 20, 43, 53-57 etc.,
- Helsinki Declaration, International recognition of human rights.

### 2.23.8 Codes and Acts

- National: Medical practitioners' and Dentists' Act; Public Health Act; The Human Anatomy Act
- International: The Helsinki Declaration; The Nuremberg Convention; Geneva Convention; The International Code of Medical Ethics; the Tokyo Declaration; The Malta Declaration; The Oath of Athens; Hippocratic Oath



## 2.24 Information and Digital Technology in Healthcare

LEARNING MODULE	
	<p><b>Units</b> 3 (Three)</p> <p><b>Course Purpose</b> To enable the learner to use information technology in patient management and healthcare</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Apply the skills of computer technology in learning, delivery of healthcare and research</li> <li>→ Utilize information technology in data management in healthcare including data protection and security</li> <li>→ Demonstrate basic knowledge of digital technology in dentistry</li> </ul>

### 2.24.1 General Course Content

- Reasons of computers in Healthcare/ Application of IT in health care;
- Requirements for computer rooms;
- Medical record keeping, and retrieval and searching for information,
- Health Informatics: Organisation of Health informatics department; Functions of staff;
- Tool for managing and processing health data;
- Database and database design, Database processing and management systems
- Health information challenges, Information Security issues and Solutions – Data security laws and policies
- IT in health research; Analysis and presentation of healthcare statistics.
- Digital technology in dentistry: Types of digital innovation; Basic concepts of telemedicine, Artificial intelligence, Robotics, Virtual reality, Biomedical devices.



## 2.25 Introduction to Entrepreneurship

LEARNING MODULE	
	<p><b>Units</b> 1 (One)</p> <p><b>Course Purpose</b> To equip the learner with knowledge of entrepreneurship and its application</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Describe the fundamental concepts of entrepreneurship</li> <li>→ Describe the processes involved in starting a new business</li> <li>→ Describe alternative ways of investment and entrepreneurial financing</li> </ul>

### 2.25.1 General Course Content

- Fundamental concepts of entrepreneurship: evaluating business opportunities: market opportunity; idea conception; business models and planning, sources of value; resources and risk taking; drivers of long-term competitive advantage
- Core elements of starting new businesses: financial projections and modelling; business development and sales strategies; the investment process; creating and communicating a business plan
- New Venture Finance: private equity; investing in private companies, and entrepreneurial finance, the financial tools most relevant to young companies.



## 2.26 Basic Life Support and Medical Emergencies

LEARNING MODULE	
	<p><b>Units</b> 2 (Two)</p> <p><b>Course Purpose</b> To enable the learner competently manage medical emergencies and provide basic life support</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Recognise medical emergencies</li> <li>→ Provide basic life support, stabilize and refer appropriately</li> <li>→ Identify patients at risk of medical complications and take appropriate measures</li> <li>→ Participate in managing medical emergencies and offering basic life support</li> </ul>

### 2.26.1 General Course Content

- Medical emergencies: Syncope, hypoglycaemia, hyperglycaemia, hypertension, seizures, asthma, asphyxia and anaphylaxis, bleeding, shock, angina, myocardial infarction, cardiopulmonary arrest and others.
- Emergency drugs: adrenalin, oxygen, oral glucose solution, glucagon injection, Valium, salbutamol inhaler, midazolam, glyceryl trinitrate, atropine, hydrocortisone and others.
- Techniques and equipment: portal oxygen cylinder, oxygen face mask, oral pharyngeal airways, portable suction and suction catheters and tubing, disposable syringes and needles, automated blood glucose measurement device, space saver for inhaled bronchodilators, automated external defibrillator (AED), emergency telephone numbers and others.
- Skills: CPR, AED, ABCDE approach, IV Infusion, Oxygen administration, Tracheostomy, Resuscitation, Effective patient transfer, Communication and others.

## 2.27 Communication Skills for Health Workers


LEARNING MODULE	
	<p><b>Units</b> 2 (Two)</p> <p><b>Course Purpose</b> To enable the learner to develop the knowledge, skills and attitudes necessary for effective and sensitive communication with patients, families, care givers professional colleagues and other stakeholders</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> <li>→ Explain theories and principles relating to human communication</li> <li>→ Evaluate the contribution of socio-cultural knowledge, age, gender and emotional status to communication between doctor and patient</li> <li>→ Demonstrate appropriate interviewing skills applicable the doctor- patient interactions</li> <li>→ Communicate effectively in challenging patient's circumstances</li> </ul>

