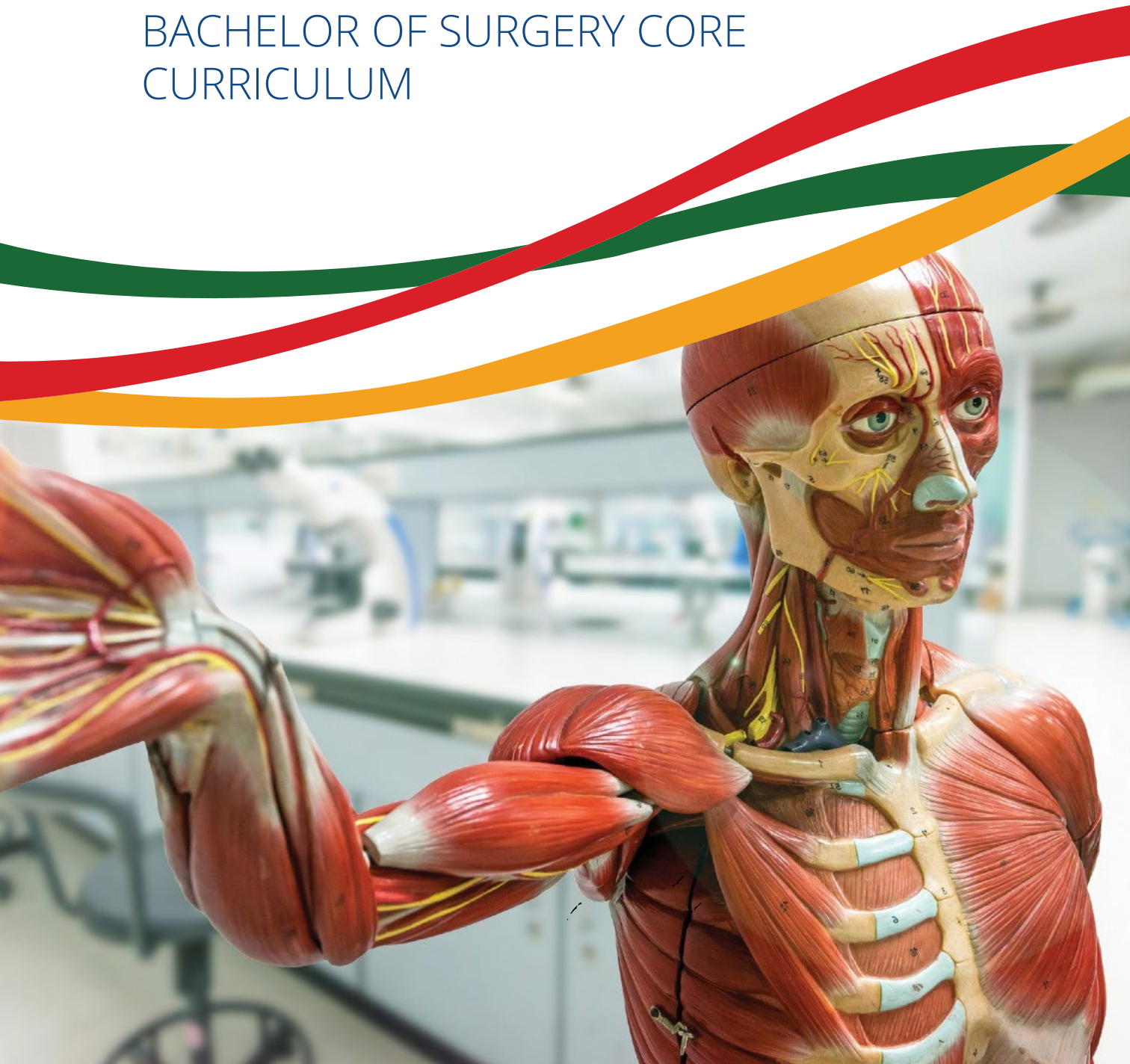




KENYA MEDICAL PRACTITIONERS AND DENTISTS COUNCIL (KMPDC)

BACHELOR OF MEDICINE AND
BACHELOR OF SURGERY CORE
CURRICULUM







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The development and production of this Curriculum is a result of the joint efforts and contributions of many individuals within and external to KMPDC. Thank you to everyone who has made contributions in different ways. Your significant contributions throughout the meetings and interactive sessions are greatly appreciated.



**BACHELOR OF MEDICINE
AND BACHELOR OF
SURGERY (MBCHB)**
CORE CURRICULUM
2022

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Abbreviations and Acronyms

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





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The curriculum is presented in 24 sections. All medical schools in the country are expected to review their curricula to ensure that they are in line with the guidelines provided in this core curricula publication. Moreover, it is emphasised that this revised (MBChB) curriculum therefore supersedes any other previous curriculum publications and is effective from 1st July 2022.



Foreward

Globalization, population growth and migration have made the world a global village in which emerging and re-emerging diseases are having an impact on morbidity and mortality. The dental practitioners must therefore have vast knowledge of conditions that are prevalent all over the world along with their management approaches, in order to ensure effective service delivery to citizens. It is to be noted that the Bachelor of Medicine and Bachelor of Surgery (MBChB) curriculum in Kenya was last reviewed in July 2013. Nevertheless, there have been significant changes over the years in terms of disease pattern, management approaches as well as in terms of information technology. It is in view of these dynamics that the Kenya Medical Practitioners and Dentists Council (KMPDC) found it necessary to review the existing MBChB Core Curriculum in order to harmonize the training of dentists while also addressing gaps in both the training and the practice.

The curriculum proposals herein provide the fundamental content that must be covered by all medical practitioners during their undergraduate training programme. Besides the specialized areas, the curriculum also covers Leadership, Management and Governance in Health Systems, Community Health as well as in Mental Health, which are deemed to be important areas for practitioners to be conversant with. The curriculum is presented in 24 sections. All medical schools in the country are expected to review their curricula to ensure that they are in line with the guidelines provided in this core curricula publication.

Moreover, it is emphasised that this revised (MBChB) curriculum therefore supersedes any other previous curriculum publications and is effective from 1st July 2022.

Prof. Stanley O. Khaingga

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 Course Structure



Course duration

- The programme should extend over a period of not less than 6 years;
- An academic year could either be divided in semesters or terms;
- The duration of the programme should not be more than 12 years.



Units / Credit system

- The minimum credit hours for a unit course will be equivalent to 15 hours of lecture, 30 hours of tutorial hours and 45 hours for practicals.
- The programme should not exceed 42 weeks in a calendar year.
- The programme will be weighted 220 units in 6 years.
- One unit of medical courses is equivalent to one week of lecturers.

1.2 Admission Requirements / Criteria

All candidates admitted to the Bachelor of Medicine and Bachelor of Surgery (MBChB) degree programme must satisfy the following requirements:

KCSE Holders

Minimum university admission requirement is C+. Additionally, an average of B Plain in each of the following subjects:

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

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

A minimum “O” level Division II pass or C+ (plus) Mean Grade and credit pass C+ in the cluster subjects in K.C.S.E., in addition to a three-year diploma with a minimum of a credit pass from a Medical Training Institution recognized by the Medical Practitioners and Dentists Board.

Degrees in Biological Sciences

Holders of any degree in Biological Sciences or Equivalent qualifications from a recognized University.

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.

1.3 Curriculum Design

Every Medical 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 medicine.

1.4 Learning/Instructional Methods

Each medical 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.

1.5 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 (necessary competencies): with essential skills to be acquired for each course;
- Case reports; Portfolios.
- Project reports;
- Regular course examinations: written, practicals, clinical (OSCEs, Short and Long cases), and Vivas;
- Attitudinal assessment.

University End of Year Examinations (Summative)

- Written: MCQs, SAQs, MEQs, LEQs;
- Clinicals: OSCEs, Clinical Short and Long cases;
- Practical;
- Viva voce.

Examination Regulations

- Certification will be an MBChB Degree.
- Distribution of marks will be specified by individual institutions. However, continuous assessment should cover 30-50% of the final mark;
- The pass mark will be 50%;
- It is mandatory to pass clinical examinations in order to proceed into the next year of study;
- MBChB Degree is not classified

Grading

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

Section 2.0

Course Descriptions and Weightings

COURSE TITLE	UNITS
PRE-CLINICAL	
Introduction to Computers	2
Human Anatomy	14
Medical Biochemistry	12
Medical Physiology	12
Behavioural and Social Sciences (Anthropology, Sociology and Psychology)	3
Nutrition and Dietetics	2
Communication Skills for health workers	3
University common courses	5
TOTAL	48
PATHOLOGY/LABORATORY MEDICINE	
Immunology, Microbiology and Parasitology	11
General and Systemic Pathology	10
Haematology and Blood Transfusion	3
Clinical Chemistry	3
TOTAL	27

COURSE TITLE	UNITS
POPULATION HEALTH, HEALTH SYSTEMS AND RESEARCH	
Biostatistics and Demography	3
Epidemiology	3
Environmental Health	2
Occupational Health and Safety	2
Leadership, Management and Governance in Health systems	3
Entrepreneurship	2
Research methodology and Research project	6
Health Service Attachment	4
Community Health	6
TOTAL	31
CLINICAL COURSES	
Pharmacology and Therapeutics	8
Child Health and Paediatrics	15
Internal Medicine	15
Reproductive Health	15

COURSE TITLE	UNITS
CLINICAL COURSES	
Surgery	15
Medical jurisprudence and Applied Toxicology	3
Mental Health	11
Anaesthesiology and Critical Care Medicine	3
Otorhinolaryngology	3
Ophthalmology	3
Dermatology and Venereology	3
Orthopaedics and Traumatology	6
Radiology and Imaging	3
Oral Health	2
Medical Electives	6
Medical Ethics, Professional Conduct and Medico-Legal Issues	3
TOTAL	106
GRAND TOTAL	220





COURSE TITLE	UNITS
CLINICAL COURSES - JUNIOR CLERKSHIPS	
Pharmacology and Therapeutics	8
Junior Clerkship: Child Health and Paediatrics	7
Junior Clerkship: Internal Medicine	7
Junior Clerkship: Reproductive Health	7
Junior Clerkship: Surgery	7
Junior Clerkship: Mental Health	4
TOTAL	40
PRE-CLINICAL	
Medical Jurisprudence and Applied Toxicology	3
Anaesthesiology and Critical Care Medicine	3
Otorhinolaryngology	3
Ophthalmology	3
Dermatology and Venereology	3
Orthopaedics and Traumatology	6
Radiology and Imaging	3
Oral Health	2
Medical Electives	6
TOTAL	32

COURSE TITLE	UNITS
PATHOLOGY/LABORATORY MEDICINE	
Senior Clerkship: Mental Health	7
Senior Clerkship: Child Health and Paediatrics	8
Senior Clerkship: Internal Medicine and Geriatrics	8
Senior Clerkship: Reproductive Health	8
Senior Clerkship: General Surgery	8
Medical Ethics, Professional Conduct and Medico-Legal Issues	3
TOTAL	42
GRAND TOTAL	220



2.1 Computer Use In Health

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To facilitate the learner to acquire knowledge, skills and attitudes in digital technology usage necessary for learning, health care delivery and research</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the concepts, functions of parts of digital devices in health → Apply the principles of computer operating systems and information processing in education research and patient management → Interpret health related data and using it in decision making → Prepare a report related to learning, health delivery and research

2.1.1 Classification of Computers

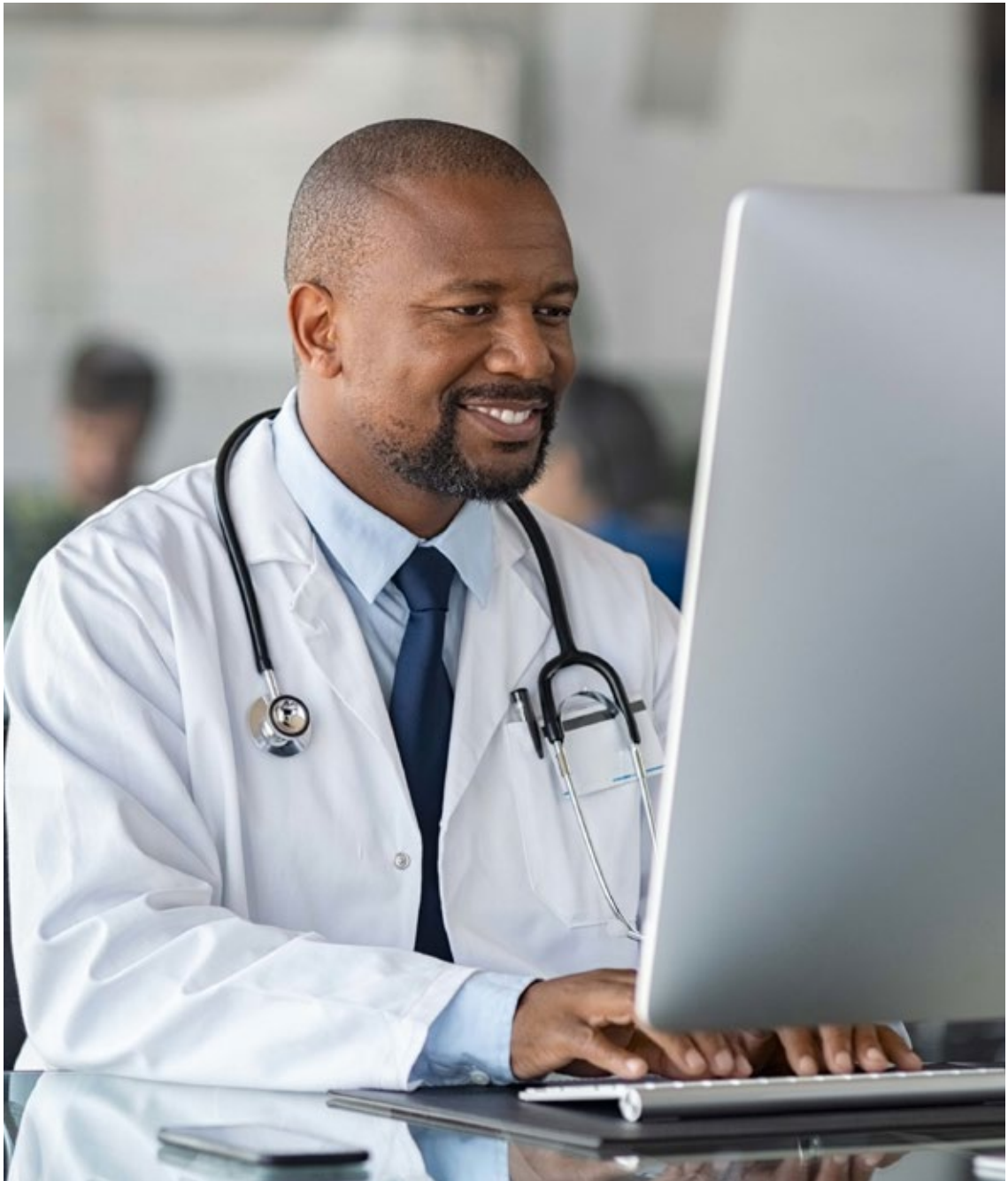
- Microcomputer; minicomputer; palm computers; main frame computer; supercomputers; Hardware, and software:
- Input devices: monitor; mouse; voice data entry; light pen; scanner; key board; touch screen; Output devices: monitor; printer; plotter;
- Storage devices: buffer; central processing unit; back-up; file storage devices; Operating systems; Utilities and operations software.

2.1.2 Principles of Data Management



- Setting up files; modifying; storing; data coding; data entry; data processing, analysis and interpretation; coding; data entry; data processing.
- Analysis and interpretation.

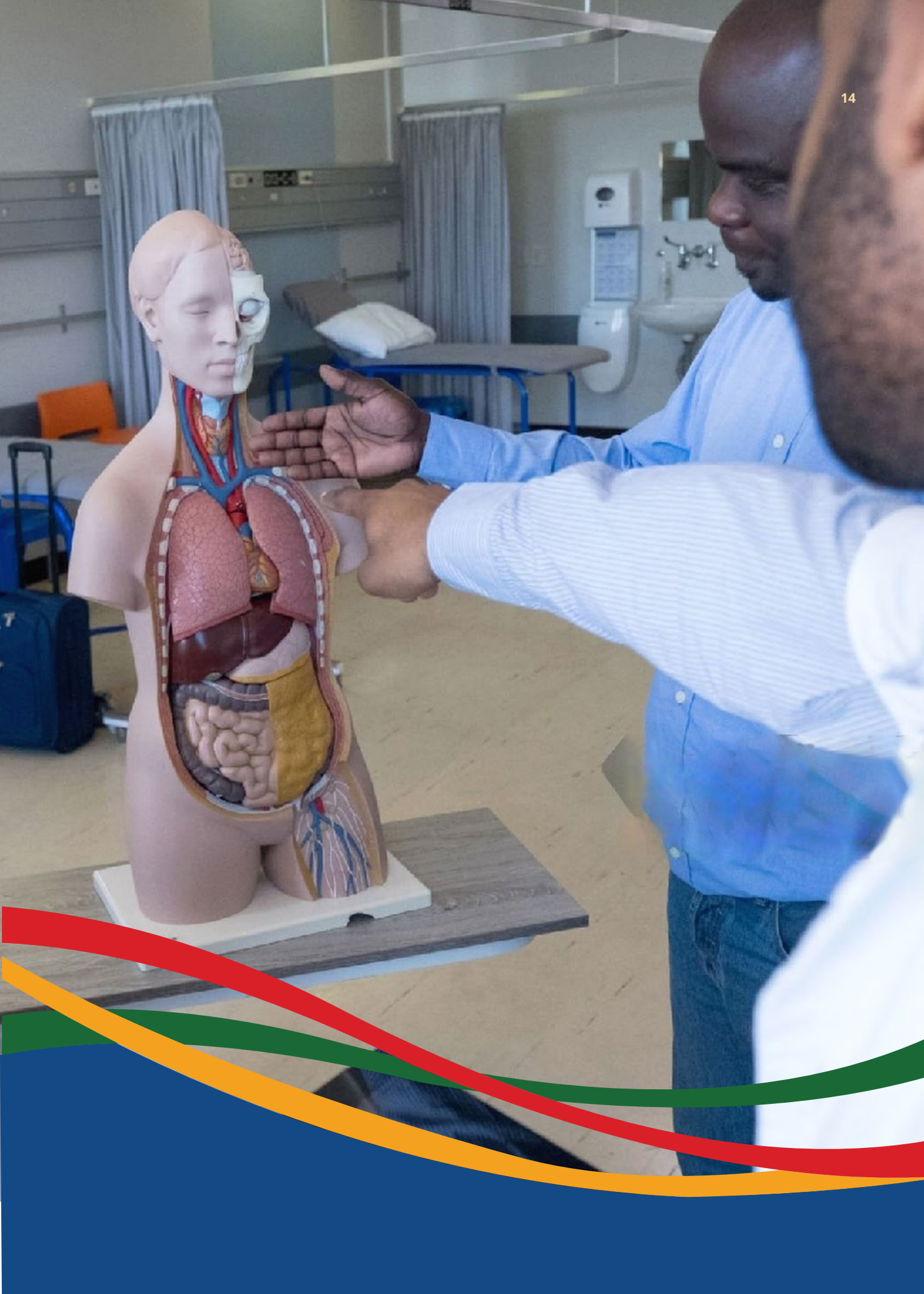
2.1.3 Computer Applications

- Computer applications in health services and research. Emerging issues in Health-related ICT Medical literature search, medical record keeping, and retrieval; and searching for information; Computer assisted learning; security of information and data protection laws, levels of access and confidentiality; report writing.nds



2.2 Human Anatomy

LEARNING MODULE	
	<p>Units 14 (Fourteen)</p> <p>Course Purpose To enable the learner to acquire knowledge on the normal topographic, microscopic and developmental anatomy of tissues and organs of the human body, as a foundation for medical training</p>
EXPECTED LEARNING OUTCOMES	
	<p>Cell and Tissue Biology, Genetics and Embryology</p> <ul style="list-style-type: none"> → Describe cell and tissue structure and function of the human body → Analyze the principles and concepts of human genetics → Identify the steps of development of the human embryo → Prepare a report related to learning, health delivery and research <p>Systemic Anatomy</p> <ul style="list-style-type: none"> → Describe normal topographic and imaging anatomy, blood supply lymphatic drainage of various organs, regions and systems of the human body → Identify various organs of the human body microscopically → Differentiate between normal development and developmental defects of the various organs of the human body



2.2.1 Cell and Tissue Biology, Genetics and Embryology

- 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.
- 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.
- 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 membrane.s
- Umbilical cord and twinning. Teratology and teratogenesis.

