Republic of Kenya

Medical Practitioners and Dentists Board

Bachelor of Medicine *and* Bachelor of Surgery

Core Curriculum

1.1 Course Structure

a. Course duration

i) The programme should extend over a period of not less than 6 years;

ii) An academic year could either be divided in semesters or terms;

iii) The first three years will be regarded as pre-clinical years and the others as clinical years;

iv) The duration of the programme should not be more than 12 years.

b. 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 40 weeks of teaching per year.

The programme will be weighted **220** units in **6** years. One unit of medical courses is equivalent to one week of teaching. Teaching should not exceed 40 weeks in a year. The examination period is expected to cover another **2** weeks.

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:

i) **K.C.S.E. holders**: Minimum university admission requirement is C+. Additionally, an average of B Plain in the following subjects.

Biology
Chemistry
Physics or Mathematics
English or Kiswahili.

ii) **Advanced Level Holders**: A minimum of 2 principal passes; in Biology, Chemistry, and a subsidiary pass in either Mathematics or Physics.

iii) **IB**: Grade 5 and above in International Baccalaureate (IB).

iv) **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.

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

vi) Holders of other qualifications deemed to be equivalent to (a-e) mentioned above from institutions recognized by the different Institutional Senates may also be admitted.

vii) Proficiency in English language.

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 the its instructional methods that encompass diverse teaching and learning approaches including any of the following:

i) Lectures/Overviews;

ii) Tutorials and Seminars;

iii) Practical classes/ Skills laboratories;

iv) Clinical demonstrations;

v) Clinical Teaching: Includes bedside teaching, ward rounds, ambulatory care teaching,

vi) operating theatre experiences, emergency and critical care;

vii) Post-mortem demonstrations;

viii) Laboratory practicals;

ix) Fieldwork and community based learning;

x) Self-directed learning; and

xi) 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.

a. Continuous assessment (Formative)

i) Log of experiences and procedures done (necessary competencies): with essential skills to be acquired for each course;

ii) Case reports; Portfolios.

iii) Project reports;

iv) Regular course examinations: written, practicals, clinical (OSCEs, Short and Long cases), and Vivas;

v) Attitudinal assessment.

b. University End of Year Examinations (Summative)

i) Written: MCQs, SAQs, MEQs, LEQs;

ii) Clinicals: OSCEs, Clinical Short and Long cases;

iii) Practicals;

iv) *Viva voce*.

c. Examination regulations

i) Certification will be an MBChB Degree.

ii) Distribution of marks will be specified by individual institutions. However, continuous assessment should cover 30-50% of the final mark;

iii) The pass mark will be 50%;

iv) It is mandatory to pass clinical examinations in order to proceed into the next year of study;

v) MBChB Degree is not classified.

Grading

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

S/No	COURSES TITLE	UNITS
PRE-CLINICAL		
1.	Introduction to Computers	2
2.	Human Anatomy	14
3.	Medical Biochemistry	12
4.	Medical Physiology	12
5.	Behavioural and Social Sciences (Anthropology, Sociology and Psychology)	3
6.	Nutrition and Dietetics	2
7.	Communication Skills for health workers	3
8.	University common courses	15
	Total	**63**
PATHOLOGY/ LABORATORY MEDICINE		
1.	Immunology, Microbiology and Parasitology	11
2.	General and Systemic Pathology	10
3.	Haematology and Blood Transfusion	3
4.	Clinical Chemistry	3
	Total	**27**
POPULATION HEALTH, HEALTH SYSTEMS AND RESEARCH		
I.	Biostatistics and Demography	3
2.	Epidemiology	3
3.	Environmental Health	2
4.	Occupational Health and Safety	2
5.	Leadership, Management and Governance in Health systems	3
6.	Entrepreneurship	2
7.	Research methodology and Research project	6
8.	Health Service Attachment	4
	Total	**25**
CLINICAL COURSES		
I.	Pharmacology and Therapeutics	8
2.	Child Health and Paediatrics	14
3.	Internal Medicine	14
4.	Reproductive Health	14
5.	Surgery	14
6.	Medical jurisprudence and Applied Toxicology	3

S/No	COURSES TITLE	UNITS
7.	Anaesthesiology and Critical Care Medicine	3
8.	Otorhinolaryngology	3
9.	Ophthalmology	3
10.	Dermatology and Venereology	3
11.	Orthopaedics and Traumatology	6
12.	Radiology and Imaging	3
13.	Medical Electives	6
14.	Mental Health	8
15.	Medical Ethics, Professional Conduct and Medico-Legal Issues	3
	Total	**105**
	GRAND TOTAL	**220**

PRE-CLINICAL		
1.	Introduction to Computers	2
2.	Human Anatomy	14
3.	Medical Biochemistry	12
4.	Medical Physiology	12
5.	Behavioural and Social Sciences (Anthropology, Sociology and Psychology)	3
6.	Nutrition and Dietetics	2
7.	Communication Skills for health workers	3
8.	University common courses	15
	Total	**63**