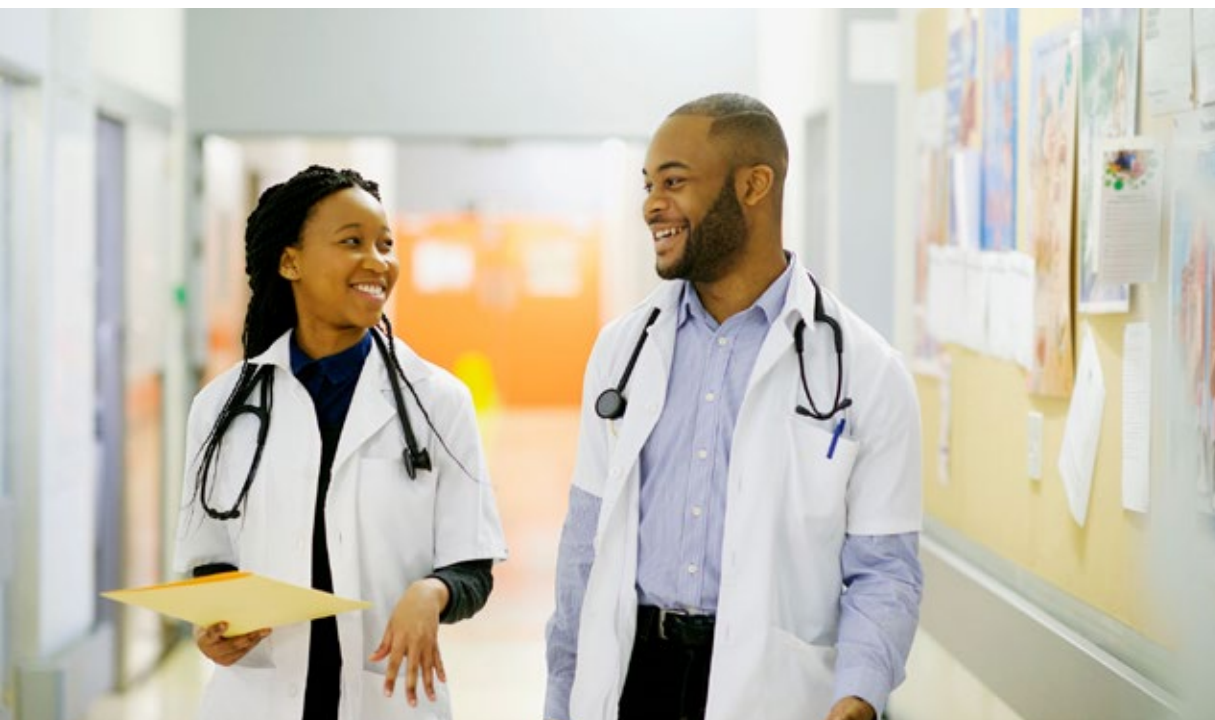
### 2.27.1 General Course Content

- Concept, principles and theories of human communication: verbal and nonverbal communication; Language; Interviewing; definition, environment; behaviour, techniques. Interview; recording reproduction.
- History taking and communication skills: Questioning and active listening: open questions, focused and closed questions, probing questions; Listening: effective listening, verbal and non-verbal cues, appropriate body language, facilitative comments; Encouraging; Summarizing Socio-cultural variations in human communication. Use of appropriate communication skills for the patients' culture during interviews, Ethics in interviewing.



- Challenging patients: angry patients; reticent patients; talkative patients; those with physical impairments which hinder communication i.e. deafness, speech impediments.
- Communicating about sensitive subjects (breaking bad news): what constitutes a sensitive subject; factors that can make us reluctant to impart bad news; empathy with the patient; sexual history- importance of a sexual history both in physical and psychological illness, sexual history from e.g. the opposite sex, adolescents, elderly people, disabled people, people from different cultures.
- Communication with professional colleagues and other stakeholders including care givers, family members, community, financiers, politicians, media, etc

## 2.28 Common Undergraduate Courses

LEARNING MODULE	
	<p><b>Units</b> 4 (Four)</p> <p><b>Course Purpose</b> To take a multidisciplinary approach to practising as a doctor in a modern health service</p>



## 2.29 Dental Electives

LEARNING MODULE	
	<p><b>Units</b> 8 (Eight)</p> <p><b>Course Purpose</b> To provide learners with opportunities to widen their curriculum-based experiences in areas of their interest which will be useful in their career</p>
EXPECTED LEARNING OUTCOMES	
	<p>→ The learner should be able to provide a report on their elective experience</p>

### 2.29.1 General Guidelines

- During this period learners may choose to take a programme in basic social or clinical sciences or any other field relevant to their future career.
- Develop a plan of their learning activities and the implementation process.
- The learners will be responsible for making arrangements (including finances) pertaining to the elective.
- The students shall submit a plan of their activities for approval.
- Upon completion of the elective the students shall submit a written report.
- A confidential report shall be submitted to the Dean from the host institution regarding the learner's performance.
- The institution shall provide learners with guidelines of their conduct during the elective.
- Students shall conform to the rules and regulations of the host institution during their electives. Where research is involved, approval will be sought from the host institution.