2.2.2 Systemic Anatomy

Topographic Anatomy

- Lower Limbs: Bones, joints, muscles, nerves and vessels. Layers and arches of the foot. Mechanism of walking.
- Upper limb: Bones, joints, muscles, nerves and vessels. Breast, features, blood supply and lymphatic drainage. Scapular region and shoulder joint complex. Axilla; boundaries and contents. Formation and distribution of the brachial plexus. Cubital fossa; boundaries and contents. The hand; palmar spaces, intrinsic muscles, arterial arches, finger movements and prehension.
- Back: features, articulations and movements of the vertebrae. Vertebral venous plexi and their communications. Layers of the extensor muscles of the back.
- Head and neck: features, foramina and aspects of the skull. Layers, blood vessels, nerves, lymphatics and applied anatomy of the scalp and the face. Cranial fossae, meninges, dural venous sinuses and hypophysis cerebri. Boundaries and contents of the orbit. Optic nerve and visual pathways. Nasal cavity- boundaries, nasal conchae, paranasal sinuses and olfactory pathways. Ear - features of the external ear, tympanic cavity and inner ear. Neck - boundaries and contents of the triangles. Fasciae - investing, carotid sheath, pretracheal and prevertebral.

Pharynx - layers and subdivisions, nerves and vessels. Larynx - cartilages, muscles, nerves, vessels and the internal features. Trachea – cartilages, muscles, nerves, vessels. Thyroid and parathyroid glands. Oral cavity; organization of the tongue, palate, gums and the salivary glands and teeth. Root of the neck; subclavian vessels, jugular system and the scalene triangle.

- Neuroanatomy: Spinal cord segments, blood supply internal features, laminae of the gray mater, ascending and descending tracks. Brain; topography and the functional areas. Cerebral vessels, ventricles and cerebrospinal fluid. Cerebellum: features, phylogeny and connections.
- Brain stem; features of midbrain; pons and the medulla. Components and connections of the diencephalons, basal ganglia and limbic system. Cerebral white matter; association, commissural and projection fibres. Peripheral nervous system; cranial spinal nerves and autonomic nerves.
- Thorax: Thoracic cage, intercostals spaces, and divisions and recesses of pleura. Lungs: features, relations, lobes bronchopulmonary segments and blood vessels. Pericardium; layers, relations nerve supply. Heart; surface landmarks, external features, interior of the chambers, conducting system and coronary blood vessels; Mediastinum; subdivisions contents and relations.
- Abdomen: Surface landmarks, Peritoneum; folds, mesenteries, cavities and recesses. Abdominal organs; features, relations, blood supply, nerves and lymphatics. Posterior wall, muscles, aorta, inferior vena cava, thoracic duct, lumbar plexus and the sympathetic chains. Diaphragm; attachments, openings, nerves and vessels.
- Pelvis: Walls and dimensions, male and female bony pelvis. Pelvic diaphragm, attachments, relations, nerves and vessels. Perineum; urogenital triangle, external genitalia, anal canal and ischiorectal fossae. Urinary bladder surfaces, relations, blood, nerve and lymphatic supply. Rectum: relations, blood, nerve and lymphatics supply. Uterus, ovaries and vagina; features, position, relations, vessels and nerves Prostate; lobes, capsules, relations, vessels and nerves. Male and female urethra; parts and features. Seminal vesicles; position and features. Sacral plexus and the pelvic vessels.

Microscopic Organization of Human Body Organs



- Skin and subcutaneous tissue: structure, appendages, adaptations and functions.
- Respiratory system: structure of the nasal cavity; larynx, trachea, the bronchial tree and alveoli.
- Circulatory system: organization of the blood vessels and the heart.
- Lymphatic system: organization of the lymph nodes, tonsils, thymus and the spleen.
- Digestive system: major mucosal cell types, hepato-biliary structures and pancreas.
- Urinary system: structure of the uriniferous tubules, ureters, the urinary bladder and the urethra.
- Genital system: gonads, gametes, seminiferous tubules and the 10 interstitial cells. Organization of genital ducts, uterus, uterine cervix and vagina. Organization of the prostate, seminal vesicles and the bulbourethral glands.

- Endocrine system: microscopic organization, cell types and their features of pituitary, pineal, thyroid, parathyroid, endocrine pancreas, adrenal glands.
- 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.

Developmental Anatomy and Birth Defect

- Development and anomalies of the skin and appendages, cartilage and bone, muscles, limbs and axial skeleton.
- Neural tube formation, derivatives and anomalies. Pharyngeal arches, origin, derivatives and anomalies. Morphogenesis and defects of the face, nose, palate, maxilla, mandible and tongue.
- Histogenesis and anomalies of endocrine glands. Development and anomalies of the ear and eye.
- Stages of development and anomalies of lung diverticulum.
- Appearances of blood islands and early development of blood vessels and lymphatics. Heart tube formation, sacculatation, partitioning and fate. Foetal circulation and its postnatal changes
- Congenital abnormalities of the heart and blood vessels. Fate of the coelomic cavity and development of the diaphragm. Foregut; derivatives; rotation and anomalies of the stomach. Midgut; loop herniation, rotation, development and anomalies of the intestines.
- Development and anomalies of liver, biliary passages and the pancreas.
- Development and anomalies of the urinary system.
- Development and anomalies of the gonads, uterus, vagina, oviducts, male and female external genitalia.
- Development and anomalies of endocrine system.

2.3 Medical Biochemistry and Molecular Biology Course

LEARNING MODULE	
	<p>Units 12 (Twelve)</p> <p>Course Purpose To enable the learner to apply knowledge of the chemical composition and processes of the normal human body, their regulation and the composition of the various biological agents the body encounters</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain the basic chemistry of the constituents of the body → Describe the structure and functions of biomolecules including enzymes; vitamins; hormones and neurotransmitters → Outline the principles of the various intermediary metabolic processes → Apply the knowledge of cell, and molecular biology and genetics in medical practice → Outline the basic chemistry of microorganisms relevant in medicine → Describe the principles of biochemical techniques

2.3.1 Basic Chemistry

- Physical Chemistry: Water, solutions and colloids; Ion producing substances; water, 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: 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, alkanes, 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 reaction.

2.3.2 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 the types of neurotransmitters and other neurochemicals. Hormones: synthesis, storage, release, transport, mode of action and degeneration of peptide, steroid, amino acid derived hormones and prostaglandins.

2.3.3 Intermediary Metabolism

- Standard free energy change of a chemical reaction. Exogenic and endogenic reactions. ATP, NADPH and other high energy compounds. Endergonic reaction. ATP, NADPH and the 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 triacyl glycerol 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.

2.3.4 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 a 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.



2.3.5 Chemical Microbiology

- Molecular virology: Classification and properties of viruses. Replication and life cycle. Interferons, oncogenes and oncogenic viruses. Iridoids and prions. Parasite biochemistry: Special metabolism in parasitic protozoa and helminths. Bacterial biochemistry: cell wall structure of gram positive and gram-negative bacteria. The lipopolysaccharide molecule, bacterial toxins and virulence. Fungal biochemistry: cell wall structure and metabolism of fungi. Bioterrorism.

2.3.6 Bio-chemical Techniques

- Introduction to basic bio-informatics and biotechnology Carbohydrates, protein and lipid isolation and identification, Biotechnology: cloning of important proteins

2.4 Medical Physiology

LEARNING MODULE	
	<p>Units 12 (Twelve)</p> <p>Course Purpose To equip the student with the knowledge required to understand the normal functioning of the human body</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain physiological concepts and processes → Describe the organization and functions of body tissues → Describe the organization and functions of body systems → Discuss the regulatory mechanisms involved in the functioning of body systems

2.4.1 Physiological Concepts and processes

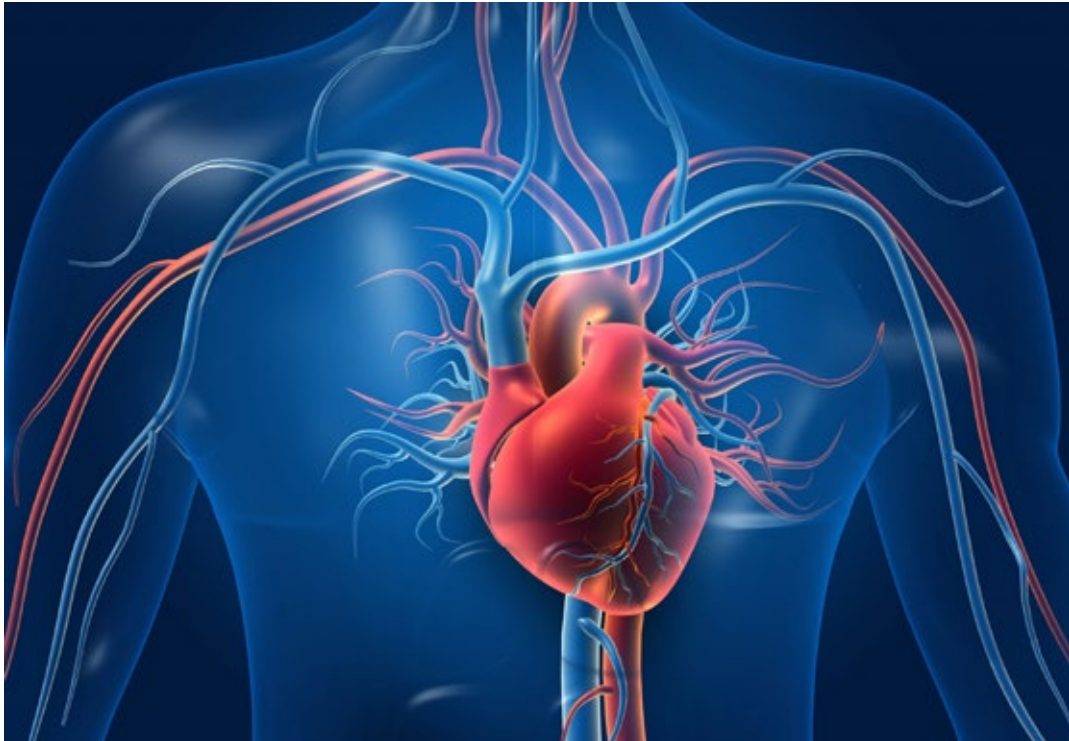
- Introduction to physiological concepts: Descriptive terms and units. Properties of physiological solutions; Concept of homeostasis and normal physiology. Cell structure and function; cell physiology and human genetics. Body fluids and compartments; Intravascular and extravascular compartments. Interstitial fluid composition, function and disorders. Functional organization of the body. Variability, haemodynamic 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

2.4.2 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 hemostasis.
- 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.



2.4.2 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. Fetal 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. None one atmosphere respiratory function. Non respiratory functions of the lungs
- Gastrointestinal system: Functional organization and design. Humoral and neuromyogenic 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, hypothalamohypophyseal 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 reproduction 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, feto-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.

2.5 Behavioural Sciences

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To facilitate the learner with knowledge, attitude and skills of the psychosocial, cultural, and environmental influences on behaviour, health and disease processes</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain the theories, concepts and principle of psychology, sociology and anthropology as they apply to → Describe and explain the life cycle (birth through senescence) and the development of the person as it relates to health and illness → Discuss the psychological and social factors influencing patient behaviour in health and illness → Explain the role of society in health and disease → Discuss the role and impact of behavioural sciences in the management of illness and disability

2.5.1 Basic Principles

- Explain and discuss the developmental psychology; theories of motivation and learning; socialization process; emotional development and support.
- Outline and explain the concepts in sociology; emerging relationship between medicine and sociology; social behaviours and disease occurrence; health seeking behaviours; the sick role.
- Outline and discuss the basic principles of anthropology: concept of culture, health and disease; cultural concepts of illness; ethnomedicine.



2.5.2 Life Cycle and the Development of the Person

- Demonstrate understand and explain pregnancy and childbirth; Reproductive issues; Development in early infancy; Childhood and child health; Adolescence; Adulthood and mid age; Ageing; Bereavement.
- Classify and explain personality development; Understanding learning; Perception; Memory and forgetting; Development of sexuality; Intelligence; Development of thinking.

2.5.3 Factors Influencing Patient Behaviour

- Discuss the personality factors in disease causation.
- The psychodynamic and behavioural factors and related past experience in disease causation.
- The family and cultural factors, including socio-economic status in disease causation.
- The adaptive behavioural responses to stress and illness as coping mechanisms.
- The maladaptive behavioural responses to stress and illness. Understanding of the interactions between the patient and the physician or the health care system in access to health care.



2.5.4 Society and Health

- The understanding and appreciation of the groups; concepts of health, illness and disease; measuring health and illness; changing patterns of health and illness; social class and health; gender and health; ethnicity and health; quality of life; media and health; ageing, society and health; housing, homeless and health; work and health; education and health; unemployment and health; labelling and stigma.

2.5.5 Introduction to Illness and Disability

- To be taught in more detail in the clinical years. Impact of illness on individual, family and community.
- Death and dying.
- Coping with illness and disability: counselling; adaptation, coping and control; stress management; cognitive behaviour therapy; role of career; self-help groups; palliative care; complementary therapies; management of pain; health beliefs and behaviour; bereavement.

2.6 Nutrition and Dietetics Course

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable learners, acquire knowledge, skills and attitudes on nutrition and dietetics in health and disease</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain the principles of nutrition and dietetics → Determine requirements for energy and other essential nutrients in relation to different phases of life, physiological conditions and disease → Prepare and implement an appropriate nutritional management plan → Monitor and evaluate the impact of the nutrition plan

2.6.1 Introduction

- Basic nutrition: Basic principles of nutrition and dietetics, Nutrients: Types, sources and role in the body; Micronutrients and trace elements: Social cultural factors in nutrition: Generation, expenditure and storage of nutrients at the whole-body level: Digestion and absorption of nutrients.
- Functions of essential nutrients: Caloric and nitrogen balance.

2.6.2 Nutrition in the life cycle

- Maternal nutrition: Pregnancy and Lactation, Infant and Childhood Nutrition, Adolescents Nutrition, Nutrition of Older People.

2.6.3 Malnutrition

- Overview of causes: Protein energy malnutrition (pEM); Nutritional Anaemia; Vitamin deficiency disorders and toxicities; mineral deficiencies and toxicities; Iodine deficiency disorders: Overnutrition (obesity); Underlying causes of malnutrition (Food Security, Care and Public Health Factors): Synergism between malnutrition and infections and its effects on mental and physical growth and development of children.

2.6.4 Nutrition Diagnosis

- Causes of malnutrition.
- Assessment of nutritional status: Protocols in nutrition assessment, Methods for assessment of nutritional status; Nutritional status indicators and classification systems.
- Nutrition Status Data Management, Analysis, Community Feedback.

2.6.5 Community Nutrition Interventions

- Types and distribution of nutrition interventions.
- Public Health Aspects of Over-nutrition (Obesity).



2.6.6 Nutritional Management and Care of Patients

- Priority nutrition interventions within the health sector.
- Nutritional policies within the health sector (including HIV / AIDS and infant feeding).
- Nutritional supplements: Role in health care.
- Nutrition and HIV/AIDS: Relation between Nutrition and HIV/AIDS;

2.6.7 Nutritional Management of Common Symptoms

- Nutritional management in disease states; Monitoring and evaluation of nutritional management plan

2.7 Communication Skills for Health Workers

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable the learner 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"> → Explain theories and principles relating to human communication → Evaluate the contribution of socio-cultural knowledge, age, gender and emotional status to communication between doctor and patient → Demonstrate appropriate interviewing skills applicable the doctor- patient interactions



2.7.1 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 Sociocultural 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

2.8 Pathology and Laboratory Medicine

2.8 (a) Microbiology and Parasitology

LEARNING MODULE	
	<p>Units 8 (Eight)</p> <p>Course Purpose To enable learners, acquire knowledge of microorganisms and parasites and its application in medical practice</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Classify and characterize microorganisms and parasites of medical importance → Describe the pathophysiology of infections caused by medically important bacteria, viruses, parasites and fungi → Apply the principles of sterilization and disinfection → Discuss the principles of antibiotic use and chemotherapy of bacterial viral, parasitic, fungal and entomologic infections → Outline the principles of public health bacteriology → Describe the principles of laboratory methods and diagnosis for pathogenic organisms → Effective management of conditions and diseases caused by microorganisms and parasites in medical practice

2.8.1 Bacteria and Bacterial Diseases

- Structure, composition, metabolism, physiology and regulation of bacteria.
- Principles of bacterial genetics.
- Pathophysiology of infection, virulence.
- Antibiotics and chemotherapy of bacterial infections.
- Principles and methods of sterilization and disinfection.
- Pathogenic bacteria: Gram positive; Gram negative; Acid fast bacilli; Enterobacteriaceae; Anaerobes. Other bacteria: Spirochaetes, rickettsiae, Chlamydia, mycoplasma and actinomycetes.
- Public health bacteriology: Epidemiology and ecology. Bacteriology of food, water and sewage; food poisoning.
- Clinical microbiology: Systemic infections; upper and lower respiratory tract infections; central nervous system infections; septicemia and endocarditis; gastrointestinal infections; urinary tract infections and sexually transmitted infections; wound, skin, musculoskeletal and soft tissue infections; collection and handling of clinical specimens: body fluids including CSF, urine, blood, sputum, stool, wound, genitourinary specimens and tissue biopsies.
- Principles of laboratory diagnosis: microscopy and microbiological methods; isolation and identification of pathogenic organisms, antibiotic sensitivity testing, interpretation, minimum inhibitory concentration, minimum bactericidal concentration. Quality control.