PATHOLOGY/LABORATORY MEDICINE		
1.	Microbiology and Parasitology	8
2.	Immunology	3
3.	General and Systemic Pathology	10
4.	Haematology and Blood Transfusion	3
5.	Clinical Chemistry	3
	Total	**27**

POPULATION HEALTH, HEALTH SYSTEMS AND RESEARCH		
1.	Biostatistics and Demography	3
2.	Epidemiology	3
3.	Environmental Health	2

4.	Occupational Health and Safety	2
S/No	**COURSE TITLE**	**UNITS**
5.	Health Services Management	3
6.	Entrepreneurship	2
7.	Research methodology and Research project	6
8.	Health Services Attachment	4
	Total	**25**
CLINICAL COURSES - JUNIOR CLERKSHIPS		
1.	Pharmacology and Therapeutics	8
2.	Junior Clerkship: Child Health and Paediatrics	7
3.	Junior Clerkship: Internal Medicine	7
4.	Junior Clerkship: Reproductive Health	7
5.	Junior Clerkship: Surgery	7
	Total	**36**
SPECIAL SUBJECTS		
1.	Medical Jurisprudence and Applied Toxicology	3
2.	Anaesthesiology and Critical Care Medicine	3
3.	Otorhinolaryngology	3
4.	Ophthalmology	3
5.	Dermatology and Venereology	3
6.	Orthopaedics and Traumatology	6
7.	Radiology and Imaging	3
8.	Medical Electives	6
	Total	**30**
SENIOR CLERKSHIPS		
1.	Senior Clerkship: Mental Health	8
2.	Senior Clerkship: Child Health and Paediatrics	7
3.	Senior Clerkship: Internal Medicine and Geriatrics	7
4.	Senior Clerkship: Reproductive Health	7
5.	Senior Clerkship: General Surgery	7
6.	Medical Ethics, Professional Conduct and Medico-Legal Issues	3
	Total	**39**
	GRAND TOTAL	**220**

1.6 Credit Transfers

i) Will depend on the curriculum model or design between the institution where the credit transfer will take place;

ii) Credits from the clinical disciplines are not transferrable;

iii) Students seeking the transfer must have satisfied the requirements and passed all the relevant courses, with the results reflected in an official transcript;

iv) The student should present a letter from the Dean in their previous institution;

v) The students seeking transfers should have taken the course not more than three years prior to their seeking of credit transfer;

vi) Transfer of credits will be subjected to the availability of space in the institution;

vii) The Medical Practitioners and Dentists Board shall be concurrently notified of the credit transfers.

1.7 Students with Medical Problems

Students with medical problems that make it difficult for them to continue with their studies without interruptions in any academic year or who may put patients at risk, should be discontinued from the medical programme at the earliest possible time.

In special circumstances, a student shall be discontinued on medical grounds if found unfit to qualify as a medical doctor, and Medical Practitioners and Dentists Board shall be notified.

1.8 Course Description

Each course should have a title and description under the following sub titles:

1. Course weighting;
2. Course purpose;
3. Course outcomes;
4. Course Content.

SECTION 2

Course Description and Weighting

2.1 Pre-Clinical Courses

i. Introduction to Computers (2 Units)

1. Course Purpose

To equip the student with computer knowledge, skills and attitudes necessary for learning, health care delivery and research.

2. Course Outcomes

At the end of the course, the student should be able to:

a) Describe the classification and components of computer system.

b) Apply the principles of computer operating systems and information processing.

c) Apply common computer software packages for word processing and data management.

d) Apply the skills of computer technology in learning, delivery of health care and research.

3. Course Content

- 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.

- Principles of data management: Setting up files; modifying; storing; data coding; data entry; data processing and analysis; databases.
- Software and programming: System programmes; operating systems; utility programmes; special purposes programmes; application programmes; programming languages; Word processing: word perfect; word; SPSS; EPI-info; Internet access; Medline; Cochrane databases; World wide web; Ovid: Statistical programmes: statistical tests; data entry; data cleaning.
- Computer applications in health services and research. Medical literature search, medical record keeping, and retrieval; and searching for information; Telemedicine; Virtual reality; security of information, levels of access and confidentiality.

ii. **Human Anatomy** (14 Units)

1. Course Purpose

To describe the normal topographic, microscopic and developmental anatomy of tissues and organs of the human body, as a foundation for medical training.

A. Cell and Tissue Biology, Genetics and Embryology

2. Course Outcomes

At the end of the course the student should be able to:

a) Describe cell and tissue structure and function

b) Explain the principles and concepts of human genetics.

c) Describe development of the human embryo.

3. Course Content

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 membranes. Umbilical cord and twinning. Teratology and teratogenesis.

B. Systemic Anatomy

1. Course Purpose

(See number 1 on page 10)

2. Course Outcomes

At the end of the course, students should be able to

a) Describe normal topographic and imaging anatomy, blood supply lymphatic drainage of various organs, regions and systems of the human body.

b) Describe the normal microscopic organization of the various organs of the human body.

c) Describe the normal development and developmental defects of the various organs of the human body.