## Section 3.0

# Annexes

### 3.1 List of Suggested Books and Reference Materials

#### 3.1.1 Important Notice to Students and All Other Users

The list here below indicates the suggested Text Books which BDS students should find relevant and useful. While every effort has been made to ensure that the list is comprehensive and accurate at the time of publication, the Council cannot take any responsibility for omissions or commissions that may lead to the acquisition of material not necessarily required for a particular course at any given time.

Furthermore, the Council stresses that the list is not exhaustive; and whereas every effort has been made to ensure currency and accuracy, it remains the sole responsibility of course leaders at every academic institution, to provide proper guidance to students in ensuring the acquisition, purchase as well as reference to the most recent sources and any new developments in the dental field.

#### 3.1.2 Suggested Books and Reference Materials

Melfi, R.C and Alley, K.E (2000). *Permar's Oral Embryology and Microscopic Anatomy: A Textbook for Students in Dental Hygiene* (10th edition). Lippincott, Williams & Wilkins. ISBN-13: 978-0683306446

Nelson, Stanley, J (2019). *Wheeler's Dental Anatomy, Physiology and Occlusion* (9th edition). Saunders. ISBN-13: 978-0323638784

Das, J.C (1985). *Pedodontics*. Current Distributors

Carr, Allan, B and Brown, T David (2016). *McCracken's Removable Partial Prosthodontics* (13th edition). Mosby. ISBN-13: 978-8131245248

Dean, Jeffrey, A; Avery David, R and McDonald Ralph, E (2021). *McDonald and Avery Dentistry for the Child and Adolescent*. Elsevier Health Sciences. ISBN-13: 978-0323698207

Baer, S. Adela (1971). *Central Concepts of Biology*. Macmillan

Marsh, D Philip, et al. (2016). *Oral Microbiology*. Elsevier Health Sciences, UK. ISBN-13: 978-0702061066

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Provenza, Dominic Vincent (1988). *Fundamentals of Oral Histology and Embryology*. Leah & Febiger

Tilakraj (2003). *Essentials of Pedodontics*. Jaypee Brothers

Cawson, Roderick, A and Odell, W Edward (2017). *Cawson's Essentials of Oral Pathology and Oral Medicine*. Elsevier Health Sciences. ISBN-13: 978-0702049828

Bhalajhi, I, Seema (2009). *Orthodontics: the Art and Science* (4th edition). Arya (Medi) Publishing House

Landau, R. Barbara (1980). *Essential Human Anatomy and Physiology* (2nd edition). Scott Foresman and Company.

Forrester, J. Donald, et al (1980). *Pediatric Dental Medicine*. Lea & Febiger

Gartner, Leslie, P. (2010) *Color Atlas of Histology* (5th edition). Lippincott, Williams & Wilkins

Atri, S. C. (2002). *Surgery for Dental Students*. Jaypee Brothers Publishers

Chambers, James A. (2013). *Tarascon Plastic and Reconstructive Surgery Pocketbook*. Jones and Bartlett Publishers. ISBN-13: 978-1449636364

Giele, Henk and Cassell, Oliver (2008). *Plastic and Reconstructive Surgery*. Oxford University Press

Cocke, M, William, et al. (1979). *Essentials of Plastic Surgery*. Little Brown. ISBN-13:978-0316149211

Fejereskov, Ole and Kidd, Edwina (2015). *Dental Caries: The Disease and its Clinical Management*. John Wiley & Sons. ISBN-13: 978-1118935828

Johnson, Roderick David (1997). *Anatomy for Dental Students* (3rd edition). Oxford University Press

Craig, George Robert and Ward, Marcus, L (1997). *Restorative Dental Materials*. Elsevier España. ISBN-13: 978-0815119203

Van Beek, Geoffrey, C (1983). *Dental Morphology: An Illustrated Guide*. Wright-PSG. ISBN-13: 978-0723606666

Meechan, J.G, et al (1998). *Pain and anxiety Control for the Conscious Dental Patient*. Oxford University Press. ISBN-13: 978-0192628480

Pramod, John, (2012). *Principles of Practical Oral Medicine and Patient Evaluation*. CBS Publishers and Distributors. ISBN-13: 978-8123913056

Tripathi (2006). *Text Book of Physiology for Dental Students*. Elsevier, India. ISBN-13: 978-8131225318

Chandra, Satish, et al (2010), *Dental and Oral Histology with Embryology and Multiple Choice Questions*. Jaypee Brothers

Interactive CD *Inside oral Histology Development Structure and Function*

Amwayi, P; Hassanali, J; Ngassapa, D (1996). *Practical Manual Oral and Craniofacial Histology and Embryology*. Digital depository: URL: <http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/50736>