2.8.2 Viruses and Viral Infections

- Management of resistant bacterial infections and diseases viruses and viral infections.
- Classification, general properties related to viral families, physical and chemical properties.
- Replication and cultivation of viruses.
- Host response to viral infections.
- Genetics.
- Molecular basis of pathogenesis.
- Latent and persistent infections.
- Epidemiology.
- Oncogenic viruses.
- Principles of cultivation, assay and laboratory diagnosis, laboratory safety.
- Pathogenic viruses: DNA viruses; RNA viruses.

- Viral syndromes, HIV/AIDS and other viral sexually transmitted diseases; emerging viral infections.
- Viral childhood fevers.
- Viral CNS infections.
- Viral skin manifestations.
- Prions and their disorders.
- Anti-retroviral agents and mechanisms of action (this section could be dealt within pharmacology/internal medicine).
- Emerging new viral diseases.

2.8.3 Mycology

- Classification of medically important fungi.
- Epidemiology, structure, pathogenesis, diagnosis, treatment and control of: superficial and cutaneous mycosis: dermatophytes and non dermatophytes; systemic, subcutaneous and deep mycoses, mycetoma, eumycetoma, yeast infections, candida and Cryptococcus, aspergillosis, mycotoxins.

2.8.4 Medical Parasitology



- Definitions and terminology.
- Taxonomy and classification of medically important parasites.
- Life cycles, epidemiology, pathogenesis, host response, clinical manifestations, diagnosis, treatment and control of diseases caused by nematodes, cestodes and trematodes.
- Life cycles, epidemiology, pathogenesis, host response, clinical manifestations, diagnosis, treatment and control of diseases caused by protozoan parasites including blood protozoa, gastrointestinal protozoa and tissue protozoa.
- Emerging parasitic disease in immuno-suppressive states (HIV / AIDS).
- Laboratory methods; collection and handling of clinical specimens, identification of pathogenic organisms.

2.8.4 Medical Entomology

- Medically important vectors of parasitic infections.
- Ecology, physiology, population biodynamics, vectoral capacity and control.
- Ectoparasites, lice, scabies mites, blowflies, botflies, venomous bites and stings.
- Laboratory methods: Collection, handling of clinical specimens, identification of pathogenic organisms.



2.8 (b) Immunology and Immunopathology

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose This course aims at equipping the student with knowledge of the organization and function of the immune system in health and disease</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the functional organization of the immune system → Describe the structure and function of antibodies and antigens and their interactions → Describe the immune effector mechanisms → Explain immune responses found in healthy and disease states → Outline the principles of vaccination → Describe laboratory methods in immunology

2.8.5 Introduction to 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.
- Elements of immune response: Immune response cells; lymphatic system; interrelationship between acquired and innate immunity..
- Immunogens and antigens: Immunogenicity, primary and secondary immune response, antigenicity, antigen-binding sites, epitopes, major classes of antigens, cross-reactivity; immunologic adjuvants.
- Antibody structure and function: Structure of light and heavy chains, immunoglobulin structural and biological characteristics, kinetics of the immune response, primary and secondary response.



- Activation and function of T and B cells: Biology of the T and B lymphocytes, CD 4+ T cell functions, cytotoxic T-cell function, super antigens, B-cell activation and function, T-B cooperation, T-independent immune responses. Immune effector mechanisms.
- Cytokines: actions and interactions in the immune responses; properties and functional categories; role in disease especially toxic shock syndrome, bacterial septic shock, cancers, autoimmunity; therapeutic applications of cytokines/cytokine receptors.
- Complement systems: Classical pathway, alternate pathway, terminal pathway; biological activities of complement fractions; complement and disease.
- Cell mediated immunity: Effector cells in CMI, effector responses, assessment of cell mediated cytotoxicity.
- Hypersensitivity reactions: Type I (IgE-mediated) hypersensitivity, Type II (Antibody mediated), Type III (Immune complex-mediated), Type IV (Delayed type) hypersensitivity.
- Hypersensitivity reactions: Type I (IgE-mediated) hypersensitivity, Type II (Antibody mediated), Type III (Immune complex-mediated), Type IV (Delayed type) hypersensitivity.
- Control mechanisms in the immune response: Tolerance; immune regulation in the individual; immunologically privileged sites; immunosuppression by drugs, radiation and others.

2.8.6 Immune Responses in Health and Disease

- Host defence against pathogens: Innate and adaptive immune defences; mechanisms used by pathogens to evade the immune response.
- Major immunohistochemistry complex in the immune system: Variability of MHC; genes and genetic polymorphism; Structure and function of MHC class I and II molecules; association of MHC with disease.
- Autoimmunity and autoimmune disorders: Etiology, examples of autoimmune disease – autoimmune haemolytic anaemia, myasthenia gravis, Graves' disease, systemic lupus erythematosus (SLE), multiple sclerosis, insulin-dependent diabetes mellitus, Hashimoto's thyroiditis, rheumatoid arthritis; Autoimmune diseases resulting from complement deficiency.
- Transplantation immunology: Allograft rejection – Hyper, acute and chronic rejection; histocompatibility antigens; tests for histocompatibility Ag's; prolongation of allograft survival; bone marrow and peripheral stem cell transplantation; graft-vs-host reactions; foetal-maternal relationship.
- Tumour immunology: Tumour antigen categories; immunologic factors and cancer; effectors mechanisms in tumour immunity; B-cell responses; cell-mediated responses; cytokines; limitations of tumour immune response; Immunodiagnosis; Tumour immunoprophylaxis; Immunotherapy.

- Principles of immunization: Passive and active immunizations; basic mechanisms of protection; precautions; Current methods of vaccine production – Recombinant DNA vaccines, conjugated polysaccharides, synthetic peptide vaccines, anti idiotypic vaccines, virus-carrier vaccine, toxoids; immunotherapy.
- Immune assays and laboratory methods: Principles of antigen-antibody interactions; comparison of agglutination and precipitation reactions, direct binding and solid-phase immunoassays; Immunofluorescence, Fluorescence activated cell-sorting analysis; comparison of immunoadsorption and immunoabsorption, Monoclonal and genetically engineered antibodies.

2.8 (c) General and Systemic Pathology

LEARNING MODULE	
	<p>Units 10 (Ten)</p> <p>Course Purpose This course aims at equipping the student with knowledge of the etiology and pathophysiology of disease</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the biology of tissues and their response to disease → Discuss the classification, biology, immunology, spread and effects and diagnosis of tumours → Demonstrate knowledge of pathology as relates to genetic/ congenital and acquired disorders of the various body systems → Accurately determine and document causes of death → Demonstrate knowledge of laws related to medicine

2.8.7 Introduction to Anatomic Pathology

- Principles of pathology, terminology, definitions and concepts.

2.8.8 Biology of Tissues and Response to Disease

- Cell types, growth and differentiation, cell and tissue injury, types (including drugs and Irradiation, trauma) and adaptation.
- Inflammation: acute inflammation – mediators, effects, cellular components, chemo taxis, phagocytosis, vascular responses, chemical mediators, systemic manifestations; chronic inflammation.
- Repair, regeneration and degeneration; skin, bone, brain – Reparative process; wound and injury healing: granulation tissue, angiogenesis; scar formation.

2.8.9 Neoplasia

- Classification of neoplasms
- Basis for histological diagnosis of tumours
- Carcinogenesis; Carcinogens: genetic, environmental, physical, chemical factors, viruses;
- Cell biology, biochemistry, and molecular biology of neoplasms
- Tumour immunology; spread of malignant tumours; clinical effects of tumours paraneoplastic manifestations; cancer epidemiology and prevention.



2.8.10 Systemic Pathology

- Genetic/congenital, inflammatory, infectious, immunologic, toxic disorders, metabolic disorders; endocrine disorders, traumatic, degenerative disorders and neoplasms of: Central and peripheral nervous systems; Skin, bone and connective tissue; Respiratory system; Cardiac and vascular systems; Gastrointestinal system; Renal/urinary system; Reproductive system; Endocrine system
- Pathology of HIV / AIDS disorders.

2.8.11 Autopsies and Laws Related to Medical Practice

- Limited and full autopsies; demonstration of disease and cause of death both gross and microscopic.
- International and national laws related to the practice of medicine; confidentiality, negligence and medical malpractice.

2.8 (d) Haematology and Blood Transfusion

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To equip the student with knowledge of haematological, and lymphoreticular disorders and their management including blood transfusion</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe anatomy and functional organization of the haemopoietic and lymphoreticular tissues → Describe blood groups, blood group serology and the blood transfusion service → Describe the red cell abnormalities, their laboratory evaluation and principles of management → Explain normal and abnormal haemostasis and the principles of laboratory evaluation of haemostatic defects → Apply principles of blood transfusion and use of blood and blood products → Describe and classify the benign leucocytes abnormalities → Describe neoplastic haematological disorders and outline their management → Discuss the principles and practice of laboratory evaluation in haematology and blood transfusion

2.8.12 Normal Haematological System

- Haemopoiesis: erythropoiesis, haemoglobin, metabolism of nutritional factors in production and function of erythrocytes (especially iron, vitamin B 12 and folate); erythrocyte function; leucopoiesis, function of leucocytes; thrombopoiesis and function of platelets; Lymphoreticular system, spleen function and role; Haemostasis: Normal haemostatic function, role of platelets and vascular endothelium, coagulation system, fibrinolysis, natural inhibitors of coagulation. Laboratory evaluation of haemostasis; Blood groups and blood group serology especially ABO, Rhesus blood groups; significance of blood groups; Blood Transfusion Service.

2.8.13 Disorders of the Red Blood Cell

- Anaemias: Disorders of iron metabolism: Iron deficiency; iron overload states; Megaloblastic anaemia: deficiency of Vitamin B 12 and folate; Haemolytic anaemias: Haemoglobinopathies (especially sickle cell), membraneopathies, enzymopathies and extracorporeal causes (e.g. immune haemolytic anaemias, parasitic causes, mechanical fragmentation); Anaemia of chronic disorders: Bone marrow failure; Hypersplenism; Secondary Polycythaemias; Haematology of HIV/AIDS; Laboratory evaluation of red cell disorders.

2.8.14 Benign Leucocyte Disorders

- Leucopenia: Hereditary and acquired causes; leucocytosis; reactive leukamoid reaction; laboratory evaluation of leukocyte disorders.

2.8.15 Disorders of Haemostasis

- Hereditary disorders (especially Haemophilias).
- Acquired disorders of haemostasis (especially idiopathic thrombocytopenic purpura, liver disease, disseminated intravascular coagulation).
- Thrombotic disorders. Anticoagulant and thrombolytic agents and their control.
- Principles of investigation of a haemostatic disorder.



2.8.16 Neoplastic Disorders

- Acute leukaemia's -acute lymphoblastic leukaemia, acute myeloid leukaemia •
Chronic myeloproliferative disorders – Chronic myeloid leukaemia, myelofibrosis, polycythaemia vera and essential thrombocythaemia
- Lymphoproliferative disorders especially chronic lymphocytic leukaemia, lymphoma, multiple myeloma
- Laboratory evaluation of neoplastic disorders

2.8.17 Blood Transfusion

- Clinical indications and use of blood and blood components/products.
- Compatibility testing.
- Transfusion complications; investigation and their management. Laboratory evaluation and investigation of haematological disorders and blood transfusion.
- Principles of laboratory evaluation.
- Routine investigations. Special and other investigations.

2.8 (e) Chemical Pathology

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To equip the student with knowledge of the biochemical basis of disease</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe specimen handling in Chemical Pathology → Describe the biochemical basis of normal and abnormal metabolic, physiologic and regulatory pathways → Demonstrate knowledge of the biochemical assessment of organ systems → Describe the biochemistry of neoplastic disorders → Describe the principles of clinical toxicology → Describe the laboratory methods and quality assurance processes used in Clinical Chemistry



2.8.18 General Course Content

- Specimen collection, processing and analysis; instrumentation and point of care testing; interpretation of results; biostatistics in clinical chemistry: clinical sensitivity, specificity, predictive values and efficiency of a test, test selection; quality assurance.

2.8.19 Normal Metabolic, Physiologic and Regulatory Pathways

- Fluid and electrolyte balance: body fluid distribution and regulation; acid base balance.
- Endocrinology; anterior Pituitary function, adreno-cortical and thyroid function and endocrine pancreas.
- Bone metabolism.
- Plasma enzymes: isoforms and isoenzymes, clinical enzymology.
- Plasma lipids, serum proteins .
- Purine metabolism.
- Biochemical assessment of renal, hepatic, gastric and pancreatic function.
- Porphyrins and porphyrynia.
- Vitamins, trace elements.



2.8.20 Disorders involving metabolic, physiologic or regulatory pathways

- Disorders of carbohydrate metabolism: Diabetes mellitus and hypoglycaemia.
- Disorders of lipid and lipoprotein metabolism: hyperlipidaemias.
- Disorders of protein metabolism: Protein energy malnutrition .
- Purine metabolism disorders; gout.
- Disorders of fluid and electrolytes: acid base and electrolyte imbalance.
- Renal disorders: Biochemical tests in acute and chronic renal failure, renal osteodystrophy, biochemical monitoring of dialysis and renal transplant patients, renal calculi.
- Liver disorders: Jaundice and classification.
- Inherited metabolic disorders.
- Iron metabolism in health and disease.
- Principles of Clinical toxicology: chemical poisoning including drug overdose, management of poisoning, therapeutic drug monitoring.
- Biochemistry of neoplastic disorders: Biomarkers, paraneoplastic endocrine syndromes, ectopic hormone production.
- Laboratory methods in Clinical Chemistry and their interpretation.



2.9 Population Health, Health Systems and Research

2.9 (a) Biostatistics and Demography

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To equip the student with knowledge of the principles of biostatistics and demography and their application to health care delivery and research</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the concepts and terminologies used in biostatistics → Apply the principles of biostatistics in health care delivery and research → Describe principles of demography

2.9.1 Introduction to Basic concepts and Terminologies

- Descriptive statistics, inferential statistics; types of data and data presentation; measures of central tendency; measures of variability (dispersion), probability, binomial, Poisson and normal distributions; Bayes' theorem.
- Sampling methods and sample size; Sampling distribution; distribution of sample mean; population parameters and sample statistics; estimation of standard error.
- Statistical Inference and Types of statistical hypotheses: Null and Alternative hypotheses, Type I error and Type II error; level of significance; confidence interval; relationship between the variables (Chisquare test, regression analysis and correlation); comparison of means (student's t-test, z-test, paired t-test etc).
- Sources of biostatistical and demographic information.
- One-way analysis of variance.



2.9.2 Biostatistics in Health Care Delivery and Research

- Organizing information for policy matters and decision making;
- Principles of biostatistics in health care delivery and research;
- Data use for the prediction of certain health related conditions;
- Models to predict disasters with potential to cause health impacts.

2.9.3 Demography

- Principles of demography.
- Population, growth rate, mortality rate, fertility, migration.



2.9 (b) Epidemiology

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To facilitate the learner with knowledge, attitude and skills of disease occurrence, its' determinants, distribution and its application in health care research</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain, translate and apply the concepts and principles (epidemiological triad and Ws) of epidemiology and its role in the identification and solving of health problems in the community → Demonstrate knowledge of and apply the principles of epidemiology in medical practice, public health and research → Demonstrate knowledge of and apply statistical methods in epidemiology in disease control and research

2.9.4 General Course Content

- Introduction to concepts and principles of epidemiology.
- Demonstrate the epidemiologic concepts: definitions; scope; variations in severity of diseases; modes of disease causations.
- Describe and discuss descriptive epidemiology (“Ws”); classification of diseases; measures of morbidity and mortality; incidence and prevalence rates; crude, specific, and adjusted rates
- Determine and describe the determinants of disease transmission and causation; host, agent, and environmental factors; natural history of disease; levels of disease prevention
- Demonstrate the importance of screening of diseases; types of screening and screening tests: sensitivity; specificity; predictive values. Epidemiology in medical practice and research
Determine and explain the approach to disease surveillance and outbreak investigation: definition of outbreak, epidemic, pandemic and endemic; attack rate and their investigation of disease outbreaks
- Describe and explain epidemiologic methods: observational studies-cross sectional, cohort, case control, case series, community surveys. Experimental study designs (Clinical trials, community intervention trials).
- Determine and describe sampling techniques and sample size: probability sampling methods-simple; stratified, systematic, cluster and multistage sampling; non probability sampling; convenience, quota and purposive sampling.
- Statistical methods in epidemiology.
- Determine and describe, measurements: relative risk; risk ratio; odds ratio; attributable risk; confidence intervals; sensitivity; specificity; validity.
- Determine and understand statistical methods: data gathering, cleaning and entry; analysis; presentation of findings; measures of central tendency; dispersion and association; Interpretation of data: statistical power; p-value; sample size.

2.9 (c) Environmental Health

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable the learner to acquire knowledge skills and attitudes to address environmental health related issues</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the principles in environmental health → Appraise the contribution of clean water provision and environmental sanitation to health → Implement and monitor progress for prevention and management of water and environmental sanitation → Apply appropriately national and / international environmental laws and policies

2.9.5 Principles of Environmental Health

- Historical perspective; Relationship between environment, agents and human beings (susceptible host); Environmental factors and the health implications.

2.9.6 Water and Health

- Sources and types of water; The importance of potable water in relation to health; The health implications in terms of quality and quantity; Waterborne, water washed, water-based diseases; Control measures in reduction of morbidity and mortality rates.
- Biochemical Water Related Health Conditions: Fluorides in water, dental and skeletal fluorosis; Implications of fluoridation and de-fluoridation of drinking water; Appropriate interventions, Water 29 Treatment: Rural and urban water treatment processes; Quality control tests; WHO drinking water guidelines/ standards; Local Water Act requirements.



2.9.7 Solid and Liquid Waste Management

- Classification of solid wastes; Generation points (sources) and storage; Collection, transportation and disposal methods; Health problems associated with solid wastes. Human Excreta Disposal Systems: Rural excreta disposal methods; Health implications of each system; Advantages and disadvantages of each system; Intervention methods. Municipal and County Excreta Disposal systems: Peri-urban and urban excreta disposal systems; Health implication for each system; Appropriate control measures.

2.9.8 Pollution

- Physical pollution, i.e. noise, radiation, light; Sources of physical pollution; Health impacts and control measures; Air pollution; Impact on environment and health; Legislative controls e.g. Environmental Management and Coordination Act 1999; Control measures; Water and land pollution; Sources of pollutants and their health impacts; Control measures; Rural Agricultural/ Environmental Pollutants: Agrochemicals and health dangers to handlers; Health and environmental implications; Regulatory bodies, e.g. NEMA, Pollution Control Protection Board (PCPB); Appropriate handling procedures.



2.9.9 Human Shelter Environment and Health

- Human shelter and shelter needs; Diseases associated with poor/unsanitary shelter environment; Possible control measures.

2.9.10 Food Sanitation

- Emphasis of food sanitation; sanitary conditions for food establishments; Role of Public Health Act, Food, Chemicals and Drugs Substances. Act; Sanitary requirements for food handlers; Appropriate transport, storage and preservation methods; Types of food borne diseases; Causes of food borne disease outbreaks; Investigation procedures and environmental control measures. National and international environmental Laws, policy implementation and emerging issues.

2.9 (d) Occupational Health and Safety

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable the learner, acquire knowledge, skills and attitudes in relation to health and safety in workplace</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the principles of occupational health and safety → Explain the cause-effect relationship between occupational risk factors and the health of workers → Appropriately manage and prevent occupational health conditions and accidents → Critique the regulatory frameworks in occupational health and safety

2.9.11 Introduction to Occupational Health

- Principles of Occupational Health.
- Vulnerable groups in Occupational Health.
- Physician wellness.

2.9.12 Specific Hazardous Agents in Work Environment

- Chemical hazards;
- Biological hazards e.g. blood borne pathogens;
- Physical agents;
- Psychosocial hazards e.g. Stress;
- Ergonomic hazards;
- Radiation hazards.

2.9.13 Aims and Functions of Occupational Health Services

- Occupational Health Services (Curative and Preventive): Aims and objectives;
- Functions-Medical exams, Surveillance; Types of Occupational Health Services;
- Prevention and control of occupational hazards: Engineering, Administrative, Education, Personal Protective Equipment (PPE).



2.9.14 Occupational Diseases and Accidents

- Occupational Chest/Lung Diseases: Pneumoconiosis; Asbestosis; Silicosis; Byssinosis, Baggosis; Workers vulnerable to chest lung diseases; Management of chest/lung diseases;
- Occupational Dermatoses: Contact and irritant dermatitis; Photosensitivity; Occupational acne etc; Management and prevention;
- Industrial Toxicology: Dose response relationships; Factors influencing the toxicity; Short- and long-term impact on the workers;
- Occupational Hazards in the agricultural sector: Agrochemical hazards; Zoonotic / parasitic hazards; Impact on agricultural workers and vulnerable groups;
- Control measures;
- Industrial Hygiene: Causes; effects; Control measures (engineering, educational, industrial etc)
- Occupational related accidents: Type and causes; Fire safety as form of accidents; Prevention and management of accidents; Workman's Compensation act;
- Occupational hazards in radiation and related industries.

2.9.15 Regulatory Frameworks in Occupational Health and Safety

- Directorate of Occupational Health and Safety Services: Composition of the personnel; Role and policies in promotion of health and safety in work environment; Services and functions related to work environment; Occupational safety and health act (CAP 514); Radiation Protection Board.

2.9 (e) Leadership, Management and Governance in Health Systems

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To enable the learner, acquire knowledge and skills required for effective leadership, management and governance of health care systems</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the basic concepts, theories, functions and principles of leadership and management → Justify the organisation and management of health system components → Effectively lead manage and govern health systems → Institutionalise continuous quality improvement in health systems



2.9.16 General Course Content

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

- 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.
- Health Information Systems, Health Information; Sources, types, systems. Data collection methods and analysis, Information utilization; applications, policy development, decision making.
- 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.
- Governance, Governance policy and operational documents, constitution, structures; operations.
- Managing health services, Strategic management, health reforms, national health plans; Project management; Organization of health services; Human resource management; Financial management Supplies management / Logistic cycle; Management of materials; Managing change.
- Performance improvement, Performance appraisal, Quality management. Operations management.





2.9 (f) Introduction to Entrepreneurship

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

2.9.17 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.

2.9 (g) Research Methodology and Research Project

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

2.9.18 Research

- Definition; nature of; use and application; scientific enquiry; concept, nature and process.

2.9.19 Types of Research

- Basic; Applied; Operational; Evaluative.

2.9.20 Research Designs and Methods

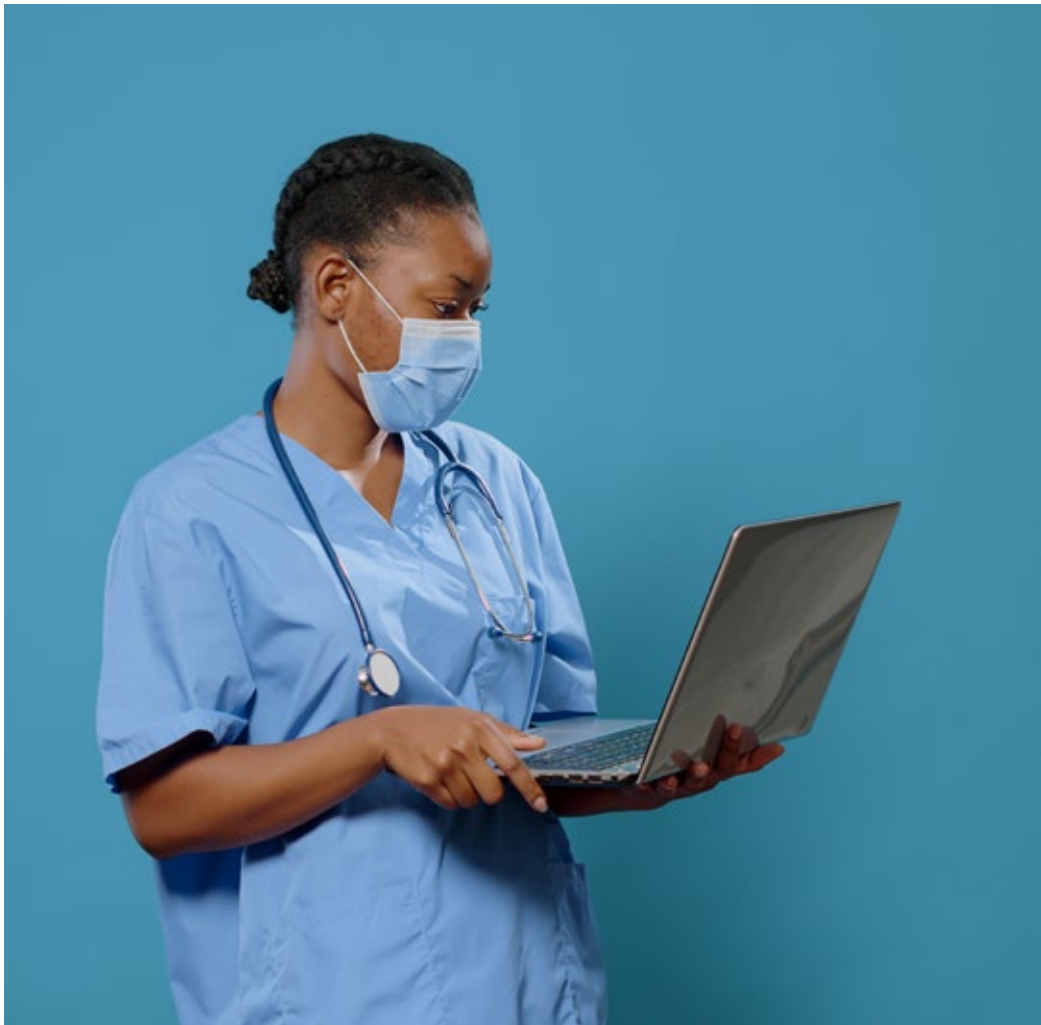
- Descriptive; cross sectional; analytical; longitudinal; cohort retrospective; case control; experimental; clinical trials; quasi-experimental.
- Research methods: Qualitative: focus groups, key informants, case studies, Interviews, Quantitative-descriptive and analytical.
- Sampling methods: simple 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.

2.9.21 Proposal Design



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

2.9.22 Disseminating of Findings

- Report writing; Dissemination of research findings: scientific paper, reports, seminars, use of findings.



2.9 (h) Health Services Attachment

LEARNING MODULE	
	<p>Units 4 (Four)</p> <p>Course Purpose To enable the learner to apply the practical aspects of the overall functioning and management of health and health care systems in a county.</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the various aspects of health services of a county. → Participate in and be able to explain the delivery of health services in a county. → Conduct community diagnosis that provide practical solution to an operational bottleneck within the county

2.9.23 County Health Services

- Organization, management and delivery of the county health services. Role of the Medical Officer (MO); role of the County Medical Officer of Health (CMOH) and other members of the CHMT; provincial administration structures and their importance to health planning and management;
- Hospital Based Aspects: Diagnostic; clinical management; pharmaceutical activities; autopsy; evaluation of service utilization; management systems and functional departments.

2.9.24 Community Oriented Aspects

- Primary Health Care (PHC); Health promotive, preventive and rehabilitative services; school health programmes. Public health: epidemic monitoring, investigation and control; management of community, development of relevant materials; program implementation; assessment of effectiveness, community diagnosis, operational bottlenecks, assessment and practical solutions.

2.9.25 Health Agencies Boards

- Observation of and participation in: decision making; reporting; monitoring and evaluation functions of Management Committees and Boards. Statutory bodies and programmes at international, national, provincial and county levels: Centre for Disease Control (CDC); World Health Organization (WHO); Medical Practitioners and Dentist Board; Pharmacy and Poisons Board; Provincial Health Management Teams (PHMT); County Development Committees (CDC); County Health Management Teams (CHMT); County Health Management Boards (CHMB); Hospital Management Teams (HMT).

2.9.25 Integrated Programmes



- Functions of: Kenya Expanded Program for Immunization (KEPI). Essential Drugs program (EDP), AIDS Awareness program, SID Control program Social medicine provision of health services to the under privileged: the aged, motherless babies, destitute and relief measures.

2.9.26 Attachment Practicum

- Visit to a Board accredited institution – commodity and supplies management; 3 weeks attachment in management position (County Hospital) and cover the following topics – Financial management, HR management, quality assurance.



2.9 (i) Medical Jurisprudence and Applied Toxicology



LEARNING MODULE	
	<p>Units 4 (Four)</p> <p>Course Purpose To enable the learner to apply medical knowledge in the legal field</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Explain laws, civil rights and procedures relating to conduct of medicolegal examinations → Document different types of medical evidence → Collect and analysis of medical evidence and samples for determination of medicolegal cases → Apply medical evidence deduced in a court of law

2.9.27 General Course Content

- Samples: Appropriate specimen collection, preservation, security, analysis/ processing, transportation and reporting.
- Autopsy and exhumation: Statutory provisions, laws and procedures.
- Gender based violence: Types and forms of violence, sexual violence and the law, medical management, forensic management, psychosocial care and support.
- Contested parentage: Counselling, legal aspects, medical and forensic management.
- Drug and substance abuse: Definition, types and forms of abuse, Interventions; psychological, psychiatric, counselling, medico-legal aspects with relevant laws and acts (Cap. 244).
- Laws in Medicine: All relevant laws and acts related to medical practice; Health Bill; human tissue act (Cap. 253) and Public Health Act (Cap. 242); Sexual Offences Act, Abortion Act, Children's Act.
- Forensic Odontology and Radiology: Definition, types of evidence, applications and medico-legal aspects.
- Mental Assessment of suspects: Mental Health Act, (Cap. 248) of the Laws of Kenya.
- Liability and litigation: Definition and types of liability; legal aspects; Due process for establishing the liability; Disciplinary procedures.

2.10 Pharmacology and Therapeutics

2.10 (a) Introduction to Basic Pharmacology



LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable learners, acquire knowledge in principles of basic pharmacology</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Discuss the general principles of pharmacodynamic and pharmacokinetic processes → Describe the general properties of autacoids, neurotransmitters and endocrine, anti-infectives, anti-neoplastic agents

2.10.1 Pharmacokinetics and Pharmacodynamics

- Mechanisms of drug absorption, distribution, and the passage across cell membranes; routes of administration; bio-availability and dosage forms; drug distribution; drug biotransformation; sites of metabolism and activation/inactivation; drug excretion and the entero-hepatic circulation.
- Mechanisms of drug action; structure-activity relationships; receptors; Factors affecting the absorption, distribution, metabolism and excretion of drugs.
- Factors altering drug effects - Individual: disease, physiological conditions- age, pregnancy, gender, obesity, compliance, dependence,
- Drug interactions and pharmacogenetics; side effects, overdose, toxicology.
- Drug metabolism in liver, intestine, kidney, lung, brain, skin.
- General properties of autacoids.
- Prostaglandins; prostaglandin inhibition; leukotrienes and thromboxanes.
- Biogenic amines: adrenergic; cholinergic; dopaminergic; serotonergic; histaminergic; GABAergic;

- Peptides and analogs such as endorphins, substance P, erythropoietin.
- Smooth muscle/endothelial autacoids: nitric acid, platelet-activating factor, endothelin, atrial natriuretic peptide.
- Cytokines: interleukins, tumour necrosis factor.
- Neurotransmitter and endocrine pharmacology; Introduction- Autonomic and somatic motor nervous system.
- Adrenergic: Pharmacological actions of noradrenaline; comparison with adrenaline; actions and uses of (a - and b - adrenoreceptor agonists and antagonists; adrenergic neurone blocking drugs; drugs that interfere with synthesis, storage and metabolism of noradrenaline.
- Acetylcholine: pharmacological actions; drugs affecting cholinergic transmission Anticholinesterases. Actions and uses of selective agonists and antagonists for muscarinic and nicotinic receptors.
- Non-adrenergic, non-cholinergic transmission. Nitric oxide, adenosine and other NANC transmitters.
- Central neurotransmission. Location and function of neurones that release dopamine, GAB A, glutamine, 5-HT and acetylcholine.
- Anti-infectives (Chemotherapy of microbial diseases)
- Antibiotic treatment, modes of action and resistance including penicillins, cephalosporins, carbapenems, monobactams, B:lactamase inhibitors, tetracyclines, aminoglycosides, erythromycin, 4-quinolones, vancomycin and fusidic acid and anti-tuberculosis agents.
- Antimicrobial synergy, antagonism and resistance.
- Viral infections and their treatment including Herpes, Varicella and HIV, HPV.
- Fungal infections including dermatophytes and Candida albicans and treatment with amphotericin and azole agents.
- Treatment of protozoal infections, including malaria. Helminths and arthropods, especially tropical issues such as schistosomiasis, filariasis.
- Tropical diseases: malaria, tuberculosis, leprosy, trypanosomiasis, leishmaniasis, and public health implications.
- Cancer Drugs (Anti-neoplastic agents): Introduction and principles of chemotherapy. The mechanisms of action, uses and limitations of the major groups of chemotherapeutic agents, e.g. alkylating and cross linking agents, anti metabolites, topoisomerase inhibitors, spindle inhibitors and biologicals. New and future therapies.
- Immunomodulation, monoclonal antibodies and conjugates, pro-drugs, vaccines, gene therapy, Novel delivery systems.
- Inhibition of angiogenesis and the metastatic cascade.
- Radiation and chemotherapy sensitisers and protectors.

2.10 (b) Clinical Pharmacology

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable learners acquire knowledge and skills of drugs use and monitoring in specific disease-state management for best patient outcomes</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the therapeutic principles of the drugs used in the treatment of disease in the various systems of the body → Discuss the rational evidence- based use of drugs → Evaluate the principles of prescription writing and monitoring of patient compliance → Effectively apply the laws, policies and regulatory framework for drugs used in health care system for patient care

2.10.2 General Course Content

- For each of the various systems of the body: outline the mechanisms of action, main therapeutic indications, contra indications, adverse effects and clinically significant drug interactions).
- Cardiovascular drugs: Antihypertensive drugs. Diuretics, vasodilators, ACE inhibitors, AT₁ antagonists, adrenoceptor blockers; – adrenoceptor antagonists, calcium entry blockers and CNS active drugs, endothelin antagonists, endopeptidase inhibitors; Ischaemic heart disease and its treatment; nitrates, – adrenoceptor blockers and calcium channel blockers
- Lipid lowering drugs: statins, cholestyramine, nicotinic acid and ACA T inhibitors.
- Antiarrhythmic drugs. Class I-IV anti-arrhythmic drugs Sodium channel blockers, Potassium channel blockers such as amiodarone and sotalol; calcium entry blockers, digoxin, adenosine, beta-adrenoceptor antagonists; Heart failure: ACE inhibitors, I-blockers, adrenoceptor antagonists, inotropic agents and vasodilator drugs in the treatment of heart failure
- Anticoagulant therapy – warfarin, heparin, ximelagatran; Fibrinolytic mechanisms; LMW Heparin. Pharmacology and therapeutic role of streptokinase and tissue plasminogen activator (tPA);

- Anti-platelet drugs and their use in vascular embolic disease; Treatment of anaemia (Haematopoietic agents).
- Dermatological drugs: Acne treatment; keratolytics, comedolytics, antibiotics, retinoids; Psoriasis - inflammatory and hyperproliferative nature of the disease. Use of topical vitamin D analogues, corticosteroids, dithranol; use of intravenous therapy in resistant cases. Alopecia: minoxidil; anti-androgens; antimicrobials and antineoplastics. Endocrine and Reproductive Drugs (Hormones and hormone antagonists).
- Drug treatment of diabetes mellitus: Insulin and oral hypoglycaemics; Hormones of the pituitary and hypothalamus; Drugs suppressing prolactin release: vasopressin and analogues.
- Drugs used in thyroid diseases; Corticotrophin and adrenal steroids.
- Drugs affecting calcium homeostasis; Osteoporosis and Paget's disease. Use of calcitonins, bisphosphonates, oestrogen receptor modulators, vitamin D analogues; calcium hormone replacement therapy; Contraceptive drugs; oestrogens and progestogens, Mechanism of contraceptive action. Drugs affecting the uterus - uterine relaxants and stimulants.
- Anabolic/androgenic steroids - use and abuse; Antimicrobials and antineoplastics.
- Gastrointestinal drugs: Drugs for peptic ulcer disease - antacids, cytoprotective agents, H₂ antagonists and proton pump inhibitors. Antibiotic treatment to eliminate H. pylori; Drugs for motility disorders - stimulants and anti-spasmodics; Drugs for nausea and vomiting - dopamine antagonists, antihistamines, anticholinergics and 5HT₃ antagonists; Laxatives - bulking agents, stool softeners, stimulant and osmotic laxatives; Anti-microbial, immunosuppressive and anti-neoplastic agents. Agents used for Biliary and Pancreatic Disease; pancreatic enzymes.
- Genitourinary drugs: Drugs for urinary incontinence – anticholinergics, antidiuretic hormone analogues; Drugs for benign prostatic hypertrophy – α-blockers and 5-reductase inhibitors; Antiandrogens and prostate cancer. Drugs for – erectile dysfunction – phosphodiesterase inhibitors; treatment of impotence; Anti-microbial agents; Immunosuppressive and anti-neoplastic agents.
- Anti-inflammatory drugs: non-steroidal anti-inflammatory drugs (NSAID); glucocorticoids as anti-inflammatory agents; second-line antirheumatic drugs; Pharmacology of immuno-modulatory drugs used to treat autoimmune diseases, including cytotoxic and immunosuppressive agents; botulinum toxin.
- Drugs for Neurological diseases and Psychotropics (CNS drugs); Analgesics: Narcotic and non-narcotic; local and central analgesia; Anaesthetics: local and general, inhalational and intravenous anaesthetics; Anti-convulsants; Hypnotics and sedatives: the barbiturates, benzodiazepines, non- benzodiazepine anxiolytics and sedatives; Psychopharmacologic agents (e.g antidepressants, mood stabilizers, antipsychotic agents); stimulants (e.g amphetamines); Antiparkinsonian drugs.
- Skeletal muscle relaxants; neuromuscular blocking agents; antiglaucoma drugs; anti-inflammatory agents; Antimicrobial; immuno-suppressive and antineoplastic drugs; Management of drug dependence.