Ngassapa, D. N. B.; Hassanali, J.; Amwayi, P.; Guthua S. W. (1997). *Essentials of Orofacial Anatomy*. URL: <http://erepository.uonbi.ac.ke:8080/xmlui/handle/123456789/26852>

Tandon, Shobha (2009). *Textbook of Pedodontics*. Paras Medical Publisher

Anusavice, Kenneth, J (2012). *Phillip's Science of Dental Materials* (Middle East & Africa Edition). Elsevier Health Science. ISBN-13: 978-1437724189

Walton, Richard, E. Torabinejad, Mahamoud (2014). *Endodontics: Principles and Practice* (4th Edition). Elsevier Health Sciences. ISBN-13: 978-1455754106

Rosenstiel, Stephen, F., et al (2015). *Contemporary Fixed Prosthodontics* (4th Edition). Elsevier Health Sciences. ISBN-13: 978-0323080118

Hall, Roger, K (1994). *Pediatric Orofacial Medicine and Pathology*. Routledge, Chapman & Hall, Incorporated. ISBN-13: 978-0412348600

Budnick, Steven, D. (1981). *Handbook of Paediatric Oral Pathology*. Year Book Medical Publishers

McDonald, F and Anthony, J. I. (1998). *Diagnosis of the Orthodontic Patient*. Oxford University Press. ISBN-13: 978-0192628893

Bishara, Samir, E (2001). *Textbook of Orthodontics*. Saunders. ISBN-13: 978-0721682891

Proffit T.W.R. et al (2018). *Contemporary Orthodontics*. Elsevier Health Sciences. ISBN-13: 978-0323543873

Lindhe, Jan (2009) *Clinical Periodontology & implant Dentistry* (5th edition). John Wiley & Sons, 2009. ISBN-13: 978-1405160995

Wolf, F. Herbert and Rateitschak-Pluss (2005). *Colour Atlas of Dental Medicine: Periodontology*. Thieme

Greenberg, Martin, S; Glick Michael and Ship Jonathan (eds) (2015). *Burket's Oral Medicine*. PMPH-USA, 2008. ISBN-13: 978-1607951889

Harris, Norman; Garcia-Gordoy, Franklin and Nathe N. Christine (2013). *Primary Preventive Dentistry*. Pearson Education. ISBN-13: 978-0132845700

Daily, Blánaid, et-al (2013). *Essential Dental Public Health*. Oxford University Press. ISBN-13: 978-0199679379

Lamster, Ira, B and Northridge, Mary, E (2010). *Improving Oral Health for the Elderly*. Springer

Miller, Chris, H and Palenik, John Charles (2017). *Infection Control and Management of Hazardous Materials for the Dental Team* (5th edition). Elsevier Health Sciences. ISBN-13: 978-0323400619

Hiremath (2006). *Textbook of Preventive and Community Dentistry*. Elsevier, India. ISBN-13 : 978-8131203460

Scully, Chrispian (undated). *Medical Problems in Dentistry* (6th edition). Churchill Livingstone

Bagg, Jeremy; MacFarlane, Wallace, T and Poxton, Ian, R (2006). *Essentials of Microbiology for Dental Students*. Oxford University Press. ISBN-13: 978-0198564898

Palmer, Carole, A. (2016). *Diet and Nutrition in Oral health*. Pearson Education Ltd. ISBN-13: 978-0134296722

Wood, C H; Glanvill, D. H. and Vaughan, J. P. (eds.) (1997). *Community Health* (2nd edition). Nairobi: AMREF

Murray, John, et al (2003). *The prevention of Oral Disease*. Oxford University Press. ISBN-13: 978-0192624574

White, Stuart C. and Pharoah, Michael J. (2013). *Oral Radiology: Principles and Interpretation*. Elsevier Health Sciences. ISBN-13: 978-0323096331

## 3.2 List of Contributors

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- Dr. Raymond Oigara (Kisii University)
- Dr. Christine Gathiri (Egerton University)
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- Prof. Boniface Ganda (Uzima University)
- Prof. Kimathi Kigatira (Mt. Kenya University)
- Prof. Stephen Ogendo (Maseno University)
- Dr. Donald Kokonya (Masinde Muliro University of Science and Technology)
- Dr. Francisca Ongecha (Kenyatta University)
- Dr. Joseph Abuya (Moi University)
- Dr. Justus Simba (Jomo Kenyatta University of Agriculture and Technology)

### Technical / Curriculum Experts

- Dr. Tonnie Mulli (Periodontologist)
- Dr. Linus Ndegwa (Restorative Dentistry)
- Dr. Claudio Owuor (General Surgeon)
- Prof. Edwin Khaemba (General Surgeon)
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