- Respiratory Drugs - Decongestants; cough suppressants and expectorants; anti-microbial agents; Pharmacotherapy of asthma – bronchodilators; b-agonists, xanthines, anticholinergics, leukotriene receptor antagonists. Anti-inflammatory drugs corticosteroids, cromoglycate, etc. Use of longer acting b-agonists; Pharmacotherapy of chronic obstructive pulmonary disease – chronic bronchitis, emphysema and smoking; Immunosuppressive and anti-neoplastic agents.
- Clinical Toxicology - Concepts of drug toxicology: Therapeutic index; adverse drug reactions; “predictable” versus unexpected toxic actions of drugs, management of adverse reactions. Non-drug toxicology, industrial and environmental toxicants. (Heavy Metals and Heavy-metals Antagonists, Non-metallic Environmental Toxicants: Air pollutants, Solvents and Vapours, and Pesticides).
- Regulations - Relevant Acts and Laws; Pharmacy and Poisons Board Act (Cap. 244); Public health; environmental issues/protection of environment.

2.11 Child Health and Paediatrics

LEARNING MODULE



Units

12 (Twelve)

Course Purpose

To equip the learner with the knowledge, skills and attitudes necessary to manage child health and paediatric problems

EXPECTED LEARNING OUTCOMES



- Describe principles of new born care
- Describe normal growth and development of children and adolescents
- Make a diagnosis from relevant history, physical examination and investigations
- Participate in the management of common paediatric conditions
- Perform routine clinical procedures in neonates and children
- Apply preventive measures and carry out health promotion
- Apply research principles in solving paediatric health problems



2.11.1 Principles of New Born Care

- Resuscitation / birth complications including birth asphyxia, meconium aspiration syndrome and prematurity; Congenital anomalies; feeding of new born; pathophysiology and management of common neonatal disorders; jaundice; temperature management; sepsis; haemolytic disease of new born (ABO, Rhesus incompatibility), PMTCT.

2.11.2 Normal Growth and Development of Children and Adolescents

- Normal growth and development stages; components; assessment of growth and development; cognitive and psychosocial development.
- Nutrition: normal nutritional requirements in childhood; breastfeeding and breast milk; HIV and breast feeding; complementary feeding; clinical significance of micro nutrients in child nutrition; malnutrition.

2.11.3 Comprehensive Paediatric History

- Birth history; immunization history feeding history; socio-economic history; growth and development; childhood illnesses; use of appropriate non-patient information sources; summarized history.

2.11.4 Comprehensive Paediatric Examination

- Vital signs anthropometric signs, general examination, systemic and mental examination.

2.11.5 Routine Clinical Procedures

- Indications; limitations; potential complications; interpretation of the results of blood biochemistry, urine biochemistry; lumbar puncture; insertion of N/G tube; veno-puncture; rectal examination, catheterization, basic CPR, pleural tap, ascitic tap, administer oxygen safely, injections, peripheral blood film, blood slide for malaria parasites, CSF analysis, specimen handling, genital examination.

2.11.6 Investigations and Data Interpretation

- Laboratory tests; haematology, blood biochemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies, CSF studies, endocrinologic tests, immunologic tests.
- Imaging: plain X-rays and basic contrast studies, basic CT scan, ultra sound imaging.

2.11.7 Management of the Sick Child

- Designing of an appropriate comprehensive management plan for health problem diagnosed;
- Patient monitoring: vital signs, clinical and laboratory monitoring;
- Consultation and referrals;
- Clinical use of pharmacotherapeutic agents and other therapeutic modalities;
- In children Counselling.

2.11.8 Common Paediatric Health Problems

- Scientific basis of illness; anatomical; biochemical; microbiological; pathologic
 - Sick child; abnormal growth and development; pathophysiology of disease; care for the sick child; care for the terminally ill child.
- Common paediatric disorders including: malaria; HIV; anaemia; acute respiratory infections; diarrhoeal and vomiting; nutritional disorders and immunizable diseases; paediatric emergencies.



- Systemic paediatric disorders; congenital; infective; traumatic; immunologic; metabolic; neoplastic; degenerative; genetic and impact of environmental factors in disease conditions of the systems: Respiratory: congenital, inflammatory and infective, immunologic, neoplastic. Neuromuscular: congenital, inflammatory and infections of the brain and meninges, seizure disorders, cerebral palsy, muscle and spinal cord disorders. Reproductive: congenital, inflammatory and infections of the reproductive system, immunologic, neoplastic conditions. Urinary: congenital, inflammatory and infections of the urinary system, immunologic (including nephrotic syndrome), neoplastic conditions. Haematologic and oncologic disorders: anaemias, haemorrhagic disorders, leukemias, solid tumours of childhood. Cardiovascular: congenital, inflammatory and infections including rheumatic heart disease and infective endocarditis, cardiac failure. Endocrine: hormonal dysfunctions including thyroid disorders, diabetes mellitus, growth disorders, precocious puberty. Skin and integumentary: congenital, inflammatory and infections of the skin and connective tissues including atopy, urticaria and dermatoses. Skeletal systems: congenital, inflammatory, infective, traumatic, degenerative and neoplastic. Behaviour and psychiatric disorders: phobias; hysteria; anxiety; antisocial behaviour; truancy; drug abuse; behaviour problems associated with physical illness; neurotic and psychotic disorders.
- Adolescent medicine: neurosis; behaviour disorders; alcohol and substance abuse; psychotic disorders; hysteria; adolescent psychiatry.
- Paediatric accident and emergencies.



2.11.9 Prevention and Health Promotion

- Recognition of genetic predisposition, ethnic/cultural, and environmental factors that influence health of children;
- Screening programmes;
- Immunization programmes: EPI schedules;
- Communication and advocacy for right to health of children;
- Intervention and health promotion: child health statistics; preventive and promotive child health; child health programmes; sanitation and safe water supply; child abuse; delinquency; child labour; child advocacy; child fostering and adoption; children living in difficult circumstances.

2.11.10 Research and Ethics

- Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases.
- Role of research in the advancement of diagnosis, therapy and management of patients.
- Ethical issues; medico-legal issues, informed consent, assent, autopsy.

2.12 Internal Medicine

LEARNING MODULE	
	<p>Units 12 (Twelve)</p> <p>Course Purpose To enable the learner to apply knowledge, skills and attitudes in general and specific areas of internal medicine</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Apply the principles of internal medicine to make a diagnosis from relevant history, physical examination and investigations → Demonstrate ability to participate in the management of common disorders in internal medicine → Describe influence of ageing on medical conditions, particularly care of the elderly → Describe the principles of human genetics and gene therapy → Perform routine clinical procedures and carry out basic laboratory investigations → Demonstrate ability to be a “self -directed learner”

2.12.1 Clinical Process

- Focused history taking; comprehensive physical and mental examination; recording of clinical data; interpretation of findings; interpretation of results of commonly done investigations including basic haematology, blood biochemistry, urine and stool examination, X-rays, basic CT scans, electrocardiography, basic contrast studies among others; clinical decision making based on the available data; outline of patient management plan; case presentation, ultra sound.

2.12.2 Investigations and Data Interpretations Management of Medical Disorders

- Designing an appropriate comprehensive treatment plan for the problem diagnosed; supportive treatment and optimization of the patient; definitive treatment; medical prophylaxis.
- Patient monitoring; vital signs; clinical and laboratory monitoring.
- Consultation and referrals.
- Rational use of pharmacotherapeutics; other therapeutic modalities.
- Counselling.
- Palliation and care of the terminally ill.
- Pathophysiology of the ageing process, care of the elderly, medication compliance, dosing and nutritional needs.
- Principles of human genetics, ethics and practice in clinical medicine.

2.12.3 Routine Clinical Procedures

- Indications; limitations; potential complications; specimen handling; lumbar puncture; insertion of nasogastric tube; venepuncture; rectal examination, bladder catheterization, pleural tap, ascitic tap; cardio pulmonary resuscitation (CPR); administer oxygen safely; Injections, (intravenous, intramuscular, subcutaneous); urinalysis; peripheral blood film; blood slide for malaria parasites; Cerebro Spinal Fluid (CSF) analysis, bone marrow aspiration, nebulisation, arterial gas sampling.

2.12.4 Common disorders in internal medicine

Respiratory disorders

- Rhinitis, sinusitis, laryngitis, epiglottitis, bronchitis, bronchiolitis, pneumonitis, interstitial lung disease, pleuritis, pneumonia, empyema, tuberculosis, fungal infections, asthma, chronic obstructive pulmonary disease, hypersensitivity disorders, pneumoconioses, HIV /AIDS and associated disorders, other immunodeficiency states, aspiration, pneumothorax, pleural effusion, acute and chronic alveolar injury, ARDS; hypoventilation; neoplastic disorders; idiopathic disorders; Vascular disorders: pulmonary emboli, pulmonary hypertension; oxygen and ventilator therapy.

Cardiovascular disorders

- Acute rheumatic fever and rheumatic heart disease, valvular heart disease, heart failure; chronic and acute including cardiogenic shock, arterial hypertension; hypotension, coronary artery disease: risk factors; clinical syndromes i.e. stable coronary disease, acute coronary syndromes; prevention pericardial disease; acute pericarditis, constrictive pericarditis, pericardial effusion, pleural effusion and tamponade, venous thromboembolism; DVT, pulmonary embolism, myocardial diseases; myocarditis, cardiomyopathies (dilated, hypertrophic, restrictive) pulmonary hypertension; primary, secondary e.g. cor pulmonale, infective endocarditis, dysrhythmias, peripheral artery disease HIV/AIDS associated cardiovascular disorders congenital heart disease.

Endocrine and metabolic disorders

- Pituitary and hypothalamic disorders; diabetes insipidus, inappropriate secretion of secretion of ADH, hypopituitarism, acromegaly, thyroid disorders; hypothyroidism, hyperthyroidism, thyroiditis, parathyroid disorders; hyperparathyroidism, hypoparathyroidism; metabolic bone disorders, disorders of glucose metabolism: diabetes mellitus; acute and chronic complications, hypoglycaemia, obesity and the metabolic syndrome adrenal disorders; Cushing's syndrome, hyperaldosteronism, corticoadrenal insufficiency, hypoaldosteronism, pheochromocytoma. disorders of lipid metabolism, disorders of the sex hormones, neoplastic disorders; ectopic hormone production, HIV/AIDS and associated endocrine disorders.

Neurological disorders

- CNS infections; meningitides, encephalitis, cerebral abscess, neurosyphilis, poliomyelitis, Guillain-Barre syndrome, neurological manifestations of HIV/ AIDS, cerebrovascular disorders (cerebral infarctions; haemorrhages; aneurysms; carvenous sinus thrombosis, seizure disorders, degenerative disorders Alzheimer's disease, Parkinson's disease, myotrophic lateral sclerosis, demyelinating disorders (multiple sclerosis, diseases of peripheral nerves, diseases of the spinal cord and spinal nerve roots, congenital anomalies, neoplasms, diseases of muscle and the neuromuscular junction, paroxysmal disorders headache, trigeminal neuralgia), metabolic and nutritional deficiencies e.g. thiamine and cyanocobalamine deficiency, symptoms and signs of ill defined conditions; coma, delirium, confusion, dementia, syncope, ataxia, sleep disorders.

Gastro-enteric disorders

- Oesophageal disorders; esophagitis, GERD, motility disorders, oesophageal varices, hiatus hernia o Peptic ulcer, gastritis, Pancreatitis; acute, chronic, Hepatobiliary disease; Hepatitis; liver cirrhosis; metabolic liver disease; liver failure; portal hypertension; Jaundice, prehepatic, hepatic, post hepatic; cholecystitis and cholelithiasis, cholangitis, Small and large bowel disease; Crohn's disease, ulcerative colitis malabsorption syndromes, diarrhoeal disease, parasitic infestations food poisoning, Peritonitis, ascites\ HIV/AIDS related disorders.

Renal disorders

- Pyelonephritis, cystitis, urethritis, prostatitis, glomerulonephritis, interstitial nephritis, transplant rejection; traumatic and mechanical disorders, obstructive uropathy, Disorders involving metabolic, physiological, or regulatory processes: renal failure, cortical and medullary necrosis, nephrotic syndrome, tubular disorders, disorders of collecting system, renal calculi, Prostatic disorders; neoplastic disorders: Wilm's tumour, bladder carcinoma; vascular disorders; effects of systemic disease on the kidney; fluid/electrolyte disorders; acid and base balance, Management of end stage renal disease (transplant).

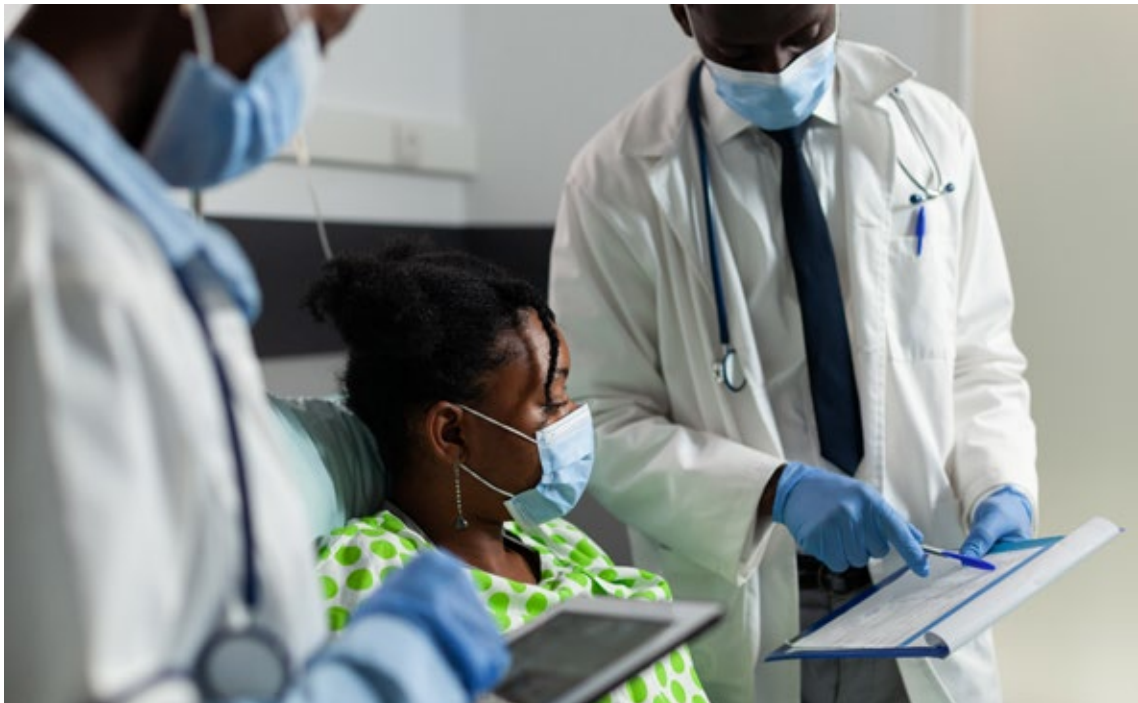
Rheumatological disorders

- Connective tissue disorders, Rheumatoid arthritis, SLE, polymyalgia rheumatica.



Haematopoietic and lymphoreticular disorders

- Anaemias; Iron deficiency, megaloblastic anaemias (B 12 and folate deficiency), haemolytic, anaemia of chronic illness, pancytopenia, Haemolytic disorders (sickle cell anaemia), Bone marrow suppression, Disorders of haemostasis; coagulopathies and platelet disorders (Haemophilia), von Willebrand's disease, DIC, ITP.
- Neoplastic disorders; Acute and chronic leukaemias, lymphomas, multiple myeloma, polycythaemia rubra vera, Transfusion and transfusion reactions. Infectious diseases.
- Epidemiology; prevention, clinical and community; socio economic and cultural dimensions, Mechanisms of disease; aetiology, transmission, pathology, pathogenesis, natural history, behavioural and socio-cultural determinants, clinical course and complications, General aspects; specific organisms and types of infectious diseases; host responses e.g. inflammation, fever; Immunity (innate and acquired); factors predisposing to infection, bacteraemia, septicaemia, septic shock, toxic shock; nosocomial infections; bases for susceptibility and resistance to antimicrobial measures, specific infections, bacterial, viral, parasitic, fungal, Principles of management and anti-microbial treatment, acute or emergency problems; septicaemia, septic shock; the immuno compromised host, Fever of unknown origin.

- Oncology (neoplastic disorders), General aspects; basic biologic behaviour of tumours; principles of primary therapeutic interventions; site and size related complications and their management; paraneoplastic syndromes; ectopic hormone secretion; palliation, Neoplastic disorders; osteogenic sarcoma.
- Emergency medicine, Aetiology, pathology, diagnosis, treatment, rehabilitation prevention and epidemiology of common medical emergencies; Epistaxis, airway obstruction, status asthmaticus, tension pneumothorax, pulmonary oedema, acute respiratory failure, pulmonary embolism, shock, arrhythmias, anaphylactic reactions, Diabetic ketoacidosis, hypoglycaemia, thyroid storm, adrenocortical crisis, urinary retention, hyperkalaemia, hyponatraemia, acute renal failure, status epilepticus, acute complicated malaria, acute psychotic state, meningitis, cavernous sinus thrombosis, cerebrovascular accident, the unconscious patient, acute poisoning, sickle cell crisis, septicaemia, snake bites, haemoptysis, haematemesis, hypertensive emergency, acute coronary syndromes.
- Health Promotion in Medicine, Factors influencing the medical care of individuals and community; Socioeconomic, cultural, familial, psychological, economic, environmental, legal, political and spiritual factors, Communication and advocacy for health issues (non-communicable diseases), Prevention of diseases and accidents, Medical appliances, Role of research, Health insurance.
- Self-directed learning, Show self-discipline, initiative, independence, persistence and self-study skills in learning by oneself. Be able to accept responsibility for own learning. Be proactive and view issues as challenges and not obstacles.



2.13 Reproductive Health

LEARNING MODULE	
	<p>Units 12 (Twelve)</p> <p>Course Purpose To enable the learner to acquire knowledge, skills and attitudes in general and specific areas of Reproductive Health</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the scientific foundation of obstetrics and gynaecology → Make a diagnosis from relevant history, physical examination and investigation → Appropriately manage common obstetric and gynaecological conditions → Appropriately perform procedures in common obstetric and gynaecological conditions → Document portfolios of cases managed



2.13.1 General Course Content

- Anatomy and physiology of male and female reproductive organs; the menstrual cycle; human sexuality, spermatogenesis; sex hormones; puberty; menopause and male climacteric; Normal pregnancy: conception; foetal growth and development; and antepartum management; Normal labour, delivery and puerperium, foetal death; Foetal and neonatal physiology. Basic pharmacology and pharmacotherapeutics and safety in pregnancy.
- Clinical process: focused history taking including socio-cultural issues comprehensive physical and mental examination; summarized history; recording of clinical data; interpretation of findings; case presentation. basic diagnostic and technical procedures: partogram, recording and record keeping, imaging techniques.



- Antenatal care, Obstetric problems: multiple gestation; abortion; ectopic pregnancy; third trimester; abnormal bleeding; eclampsia; gestational diabetes; Disorders associated with the puerperium: lactational problems; post-partum haemorrhage; sepsis; depression; Antepartum, intrapartum and postpartum disorders of the foetus; neonatal resuscitation. Abnormal labour; induction; methods of operative delivery; Obstetrics related genital tract trauma; prolapse and incontinence (uro-gynaecology).
- Vulvovaginitis; salpingitis; pelvic inflammatory disease; toxic shock syndrome; mastitis; breast abscess; orchitis; epididymitis; sexually transmitted diseases, including HIV/AIDs, Prevention of Mother to Child Transmission (PMTCT), abnormal vaginal bleeding, female genital cut (mutilation) and other genital tract trauma; prolapse and incontinence.
- Gynaecological malignancies: Tumors of the vulva uterus, cervix, ovaries, breast, testis; Radiotherapy and chemotherapy; investigations: PAP smear, colposcopy.
- Menstrual disorders; infertility; polycystic ovarian disease; endometriosis; sexual dysfunction; assisted reproductive technology Treatment of menstrual disorders; hormone replacement; antimicrobials; antineoplastics; contraception and pregnancy; population dynamics, Family Planning.
- Common clinical procedures: Catheterization; Rupture of membranes; Normal deliveries; Resuscitation of the newborn; Apgar scoring; Episiotomy and repair; Repair of perineal tears; Clinical pelvimetry; Nasogastric-tube insertion; Manual vacuum aspiration; Speculum examination; Pap smear; Insertion and removal of Intra Uterine Contraceptive Devices; Venepuncture- Induction of labour; Vacuum delivery; Breech delivery; Breech extraction; Amniocentesis; Paracentesis; Culdoscentesis; Hysterosalpingogram; Laparotomy for ectopic pregnancy; Manual removal of placenta; McDonald stitch insertion; Minilap Bilateral Tubal Ligation; Caesarean section; Oophorectomy; Myomectomy; Drainage of pelvic abscess, laparoscopy, basic Cardio Pulmonary Resuscitation (CPR) and Advanced Life Support for Obstetrics (ALSO). Role of research in continued enhancement of reproductive health care (highlight of study methods: quantitative studies- cross sectional, case control, cohort, clinical trials, community trials, qualitative studies - rapid appraisal procedures) Paediatric gynaecology.
- Adolescent sexual and reproductive health.

2.14 General Surgery

LEARNING MODULE	
	<p>Units 12 (Twelve)</p> <p>Course Purpose To enable the learner to apply knowledge, skills and attitudes to manage surgical problems</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Apply the principles of surgery in making a diagnosis from relevant history, physical examination and investigation → Demonstrate ability to participate in the management of common surgical problems → Demonstrate ability to be a “self -directed learner”

2.14.1 Principles of Surgery

- Aseptic and anti-septic techniques; hazards and precautions in operating theatre; patient evaluation; informed consent; peri-operative care and management of surgical complications; wounds and wound healing; fluid therapy and electrolyte balance; pain management; shock in surgery; multiple injury and critical care; co-morbidities of surgical importance; metabolic response to trauma; transfusion and transplant surgery.

2.14.2 Clinical Process

- Comprehensive and focused history of a surgical patient; comprehensive physical, mental, emergency directed and focused examination; recording of clinical data; interpretation of findings; interpretation of results of commonly done investigations; clinical decision making based on the available data; case presentation.

2.14.3 Routine Clinical Procedures Indications

- complications and limitations of: venopuncture including blood cultures; starting a peripheral venous access: basic Cardio Pulmonary Resuscitation (CPR), Advanced Trauma Life Support (ATLS); control of external haemorrhage; insertion of nasogastric tube; sterile techniques; universal precautions; injections; urethral catheterization; fundoscopy; suturing of lacerations; lumbar puncture; incision and drainage of abscess superficial lesions; rectal examination; excisional biopsy of lumps, suturing of wounds, insertion of chest tubes, superficial and easily accessible lesions; abdominal paracentesis; thoracocentesis, circumcision.

2.14.4 Investigations and Data Interpretation

- Laboratory tests; haematology, blood chemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies; Cerebro Spinal Fluid (CSF) studies; endocrinologic tests; basic imaging studies.

2.14.5 Management of Surgical Disorders

- Designing an appropriate comprehensive treatment plan for the surgical problem diagnosed; supportive treatment and optimization of the surgical patient; definitive treatment; surgical prophylaxis. Patient monitoring; vital signs, clinical and laboratory monitoring; biochemical parameters; Consultation and referrals.
- Rational use of pharmacotherapeutics; other therapeutic modalities Counselling, Palliation in surgery and care of the terminally ill, Pathophysiology of the ageing process, care of the elderly, medication compliance, dosing and nutritional needs, Principles of human genetics, ethics and practice in surgery.
- Management of trauma and common emergencies.

2.14.6 Systemic Surgical Disorders

- Gastro-intestinal tract: acute abdomen; congenital; dysphagia; foreign body; caustic burns; peptic ulcer disease; neoplasms; hepatobiliary disorders; peri-anal lesions; trauma; inflammatory bowel disease, gastrointestinal bleeding, hernias; Cardiovascular: congenital vascular lesions; infective processes complication of arterial diseases; trauma to vessels and heart; aneurysms; varicose veins and varicose ulcers; arteriovenous shunts, diseases of pericardium.
- Endocrine system: congenital disorders; thyroid and parathyroid glands; adrenal glands among others Genito-urinary systems; congenital disorders; infective processes, obstructive uropathy; haematuria, malignancies; acute scrotum; trauma, iniquino-scrotal swellings.

- Nervous system: congenital lesions; infective processes space occupying lesions; head injury; cord compression malignancies.
- Respiratory system: congenital lesions; infective processes, pleural effusion, chest injury and complications; empyema thoracis; foreign body in bronchus, malignancies.
- Skin and integumentary; congenital skin lesions, infective processes, benign and malignant lesions, basic reconstructive skin surgery, Surgical procedures, diagnostic techniques, plastic surgery, biopsy (punch, shave and excision), curettage, electrosurgery, cryosurgery, laser and intense pulsed light, diseases of the breast, Tuberculosis in surgery., HIV and AIDS in surgical patients.

2.14.7 Preventive and Health Promotion in Surgery

- Recognition of genetic predisposition, ethnic/cultural factors, occupational risks, exposure and lifestyle: Screening programmes; Behaviour modification: Appropriate and timely intervention programmes: Advocacy for right to health of individuals and community: educational programmes and other interventions: Prevention of disease.

2.14.8 Research in Surgery



- Role of research in the advancement of diagnosis, therapy and management of surgical patients. Limitations of scientific underpinnings guiding diagnosis, management and prevention of diseases:

2.14.9 Self-directed Learning

- Show self-discipline, initiative, independence, persistence and self-study skills in learning by oneself. Be able to accept responsibility for own learning. Be proactive and view issues as challenges and not obstacles.



2.15 Orthopaedics and Traumatology

LEARNING MODULE	
	<p>Units 16 (Sixteen)</p> <p>Course Purpose To enable the learner to apply knowledge, skills and attitudes to handle trauma, orthopaedic emergencies and common orthopaedic problems</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Apply the principles of orthopaedic and traumatology → Demonstrate ability to participate in the management of common orthopaedic problems → Demonstrate ability to be a “self-directed learner”

2.15.1 Principles of Surgery

- Aseptic and anti-septic techniques; hazards and precautions in operating theatre; patient evaluation; informed consent; peri-operative care and management of surgical complications; wounds and wound healing; fluid therapy and electrolyte balance; pain management; shock; co-morbidities of surgical importance; metabolic response to trauma; transfusion; bone fixation; resuscitation.

2.15.2 Clinical Process

- Focused history taking; comprehensive physical examination and mental examination; summarized history; recording of clinical data; interpretation of findings; case presentation, informed consent, pre-op care.

2.15.3 Routine Clinical Procedures

- Indications; limitations and complications; perform routine clinical procedures urine biochemistry, X-rays, basic CT, basic contrast studies among others; including specimen handling; interpretation of the results of blood biochemistry, lumbar puncture; insertion of N/G tube; vene-puncture; suturing of wounds and application of splints, casts and traction; Basic Life Support (BLS), Advanced Trauma Life Support (ATLS).

2.15.4 Investigations and data interpretation

- Results of blood chemistry, urine, x-rays, bone CT, MRI.

2.15.5 Management of Orthopaedic Disorders

- Designing an appropriate comprehensive treatment plan for the orthopaedic/trauma problem diagnosed; supportive treatment and optimization of the patient; definitive treatment; surgical prophylaxis.
- Patient monitoring; vital signs; biochemical parameters.
- Consultation and referrals.
- Rational use of pharmacotherapeutics; other therapeutic modalities.
- Counselling.
- Palliation in orthopaedics and care of the terminally ill.

2.15.6 Common Orthopaedic / Trauma Disorders

- Bone and joint infections; fractures of bones; compartment syndrome; spinal injury and cord compression; neuro-vascular injury; joint dislocations; multiple injuries; Congenital Bone and Joint Disorders: affecting the foot, the knee and hip joints. Achondroplasia, osteogenesis imperfecta;
- Inflammatory and Infective Conditions: Hand infections, tuberculous and parasitic bone infections, Osteomyelitis, Septic arthritis, Rheumatoid arthritis, bursitis and synovitis, chronic inflammations associated with other systemic diseases;
- Degenerative bone and Joint Disorders: synovial joint disorders, osteoarthritis, osteoporosis, low back pain. Metabolic Bone Disorders: rickets, gout; Neoplasms: Primary and metastatic musculoskeletal tumours.
- Common Fractures and Fracture Dislocations; Grading and types of fractures: first aid and transportation: management of patient with multiple injuries: management of fractures; complications of fracture; fracture healing. Response to trauma. Injuries to tendons, nerves, blood vessels; and their management; Spinal injury and cord compression; neuro-vascular injury: dislocations, fractures and fracture dislocations; soft tissue injuries, Injuries to tendons, nerves, blood vessels compartment syndrome, management of patient with multiple injuries; Triaging and mass accidents, resuscitation,
- Rational use of pharmacotherapeutics; other therapeutic modalities; Consultation and referrals: Rehabilitation, Counselling Palliative care of the terminally ill.



2.15.7 Health Promotion in Orthopaedic

- Factors influencing care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual factors.; Advocacy; Prevention of orthopaedic diseases and accidents; Orthopaedic appliances; Role of research.

2.15.8 Self-directed Learning

- Show self-discipline, initiative, independence, persistence and self-study skills in learning by oneself. Be able to accept responsibility for own learning. Be proactive and view issues as challenges and not obstacles.

2.16 Radiology and Imaging

LEARNING MODULE	
	<p>Units 4 (Four)</p> <p>Course Purpose To enable the learner to know and apply basic principles of Radiology and Imaging</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → To describe the basic Principles of Radiology and Imaging → To demonstrate knowledge in the application of Radiology and Imaging Principles → Demonstrate skills in assistance of the performance of Ultrasound, X-rays, CT scans, MRI and Interventional Radiology → Demonstrate knowledge in the interpretation and possible diagnosis of simple imaging procedures

2.16.1 General Course Content

- The scope and basic principles of diagnostic imaging techniques and modalities; Conventional; plain radiography and contrast procedures;
- Newer imaging modalities; ultrasound, computerized tomography, Doppler ultrasound, radionuclide scanning, MRI, pet scan;
- Concept of radiographic contrast media and its application Indications, contraindications and complications of radiological procedures; Interventional radiology.
- Radiation protection, monitoring and legislation.



2.16.2 Description and Interpretation of the Common Imaging Outcomes

- Skeletal tissue: normal appearance and pathologic changes of bones, healing and complications of fractures, inflammatory changes of bones and joints, degenerative diseases of joints, diagnostic features of bone tumours.
- Chest: diagnostic features of infectious and inflammatory diseases of lungs and bronchi, pulmonary tuberculosis, tumours of lungs and pleura, pulmonary oedema and embolism, air fluids in pleural-space, mediastinal disorders.
- Oesophagus: tumours and motility disorders.
- Stomach and Intestines: tumours, peptic ulceration, perforations.
- Biliary System: stones.
- Cardiovascular system: abnormalities of the heart, abnormalities of the blood vessels and lymphatics.



- Special radiological features in children.
- Central Nervous System: fractures, space occupying lesions, degenerative disorders, pathologies involving the spine.
- Head and neck radiology: imaging modalities; pathologies of the nasal cavity, paranasal sinuses, orbits, and temporal bones; other head and neck pathologies; systemic diseases involving the head and neck.
- Breast radiology: imaging modalities, breast cancer screening, mammography
Pelvic and urogenital radiology: imaging modalities, imaging in obstetrics and gynaecology, pelvic masses, urinary lithiasis, neoplasia and renal cystic disease, tuberculosis, renovascular hypertension, kidney transplantation, prostatic and scrotal pathology, trauma.
- Osteoarticular and muscular radiology: imaging modalities; anatomy and physiology; congenital, infectious, neoplastic, inflammatory, metabolic, traumatic, and vascular diseases.
- Vascular and interventional radiology: basic concepts.
- Radiation Protection Act (Cap. 243 of the Laws of Kenya); Role of Kenya Nuclear Regulatory Authority (KNRA).

2.17 Ophthalmology

LEARNING MODULE	
	<p>Units 4 (Four)</p> <p>Course Purpose To enable the learner to diagnose ophthalmic conditions and know when to refer</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the anatomy of eye and physiology of vision → Take an ophthalmic history and perform basic ocular examination and perform routine clinical procedures → Explain the Principles of common refractive errors, their correction and appropriate investigations → Participate in triage and management of the common ophthalmic disorders

2.17.1 Anatomy and Physiology

- Ocular Anatomy: Orbit; lids; conjunctiva; lymph nodes; lachrymal system; cornea; anterior chamber; iris and pupil lens; vitreous; choroids and retina; Anatomy of extraocular muscles including origin, course, insertion, innervation, and blood supply; Normal alignment. Ocular physiology: Visual pathways; Oculomotor pathways; Facial and trigeminal nerves; Autonomic pathways; Pupillary pathways Aqueous humor physiology.

2.17.2 The Eye as An Optical System

- Visual acuity; Refractive states: Emmetropia; Myopia; Hypermetropia; Astigmatism; Presbyopia and accommodation; Spectacle correction; Contact lenses; Intraocular lenses; Low vision and low vision aids; Refractive surgery including newer procedures like PRK and LASIK.

2.17.3 Clinical Process

- History taking; basic examination with flashlight; slit-lamp examination; fundoscopy; visual fields by confrontation; summarized history; recording of clinical data; interpretation of findings; case presentation.

2.17.4 Routine Clinical Procedures

- Indications; limitations; potential complications; Visual acuity; External inspection; Pupillary reflexes; Ocular motility; Direct ophthalmoscopy; Pupillary dilatation; Anterior chamber depth assessment; Visual fields by confrontation (perimetry); IOP measurement (tonometry); Fluorescein staining; Extraocular motility; Neuroimaging: X-rays; CT scan; MRI; Ultrasound, among others.

2.17.5 Management of Ophthalmic Disorders

- Designing an appropriate comprehensive treatment plan for the ophthalmic problem diagnosed; supportive treatment and; definitive treatment
- Patient monitoring; vital signs, laboratory and clinical monitoring; biochemical parameters.
- Consultation and when to refer.
- Rational use of pharmacotherapeutics: drops; ointments; local injections; local anaesthesia; other therapeutic modalities.
- Counselling.
- Rehabilitation and care of the visually impaired.



2.17.6 Common Ophthalmic Disorders

- Ocular trauma; blunt and penetrating injuries; orbital trauma and blowout fracture; burns and chemical injuries; ocular foreign bodies.
- Red eye differential diagnosis: Glaucoma; Anterior uveitis; keratitis; Conjunctivitis Scleritis; Episcleritis; Adnexal disease; Subconjunctival haemorrhage; Pterygium; Keratoconjunctivitis sicca; Abnormal lid function; Symptoms associated with the red eye and steps to differentiate red eye. Indications for referral.
- Eyelid diseases: Malpositions; Inflammations; Infections; and tumours. Lacrimal system:; lacrimal disease; Congenital and acquired nasolacrimal duct obstruction; Dacryocystitis. Orbital diseases: orbital cellulites; Thyroid disease; Pseudotumor, Orbital tumours: Aetiology, Measurement of proptosis, Investigations in proptosis including radiological investigations.
- Cataract: Symptoms; Lens examination; and red reflex; Cataract surgery.



2.17.7 Artificial Lenses

- Xerophthalmia; vitamin A deficiency and its effect on the eye; WHO classification; community health aspects
- Trachoma: causes; treatment; Complications; SAFE strategy.
- Glaucoma: Definition; risk factors, signs, and symptoms of primary open angle glaucoma and angle closure glaucoma; Visual acuity and visual fields; IOP and ways of measurement; optic neuropathy in glaucoma; Pharmacological and treatment.
- Amblyopia: strabismic; refractive; form deprivation; and occlusive. Strabismus: classification; strabismus testing: causes, effects and basics of management
- Vitreoretinal disorders: Symptoms: loss of vision; flashes; floaters; leucocoria; Fundus features of important ocular diseases: endophthalmitis and panophthalmitis; retinal detachment; age-related macular degeneration; Fundus features of important systemic diseases: diabetes mellitus; hypertension; vaso occlusive disease; HIV/AIDS; Cranial nerve palsies; Myasthenia gravis.
- Optic nerve diseases: papilloedema; papillitis; optic atrophy;
- Neoplasms: Retinoblastoma: malignant melanoma; other intra-ocular tumours and metastasis; SCC and Kaposi's.
- Sudden loss of vision.

2.17.8 Health Promotion in Ophthalmic Surgery

- Vision 2020 and Kenya Ophthalmic Program.
- Prevention of ophthalmic diseases and accidents.

2.18 Otorhinolaryngology (ORL)

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To enable the learner to apply knowledge, skills and attitudes to handle common otorhinolaryngology conditions</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Apply the principles of otorhinolaryngology in making a diagnosis from relevant history, physical examination and investigation → Demonstrate ability to participate in the management of common otorhinolaryngology problems

2.18.1 Principles of ORL

- Review of anatomy of the ear, (outer, middle and inner), nose; nasopharynx and paranasal sinuses, Larynx, trachea and Broncho-pulmonary tree, and the oral cavity including congenital anomalies, The neck including lymphatics and fascial planes; Physiology of hearing and the auditory pathway, balance and the vestibular pathway.

2.18.2 Clinical Process

- Focused history taking; comprehensive physical examination and mental examination; summarized history; recording of clinical data; interpretation of findings; case presentation. Use of flashlight, tongue blade, otoscope, nasal specula, laryngoscope.
- Designing an appropriate comprehensive treatment plan for the ORL problem diagnosed; supportive treatment and optimization of the patient; definitive treatment; surgical prophylaxis; Patient monitoring; vital signs; biochemical parameters; Consultation and referrals; Rational use of pharmacotherapeutics; other therapeutic modalities; Counselling; Radiotherapy and Chemotherapy for common head and neck tumours; Palliation in ORL and care of the terminally ill.

2.18.3 Routine Clinical Procedures

- Indications; limitations; potential complications; X-rays, basic CT, basic contrast studies among others; insertion of N/G tube. Common tuning fork tests; Webbers, rinnes, Schwabach's, Stenger's tests; Eustachian tube dysfunction in middle ear pathology; Tracheostomy, removal of foreign bodies.

2.18.4 Common ORL Disorders



- Diseases of the ear: Acute and chronic otitis media and externa; Acquired deafness and rehabilitation; Dizziness and vertigo; Tinnitus; Common tumours of the outer, middle and inner ear; Radiology and imaging in ear diseases.
- Diseases of the nose and sinuses: Rhinitis; Sinusitis; Epistaxis; Nasal Polyps; Fracture of the nasal bones; Carcinoma of the postnasal space, Nasal foreign bodies.
- Diseases of the throat: Tonsils and adenoids; Pharyngitis; Laryngitis; Aetiology of dysphagia and management, Carcinoma of the Larynx; Tumours of the oral cavity and palate: Neck masses, differential diagnosis and management; clinical significance of lymph nodes in the neck and their levels: URTI; Vertigo; Salivary gland tumours; and Foreign bodies in ORL.

2.18.5 Health Promotion in ORL Surgery

- Factors influencing surgical care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual;
- Advocacy: Prevention of ORL diseases and accidents;
- ORL appliances: Role of research.



2.19 Anaesthesiology and Critical Care Medicine



LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To enable the learner, acquire knowledge, skills and attitudes in anaesthesiology and critical care medicine</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Discuss the principles of anaesthesiology and critical care → Make diagnosis from relevant history, physical examination and investigation → Perform and document basic/routine clinical procedures in anaesthesia → Participate in the management of common anaesthesia and critical care patients → 5. Discuss medico-legal and ethical issues in anaesthesia and critical care → Discuss the role of intensive care in medicine

2.19.1 General Course Content

- History of anaesthesia. Introduction to anaesthetic drugs and Anaesthetic equipment: Anaesthetic machine and accessories;
- Anaesthetic techniques: Local, regional and general anaesthesia; Preoperative assessment of the patient: preoperative patient preparation and care of the anaesthetised patient; Physiological monitoring of the anaesthetised patient:
- Cardiovascular system; respiratory system; neurological system; and the other systems.
- Complications of anaesthesia. Post-operative management: fluid, nutrition and pain management. Postoperative patient care; shock and its management;
- Medical legal and ethical issues in anaesthesia: the consent form; anaesthetic accidents; anaesthetic death;

- Organisation of the intensive care unit. End of life decisions; de-escalating care; counselling the patient, guardians, staff. HIV/AIDS;
- Basic anaesthetic procedures such as Insertion of IV -lines, oropharyngeal airways, laryngeal mask airways, Endotracheal intubation, Insertion of NG-tubes and Urethral Catheterization, including the indications and complications Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), Paediatric Advanced Life Support (PALS), ICU/ HDU layout, personnel and equipment, criteria for admission, principles of ICU/ HDU management. ICU patient management and cardiopulmonary/cerebral resuscitation.

2.20 Dermatology and Venereology

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To enable the learner to acquire knowledge, skills and attitudes to manage common dermatology and venereal conditions</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe the principles of dermatology and venereology → Analyse the determinants and distribution of common dermatological and venereological conditions → Diagnose, manage and prevent common dermatological and venereological conditions → Develop strategies to destigmatise individuals with dermatological and venereological conditions

2.20.1 General Course Content

- Bacterial infections of skin and soft tissues e.g. impetigo, folliculitis; Superficial fungal infections e.g. candidiasis, mycoses, tinea; Viral e.g. herpes simplex and zoster, warts, molluscum contagiosum; Parasitic e.g. Scabies, pediculosis, jiggers; Sexually transmitted diseases; Skin manifestations of HIV and AIDS infection;



- Immunologic and allergic disorders e.g. contact dermatitis, atopic eczema, urticaria, drug reactions; Inflammatory disorders: Psoriasis, seborrheic dermatitis, acne. Benign tumours, precancerous lesions and malignant neoplasms of the skin, melanoma, squamous and basal cell carcinoma, Kaposi's sarcoma, metastatic diseases;
- Cutaneous manifestations of auto immune connective tissue disorders; lupus erythematosus, dermatomyositis and scleroderma; Skin manifestations of systemic diseases; Dermatological emergencies such as drug reactions, photosensitivity; Paraneoplastic skin syndrome; Pigmentary; disorders, vitiligo, melasma; Disease of the hairs, nails and mucous membranes.

2.20.2 Dermatologic Therapeutics

- Topical medications: types of formulations and vehicles (cream, ointment, paste, powder, lotion, solution, suspension, gel, tincture, collodion and aerosol), their effects and indications according to the skin condition, its location, spectrum of inflammation and age of the patient;
- Principles sustaining the prescription of the topical and systemic medications; Selected synthetic wound dressings (hydrocellular, hydrogel, hydrocolloid, hydrofiber, activated charcoal silver, alginate, silicone, Unna's boot, protease modulating, activated polyacrylate) and their formal indications, in particular in the setting of leg ulcers; therapeutic modalities in dermatology.



2.21 Mental Health



LEARNING MODULE	
	<p>Units 8 (Unit)</p> <p>Course Purpose To enable the learners, acquire knowledge, skills and attitudes to identify, manage and refer patients suffering from mental disorders and promote mental health</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Describe terms and concepts used in psychiatry → Demonstrate the skills to take a history, carry out a physical examination and plan treatment for a psychiatric patient → Acquire knowledge, skills and attitudes on the interface of psychiatry and law in relation to management of mentally ill offenders → Apply laws and acts governing management and rights of patients with behavioural and mental disorders e.g. Mental Health Act

2.21.1 General Course Content

- Psychiatric formulation, mental state examination; respect, empathy, responsiveness, and concern regardless of the patient's problems or personal characteristics; psychotherapy; counselling; team concept in management of patients; psychopharmacology; alternative forms of therapy. For each of the disorders that follow; definition, etiology, clinical manifestation, investigations, diagnosis, prognosis.
- Depressive Disorders; Suicide and self-harm; Bipolar and Related Disorders.
- Schizophrenia Spectrum and Other Psychotic Disorders;
- Anxiety Disorders; Obsessive-Compulsive and Related Disorders; Trauma-and Stressor-Related Disorders; Substance-Related and Addictive Disorders;

- Neurocognitive Disorders: Delirium, dementia Alzheimer’s disease, Parkinson’s disease and HIV encephalopathy; seizure disorders, strokes and head injuries;
- Disorders of eating, sleep-wakened psychosexual functions;
- Pathology and management of behaviour and personality disorders, somatoform disorders; Dissociative disorders; disruptive, impulse control and conduct disorders.
- Special areas: community liaison, child and adolescent, forensic and geriatric psychiatry;
- Treatment modalities: pharmacologic, Physical treatments -ECT, selected common psychotherapeutic techniques;
- Medication-Induced Movement Disorders.

2.22 Medical Ethics, Professional Conduct and Medicolegal Issues

LEARNING MODULE	
	<p>Units 3 (Three)</p> <p>Course Purpose To enable the learners, acquire knowledge of ethical and medico-legal issues of the practice of medicine</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Discuss the ethical principles and values which underpin the practice of good medicine and medical research → Demonstrate a sound base of clinical knowledge and skills, good communication skills, and sound understanding of ethics → Interpret National and International Codes and Relevant Acts of Parliament relating to the practice of medicine according to the Constitution of Kenya 2010 → Demonstrate ethical knowledge in the care of emergency, reproductive, special, vulnerable groups



2.22.1 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 versus private interests; importance of cultural, gender, intergenerational, religious, and racial sensitivity.

2.22.2 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.

2.22.3 Human Reproduction and Emerging Issues

- Ethics and the legal status of the embryo/foetus; maternal foetal relationship; assisted conception; abortion, including prenatal screening. Surrogate motherhood.
- Sterilisation; pre and postnatal screening and testing: informed consent by patient or guardian, and vulnerable groups.
- The 'New Genetics': Legal, moral and ethical issues; Gene therapy; genetic counselling; genetic testing and screening after birth: the risks of unwelcome information and of genetic stigmatization; cloning: genetic versus personal identity implications; transplantation, gender identity disorders.

2.22.4 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.

2.22.5 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; Hypocritic Oath.

2.22.6 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, MPDB 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.



2.22.7 Patient Rights

- Human Rights Bill, new Constitution of Kenya, Article 20, 43, 53-57 etc., Helsinki Declaration, International Recognition of Human Rights.

2.22.8 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; Health Acts



2.23 Oral Health

LEARNING MODULE	
	<p>Units 2 (Two)</p> <p>Course Purpose To enable learners, acquire knowledge and skills to adequately diagnose, manage and prevent dental diseases</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → Take a relevant medical history → Perform a regional physical examination of the patient → Record a summary with provisional diagnosis (impression) → Propose relevant tests (radiological) that may be important in further management

2.23.1 General Course Content

- Introduction to dental health: Structure and functions of oral cavity. Epidemiology, pathology, diagnosis and management of: dental carries, periodontal disease, malocclusion, dislocation of temporo-mandibular joint; congenital, traumatic, infectious, inflammatory and neoplastic disorders; Teeth discolouration.
- Oral manifestations of systemic diseases; haematological, endocrinological, nutritional, Acquired Immune Deficiency Syndrome (AIDS) and others. Anaesthetic procedures in dentistry: extraction of teeth, conservative dentistry. Effects of radiotherapy on structures of oral cavity. Forensic dentistry. Pharmacology in dentistry; effects of radiotherapy on the structures of the oral cavity.
- Community dental health programmes: basic principles in promotion of oral health and prevention of oral disease.

2.24 Medical Electives

LEARNING MODULE	
	<p>Units 6 (Units)</p> <p>Course Purpose To enable the learner to acquire and widened their curriculum bases experiences in areas of their interest which will be useful in their career</p>
EXPECTED LEARNING OUTCOMES	
	<ul style="list-style-type: none"> → To develop your own knowledge and skills of Community Health → To develop a project in the area of selected elective interest → To appreciate the influence of social and cultural factors in health and illness → To understand the organisation of health care provision in Kenya → Provide a report on their elective experience

2.24.1 General Guidelines for the Report

- During this period students 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 students 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 students' performance.
- The institution shall provide students 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 Readings and Supplementary Reference Materials

3.1.1 Important Notice to Users

The list provided here below comprises both the recommended Core Text Books as well as, suggested further readings and other Reference Materials for each of the courses covered within the Core Curriculum Guidelines, and which students should find useful.

While every effort has been made to ensure that the list is as comprehensive 60 and as accurate as possible at the time of publication, the Board 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 Board stresses that the list provided here, is by no means, an exhaustive one, 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 acquisition as well as purchase and reference to the most recent sources; books as well as any other new developments in their respective areas of study.

3.1.2 Suggested Readings and Reference Materials

Communication Skills

Aggarwal, Shalini (2009). *Communications Skills*. ANE Books

Sen, AnaLeena (2007). *Communication Skills*. Prentice-Hall of India Pvt Ltd. BooQCM3DEA

Okoth, Okombo (1990). *A Student's Guide to Writing and Study Skills*. Nairobi University Press

Bint, P. (1990). *A University Course in Academic Communication Skills*. Nairobi University Press

Dixon, Tara & O'Hara, Martin. *Communication skills: making practice based learning at work*. (N.I.)

Computer Studies

Kalicharan, Noel (1988). *An Introduction to Computer Studies*. Cambridge University Press

Clark, James (1991). *Computers and Information Processing: Workbook: Concepts and Applications*. South Western Publishers. ISBN-13: 978-1951204006

Bjelland, Harley and Levy, Joseph R (1995). *Create Your Own Virtual Reality System*. Windcrest; Pap/Dis edition. ISBN-13: 978-0070376519

Villamil-Casanova, John and Molina, Louis (1997). *Multi-Media Production, Planning and Deliver*. Prentice Hall India

Williams, Brian and Sawyer, Stacey (2009). *Using Information Technology: a Practical Introduction to Computers*. Career Education. ISBN-13: 978-0072260717

Pradeep, Sinha and Priti, Sinha. (2007). *Computer Fundamentals (6th ed)*. BPB Publications. ISBN-13:978-8176567527

Curt, White. (2016). *Data Communications and Computer Networks: A Business User's Approach* (8th ed). 2016. Cengage Learning. ISBN 13: 9781305116634. Publisher: Cengage Learning

Jason, Simmons. (2010). *The Designer's Desktop Manual. Rotovision*; 2nd Revised edition (June 25, 2010). ISBN-13: 978-2888930945

Harvey Deitel and Associates, Harvey Deitel, Abbey Deitel. (2022). *The Internet and the World Wide Web: How to Program*. 5th ed. Pearson, Edinburgh Gate. ISBN-13: 978-0132151009 . Kindle version available

Ze-Nian Li and Mark S. Drew (2003). *Fundamentals of Multimedia*. Prentice- Hall. ISBN-13: 978-3030621230 Hardcover version. ISBN-13: 978- 3319052892 electronic version

HIV and Drug Abuse

Bellenir, Karen(ed.) *AIDS Sourcebook (1999) (Health Reference) Illustrated Hardcover*, 2nd illustrated edition. Omnigraphics Inc., U.S

Grimes, Deanna and Grimes, Richard (1994). *AIDS and HIV Infection*. Mosby's Clinical Nursing Series. 13: 978-0801680120

Sen, Amartya (2000). *Development as Freedom: Anchor*. 0-385-72027-0

Muindi, et-al (2003). *The Status, Impact and Management of HIV/AIDs in Kenya*: CUEA Publications

Meeks, Linda, et-al (1999). *Drugs Alcohol and Tobacco*: McGraw-Hill

Nursing Skills

Perry, Anne Griffin; Porter, Patricia A, Ostendorf, Wendy (2021). *Clinical Nursing Skills and Techniques*, 8th Edition [Paperback]. Prentice-Hall. ISBN 13: 978-0323708630

Lippincott, Williams and Wilkins (2008). *Lippincott's Nursing Procedures*

Ackely, Betty J and Ladwig, Gail B (2007). *Nursing Diagnosis Handbook: Evidence Based Planning*

DeLaune, Sue C and Ladner, Patricia Kelly (2002). *Fundamentals of Nursing: Standards and Practices (Nursing Education)*

Medical Physiology

Barett, Kim E, Barman, Susan M, Scott, Boitano, Brooks, Heddwen (2019). *Ganong's Review of Medical Physiology*. ISBN-13: 978-1260122404

Boron, Walter F and Boulpaep, Emile L (2016). *Medical Physiology*. W B Saunders. ISBN-13: 978-1455743773

Hall, John E and Guyton, Arthur C (2022), 14th edition as three textbooks. *Textbook of Medical Physiology*. W B Saunders. ISBN-13: 978-0323597128

Rhoades, Rodney A and Bell, David R (2017). *Medical Physiology. Principles for Clinical Medicine*. Lippincott Williams and Wilkins. ISBN-13: 978-1496310460

Human Anatomy

Sadler, Thomas W (PhD) (2009). *Clinical Embryology for Medical Students*. Lippincott William and Wilkins

Moore, Keith L and Persaud T. V. N (2011). *The Developing Human: Clinical Oriented Embryology*. W B Saunders. 13: 978-0323611541

Moore, Keith L, Agur, Anne, M. R., Dalley II, Arthur, F (2013). *Clinically Oriented Anatomy*. Lippincott Williams and Wilkins. 00HMVGL0

Histology

Mescher, Anthony (2013). *Junquiera's Basic Histology: Text and Atlas*, (16th Edition, 2021). Mc Graw-Hill. ISBN-13: 978-1260462982

Ross, Michael H and Pawlina, Wojciech (2018). *Histology: A Textbook and Atlas with Cell Molecular Biology*. Lippincott Williams and Wilkins. ISBN-13: 978-1496383426

Snell, Richard (2018), 10th Edition. *Snell Clinical Anatomy*. Lippincott Williams and Wilkins. ISBN-13: 978-1496345646

Drake, Richard L, Vogl, Wayne A and Mitchell, Adam W M (2022). *Grays Anatomy for Students*. Churchill Livingstone. ISBN-13: 978-0323393041

Gross Anatomy

Tixa, Serge (2008). *Atlas of Surface Palpation: Anatomy of the Neck, Trunk, Upper and Lower Limbs*, 2e (Netter Basic Science). Churchill Livingstone. ISBN-13: 978-0702062254

Lumley, John S P (2008). *Surface Anatomy The Anatomical Basis of Clinical Examination*. Churchill Livingstone. ISBN-13: 978-0443067945

Field, Derek and Hutchinson, Jane Owen (2012). *Field's Anatomy, Palpation and Surface Markings*. Butterworth-Heinemann

Hansen, *John T Netter's Clinical Anatomy* (2009)-with Online Access-(Netter Basic Science). Saunders

Cell Biology and Molecular Genetics

Sherwood, Lauralee (2015). *Human Physiology: From Cells to Systems*. Cengage Learning. ISBN-13: 978-1285866932

Wolfe, Stephen L (1995). *Introduction to Cell and Molecular Biology*- 1st edition. Brooks Cole

Landowne, David (2006). *Cell Physiology* (LANGE Physiology Series). McGraw- Hill Medical. ISBN-13: 978-0071464741

Becker, Wayne M. Kleinsmith, Lewis J. Hardin, Jeff. Bertoni, Gregory Paul (2011). *The World of the Cell*. Benjamin Cummings. ASIN : BooM3USIPO

Scanlon, Valerie; Sanders, Tina (2018). *Essentials of Anatomy*. F A Davis Company. ISBN-13: 978-0803669383

Creative and Critical Thinking

Paul, Richard and Elder, Richard (2020). *Critical Thinking: Tools for Taking Charge of Your Professional and Personal Life*. F T Press. ISBN-13: 978-1538139523

Paul, Richard and Elder, Richard (2019). *Miniature Guide to Critical Thinking Concepts and Tools: Foundation for Critical Thinking*. Rowman and Littlefield

Browne, Neil. M and Keeley, Stuart. M (2011). *Asking the Right Questions: A Guide to Critical Thinking*. Pearson. ISBN-13: 978-0205111169

Facione, Noreen C and Facione, Peter (2008). *Critical Thinking and Clinical Reasoning in the Health Sciences. An International Multidisciplinary Teaching Anthology*. The California Academic Press/Insight Assessment. ISBN-13: 978-1891557606

Facione, Noreen C and Facione, Peter (2007). *Thinking and Reasoning in Human Decision Making: Analyzing Explanations of Seemingly Irrational Choices*. An international journal of applied Physiology: The California Academic Press/Insight Assessment.

Gilovich, Thomas. Griffin, Dale and Kahneman, Daniel (2002). *Heuristics and Biases. The Psychology of Intuitive Judgment*. Cambridge University Press. ISBN-13: 978-0521792608

Development Studies

Ghosh, R. N and Gupta, K. R (2010). *Development Studies*. Atlantic Publishers and Distributors (P) Ltd. ISBN-10 : 9871462220

Todaro, Michael (1999). *Economics for a Developing World: An Introduction to Principles, Problems and Policies for Development*. Longman. ISBN-13: 978-0582642003

Sen, Amartya (2000). *Development as Freedom*. Anchor. ISBN-13: 978-0385720274

Ghosh, R. N. and Gupta, K. R (2010). *Development Studies*. Atlantic Publishers and Distributors (P) Ltd. ISBN-13: 978-8126913909

Biochemistry

Nelson, Daniel and Cox, Michael (2012). *Lehninger Principles of Biochemistry*: W H Freeman. ISBN-13: 978-1429222631

Stryer, Lubert and Tymoczko, John (2002). *Biochemistry Illustrated*

Murray, Robert and Bender, David (2018). *Harpers Illustrated Biochemistry*. McGraw Hill Medical. ISBN-13: 978-1259837937

Lehninger, Albert and Nelson, David (2000). *Principles of Biochemistry*. WorthPub. ISBN-13: 978-1572591530

Behavioural Sciences

William, Simon, J; Gabe, Jonathan and Michael Calman (2002). *Health Medicine and Society, Key Theories, Future Agendas* (classic text). Routledge. ISBN-13: 978-0415221351

Gabe, Jonathan; Calnan, Michael and Bury, Michael (1991). *The Sociology of the Health Service*. Routledge

Yacorzynski, G. K (1951). *Medical psychology: A Basis for Psychiatry and Clinical Psychology*. New York : Ronald Press Company. ASIN : B0028LOF5U

Inglehart, Marita Rosch (1991). *Reactions to Critical Life Events: A Social Psychological Analysis*: Praeger ISBN-13: 978-0275938758

Sargent, Carolyn (1996). *Medical Anthropology: Contemporary Theory and Method*: Praeger. ISBN-13: 978-0275952655

Medical Microbiology and Parasitology

Tortora, Gerald (2018). *Microbiology: An Introduction* (13th Edition). Benjamin Cummings. ISBN-13: 978-0134605180

Gladwell, Mark and Trattler, Mark (2019) 7th Edition. *Clinical Biology Made Ridiculously Simple*: MedMaster Inc. ISBN-13: 978-1935660330

Capuccino, James and Sherman, Natalie (2019) 12th Edition. *Microbiology: A Laboratory Manual*: Benjamin Cummings. ISBN-13: 978-0135188996

Nester, Eugene; Anderson, Denise and Roberts, Evans (2018). *Microbiology: A Human Perspective*: McGraw-Hill

Bauman, Robert (2019). *Microbiology with Diseases by Taxonomy* (3rd Edition) Symbiosis: The Pearson Custom Library for the Biological Sci. Benjamin Cummings. ISBN-13: 978-0134832302

Black, Jacquelyn (2015). *Microbiology: Principles and Explorations* - 8th Edition. Wiley. ISBN-13: 978-1118743164

Pollack, Robert (2011). *Laboratory Exercises in Biology*. Wiley

Epidemiology and Biostatistics

Aschengrau, Anne and Searge, George R (2018). *Essentials Of Epidemiology In Public Health*. Jones and Barlett Learning. ISBN-13: 978-1284128352

Rothman, Kenneth and Lash, Timothy (2021). *Modern Epidemiology* (Third, Mid-cycle revision edition. Lippincott Williams and Wilkins. ISBN-13: 978-1451193282

Friis, Robert and Sellers, Thomas (2017). *Epidemiology for Public Health Practice* ('Friis, *Epidemiology for Public Health Practice*'-5th edition). Jones and Bartlett Learning. ISBN-13: 978-1284107852

- McCusker, Jane (1978). *Epidemiology in Community Health*. Nairobi: AMREF
- Gordis, Leon (2008). *Epidemiology-4th Edition*. Saunders. ISBN-13: 978-641416040026
- Lilienfield, David and Stolley, David (2015). *Foundations for Epidemiology*. Oxford University Press. ISBN-13: 978-0195377675
- Rothman, Kenneth. J. (2012). *Epidemiology: An Introduction*. Oxford University Press. ISBN-13: 978-0199754557
- Moon, Graham and Gould, Myles (2000). *Epidemiology (Social Science for Nurses and the Caring Professions)*. Buckingham: Open University Press. ISBN-13: 978-0335200122
- Gertsman, Burt (2013). *Epidemiology Kept Simple: An Introduction to Traditional and Modern Epidemiology*. Wiley-Blackwell. ISBN-13: 978-1444336085
- Gregg, Michael (2008). *Field Epidemiology*. Oxford University Press. ISBN-13: 978-0195313802
- Trichopoulos, Dimitrios and Olsen, Jorn (2010). *Teaching Epidemiology (A guide for teachers in epidemiology, public health and clinical medicine)*. Oxford University Press. ISBN-13: 978-0199239474
- Oleske, Denise (2010). *Epidemiology and the Delivery of Health Care Services, Methods and Applications*. Springer. ISBN-13: 978-1441901637

Human Communication Skills

- Lundlow, Ron and Panton, Fergus (1993). *The Essence of Effective Communication*. Prentice Hall Trade.
- Mutua, R W; Omulando, S J and Otiende J E (1992). *Study and Communication Skills*. Macmillan Education.
- Bovee, Courtland and Thill, John (2017) 14th Edition. *Business Communication Today*. Prentice Hall. ISBN-13: 978-0134562186
- Hybels, Saunders and Weaver, Richard (2014) 11th Edition. *Communicating Effectively*. McGraw-Hill Humanities/Social Sciences/Languages. ISBN-13: 978-0073523873
- Sears, Melanie (2015). *Choose Your Words: Harnessing the Power of Compassionate Communication to Heal and Connect*. OPA Publishing. ISBN: 198-1511673000
- Rothwell, Dan (2021). 11th Edition. *In Mixed Company: Communicating in Small Groups*. Oxford University Press. ISBN-13: 978-0197602812
- Clampitt, Philip (2012). 5th Edition. *Communicating for Managerial Effectiveness: Problems*, SAGE Publications. ISBN-13: 978-1412992046
- <http://www.gobookee.org/introduction-to-business-communication-abestudymanual/>

Immunology

Bain, Barbara J (2022) 6th Edition. *Blood Cells: A Practical Guide*. Wiley-Blackwell. ISBN-13 : 978-1119820277

Harmening, Denise (2018) 7th Edition. *Modern Blood Banking and Transfusion Practices*. F A Davis Company. ISBN-13 : 978-0803668881

Harmening, Denise (2008). *Clinical Haematology and Fundamentals of Haematois*. F A Davis Company

Hillyer, Christopher; Silberstein, Leslie. Ness, Paul; Anderson, Kenneth; Roback, John. (2006). *Blood Banking and Transfusion Medicine: Basic Principles and Practice*. Churchill Livingstone. ISBN-13: 978-0443069819

McCullough, Jeffrey (2021) 5th edition. *Transfusion Medicine*. Churchill Livingstone. ISBN-13: 978-1119599531

Klein, Harvey and Anstee, David (2014). *Mollison's Blood Transfusion in Clinical Medicine*. Wiley-Blackwell. ISBN-13: 978-1405199407

Nutrition and Dietetics

American Dietetic Association (2008). *International Dietetics and Nutrition Terminology Reference Manual*. American Dietetic Association

Escort-Stump, Sylvia (2021) 9th edition. *Nutrition and Diagnosis-Related Care*. Lippincott Williams and Wilkins. ISBN-13: 978-0880910576

Mahan, Kathleen; Raymond, Janice; Escort-Stump, Sylvia (2011) 12th edition. *Krause's Food and Nutrition Therapy*. Saunders. ISBN-13: 978-1416034018

Gropper, Sareen and Smith, Jack (2022). 8th edition. *Advanced Nutrition and Human Metabolism*. Cengage Learning. ISBN-13: 978-0357449813

Long Sarah; Sucher, Kathryn, et-al (2019) 4th edition. *Nutrition Therapy and Pathophysiology*. Cengage Learning. ISBN-13: 978-0357041710

Pronsky, Zaneta, and Crowe Patricia Jeanne, Sr. (2012). 15th edition. *Food Medication Interactions*. ISBN-13: 978-0971089631

Roth, Ruth (2017). 12th edition. *Nutrition and Diet Therapy*. Cengage Learning. ISBN-13: 978-1305945821

Eschleman, Marian Maltese (1991). 2nd edition. *Introductory Nutrition and Diet Therapy*: Lippincott Williams and Wilkins. ISBN-13: 978-0397547869

Peckenpau, Nancy (2009). 11th edition. *Nutrition Essentials and Diet*. Saunders. ISBN-13: 978-1437703184

Grodner, Michelle; Roth, Sarah Long and Walkingshaw, Bonnie (2019) 7th edition. *Foundations and Clinical Applications of Nutrition: A Nursing Approach*. Mosby. ISBN-13: 978-0323544900

Pharmacology

Katzung, Bertram; Masters, Susan and Trevor, Anthony (2020). *Basic and Clinical Pharmacology*. Mc-Graw Hill. ISBN-13: 978-1260452310

Brunton, Laurence; Chabner, Bruce, and Knollmann, Bjorn (2011). *Goodman and Gilman's the Pharmacological Basis of Therapeutics*, Twelfth Edition. McGraw-Hill Professional. ISBN-13: 978-0071624428

Frenay, Agnes Claire (1997). *Understanding Medical Terminology*. Catholic Hospital Association. ISBN-13: 978-0697219435

Tripathi, K.D (2013). *Essentials of Medical Pharmacology* – Hardcover. Jaypee Brothers Medical Publishers (P) Ltd. ISBN-13: 978-9350259375

Clinical Techniques and Basic Life Support

Glynn, Michael and Drake, William (2022). *Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice*. Saunders Ltd. ASIN: B09TSGYG96

Douglas, Graham; Nicol, Fiona and Robertson, Colin (2018) 14th edition. *Macleod's Clinical Examination*. Elsevier Health Sciences, 2009. ISBN-13: 978-0702069932

Lumley, J.S. P (2016) 19th edition. *Hamilton Bailey's Demonstration of Physical Signs in Clinical Surgery*. Butterworth-Heinemann, 2000. ISBN-13: 978-1444169188

Williams, Norman. Bulstrode, Christopher and O'Connell, Ronan (2018) 27th edition. *Bailey and Love's Short Practice of Surgery*. CRC Press. ISBN-13: 978-1498796507

Garden, James. Bradbury, Andrew. Forsythe, John and Parks, Rowan (2012). *Principles and Practice of Surgery*. Elsevier Health Sciences. ISBN-13: 66978-0702043161

General Pathology and Immunopathology

Levison, David (2008). *Muir's Textbook of Pathology* - Fourteenth Edition. Hodder Arnold. ISBN-13: 978-0340810231

Kumar, Vinnay; Kubbas, Abul Aster, Jon and Fausto, Nelson (2020). *Robbins and Cotran Pathologic Basis of Disease*. Elsevier Health Sciences. ISBN-13: 978-0323531139

Majno, Guido and Joris, Isabelle (2004). *Cells, Tissues and Disease: Principles of General Pathology*. Oxford University Press. ISBN-13: 978-0195140903

Underwood, J. Cressee, E (2009). *General and Systematic Pathology*. Churchill Livingstone. ISBN-13: 978-0443068881

Goljan, Edward (2018). *Rapid Review Pathology*. Elsevier Health Sciences, 2011. ISBN-13: 978-0323476683

Clinical Chemistry

Walker, Simon and Beckett, Geoffrey (2013). *Lecture Notes: Clinical Biochemistry*. Wiley

Gaw, Allan and Murphy, Michael (2013). *Clinical Biochemistry: An Illustrated Colour Text*. Churchill Livingstone. ISBN-13: 978-0443072697

Bradley, John R (2009). *Lecture Notes: Medical Genetics*. Wiley-Blackwell

Koay, E S C and Walmsley, Noel (1996). *A Primer of Chemical Pathology*. World Scientific Publishing Company Inc. ISBN-13: 978-9810224493

Walmsley, R,N; et-al (1999). *Cases in Chemical Pathology: A Diagnostic Approach*. World Scientific. ISBN-13: 978-9810240356

Walmsley, Noel (1996). *Chemical Pathology: Interpretative Pocket Book*. World Scientific Publishing Company. ISBN-13: 978-9810228491

Vaughan, Victor Clarence (2015). *Lecture Notes on Chemical Physiology and Pathology*. BiblioBazaar. ISBN-13: 978-1296694227

Haematology and Blood Transfusion

Bain, Barbara (2022) 6th edition. *Blood Cells: A Practical Guide*. Wiley-Blackwell. ISBN-13: 978-1119820277

Harmening, Denise (2018) 6th edition. *Modern Blood Banking and Transfusion Practices*. A. Davis Company. ISBN-13: 978-0803668881

Harmening, Denise (2008). *Clinical Haematology and Fundamentals of Haematosi*s. F A Davis.

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McClough, Jeff (2011) 5th edition. *Transfusion Medicine*. John Wiley and Sons ISBN-13 : 978-1119599531

Klein, Harvey (2013) 12th edition. *Mollison's Blood Transfusion in Clinical Medicine*. John Wiley and Sons ISBN-13: 978-1405199407

Systemic Pathology

Kumar, Vinay and Abbas, Abul (2009). *Pathologic Basis of Disease*. Saunders

McGee, J.O'D; Wright, Nicholas, A (1992). *Oxford Textbook of Pathology/ Vol 1, Vol 2* in Books A and B. Oxford University Press

Harsh, Mohan (2018) 8th edition. *Textbook of Pathology*: Anshan Publishers. ISBN-13: 978-9352705474

Kemp, William and Burns, Denis (2007). *Pathology: The Big Picture*. McGraw Hill. ISBN-13: 978-0071477482

Slauson, O David; Cooper, Barry, J. (2002) 3rd edition. *Mechanisms of Disease: A Textbook of Comparative General Pathology*. Mosby. ISBN-13: 978-0323002288

Fenoglio-Preiser, M.C, et-al (2008). *Gastrointestinal Pathology: An Atlas and Text*: Wolters Kluwer Health/Lippincott Williams and Wilkins. ISBN-13: 978-0781771467

Levinson, David; Reid, Robin, et-al (2020) 16th edition. *Muir's Textbook of Pathology*. Hodder Education. ISBN-13: 978-0367146719

Environmental and Occupational Health

Rukunga, G. K (2001). Environmental Health for East Africa. AMREF

Schilling, Francis, S.R (1981). *Occupational Health Practice*. Butterworths

The Kyoto Protocol on Climate Change. UN/UNEP Publication

Chris Wood, Peter Ngatia, Tiberry Nyakwana, Bon Oirere, Betty Rabar, Peter M Waithaka. *Community Health* 3rd Edition

Research Methods

Taylor, Bev and Francis, Karen (2013). *Qualitative Research in the Health Sciences*. Routledge. ISBN-13: 978-0415682602

Mugenda, Olive (1999). *Research Methodology: Methods and Techniques*. Nairobi: Acts Press.

Kothari, S.R (2004). *Research Methodology: Methods and Techniques*. New Age International. ISBN-13: 978-9350301562

McKenzie, James, et-al (2013). *An Introduction to Community Health*: Jones and Bartlett Publishers. ISBN-13: 978-1284026894

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

Community Health

McKenzie, James, et-al (2013). *An Introduction to Community Health*: Jones and Bartlett Publishers. ISBN-13: 978-1284026894

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

Clinical Pharmacology

Graham-Smith, David and Aronson, Jeffrey (2002). *Oxford Textbook of Clinical Pharmacology and Therapy*. Oxford University Press

Kaztung, Bertram and Masters, Susan (2011). *Basic and Clinical Pharmacology*. McGraw-Hill-Medical

Rang, Humphrey and Dale, Maureen, et-al (2011). *Rang and Dale's Pharmacology*. Churchill Livingstone. ISBN-13: 978-0702034718

Medical Legal Issues and Professional Ethics

Veatch, Robert (1989). *Medical Ethics*. Jones and Bartlett Publishers. ISBN-13: 978-0867209747

O'Rourke, Kevin and Boyle, Philip (2011). *Medical Ethics: Sources of Catholic Teachings*. Georgetown University Press. ISBN-13: 978-158901742968

Flint Austin Jnr. (2012). *Medical Ethics and Etiquette: The Code of Ethics Adopted by the American Medical Association (AMA)*. ISBN-13: 978-0342927562

Synder, John and Gauthier, Candace, et-al (2010). *Evidence-Based Medical Ethics: Cases for Practice- Based Learning*. Human Press. ISBN-13: 978- 1603272452

Singer, Peter and Viens A. M (2008). *The Cambridge Textbook of Bioethics*. Cambridge University Press. ISBN-13: 978-0521872843

Reproductive Health

Philip, Baker and Kenny, Louise (2011). *Obstetrics by Ten Teachers*. CRC Press.

Monga, Ash (2011). *Gynaecology by Ten Teachers*. CRC Press. ISBN-13: 978-1444122312

Hanretty, Kevin (2009). *Obstetrics Illustrated*. Churchill Livingstone. ISBN-13: 978-0702030666

Hart, David and Norman, Jane (2000). *Gynaecology Illustrated*. Churchill Livingstone. ISBN-13: 978-0443061998

Smith, Roger (2008). *Netter's Obstetrics and Gynaecology*. Saunders. ISBN-13: 978-1416056829

Anderson, Barbara (2004). *Reproductive Health: Women's and Men's Shared Responsibility*. Jones and Bartlett. ISBN-13: 978-0763722883

Yazbeck, Abdo, Campbell-White, Arlett and Merrick, Thomas (2006). *Reproductive Health: the Missing Millennium Development Goal - Poverty, Health, and Development in a Changing World*. World Bank Publications. ISBN-13: 978-0821366134

DeCherney, Alan et-al (2019). *Current Diagnosis and Treatment: Obstetrics and Gynaecology*. Mc-Graw Hill. ISBN-13: 978-0071833905

Gordon, John (2016). *Obstetrics, Gynaecology and Infertility: Handbook for Clinicians*. Scrub Hill Press. ISBN-13: 978-0982292150

Hoffman, Barbara and Schorge, John (2011). *Williams Gynaecology* ('Schorge, Williams Gynaecology'): Mc-Graw Hill. ISBN-13: 978-0071716727

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