3. Course Content

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 interstitial cells. Organisation of genital ducts, uterus, uterine cervix and vagina. Organisation 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, sacculation, 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.

iii. **Medical Biochemistry and Molecular Biology Course** (12 Units)

1. Course Purpose

To equip the student with 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.

2. Course Outcomes

At the end of the course the student should be able to:

a) Explain the basic chemistry of the constituents of the body.

b) Describe the structure and functions of biomolecules including enzymes; vitamins; hormones and neurotransmitters.

c) Outline the principles of the various intermediary metabolic processes.

d) Apply the knowledge of cell, and molecular biology and genetics in medical practice.

e) Outline the basic chemistry of microorganisms relevant in medicine.

f) Describe the principles of biochemical techniques.

3. Course Content

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**: IUP AC 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.

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.

Intermediary metabolism

- Standard free energy change of a chemical reaction. Exogenic and endogenic reactions. A TP, NADPH and other high energy compounds
- Carbohydrate metabolism; glycolysis, tricarboxylic acid cycle, anaplerotic reactions and glyoxylate cycle electron transport chain, oxidative phosphorylation, mitochondria shuttle system, gluconeogenesis, phosphogluconate pathway. Glycogen synthesis and glycogenolysis
- Lipid metabolism; fatty acid biosynthesis, beta oxidation, ketone bodies synthesis and utilization. Cholesterol 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.

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.

Chemical microbiology

- Molecular virology: Classification and properties of viruses. Replication and life cycle. Interferons, oncogenes and oncogenic viruses. Viroids and prions
- Parasite biochemistry: Special metabolism in parasitic protozoa and helminthes
- 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.

Bio-chemical techniques

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

iv. **Medical Physiology** (12 Units)

1. Course Purpose

To equip the student with the knowledge required to understand the normal functioning of the human body.

2. Course Outcomes

At the end of the course the student should be able to:

a) Explain physiological concepts and processes.

b) Describe the organization and functions of body tissues.

c) Describe the organization and functions of body systems.

d) Discuss the regulatory mechanisms involved in the functioning of body systems.

3. Course Content

Physiological Concepts and processes

- **Introduction to physiological concepts:** Descriptive terms and units. Properties of physiological solutions; Concept of homeostasis and normal physiology. Cell structure and function; cell physiology and human genetics. Body fluids and compartments; Intravascular and extravascular compartments. Interstitial fluid composition, function and disorders. Functional organization of the body. Variability, homeodynamism and homeostasis. Human genetics: Nucleic acids; Chromosomes, genes, and gene expression; Genetic basis of inheritance; Genetic code; Alleles and genetic polymorphism; Sex-linked genes

- **Physiological processes:** Cellular communications, Membrane receptor physiology and ligand signalling; Electrical, endocrine,exocrine, autocrine and paracrine communications; Second messengers and amplification cascades; Exchange of materials across cell membranes.

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. Interraction 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.

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 neonatalcirculation; 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, hypothalamo-hypophyseal axis and the pituitary. Pineal gland and its functions. Thyroid hormones and iodine metabolism. Parathormone, calcitonin, vitamin D and calcium metabolism. Adrenal medulla and the catecholamines. The adrenal cortex and the corticoids. The gonads and the sex hormones. The endocrine pancreas and glucose homeostasis. Diffuse neuro endocrine system: Other organs with endocrine or paracrine functions

- **Reproductive systems and Human development:** Functional organization; and development of the 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 fetal 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.

v. **Behavioural Sciences** (3 Units)

1. Course Purpose

To equip the student with knowledge of the psychosocial, cultural, and environmental influences on behaviour, health, and disease processes.

2. Course Outcomes

At the end of this course, students should be able to:

a) Describe the basic principle of psychology, sociology and anthropology.

b) Describe the life cycle (birth through senescence) and the development of the person.

c) Discuss the psychological and social factors influencing patient behaviour.

d) Describe the role of society in health and disease.

e) Discuss the role of behavioural sciences in the management of illness and disability.

3. Course Content

Basic principles

- Developmental psychology; theories of motivation and learning; proper socialization process; emotional development and support.
- Concepts in sociology; emerging relationship between medicine and sociology; social behaviours and disease occurrence; health seeking behaviours; the sick role.
- Basic principles of anthropology: concept of culture, health and disease; cultural concepts of illness; ethnomedicine.

Life cycle and the development of the person

- Pregnancy and childbirth; Reproductive issues; Development in early infancy; Childhood and child health; Adolescence; Adulthood and mid age; Ageing; Bereavement.
- Personality development; Understanding learning; Perception; Memory and forgetting; Development of sexuality; Intelligence; Development of thinking.

Factors influencing patient behaviour

- Personality
- Psychodynamic and behavioural factors, related past experience
- Family and cultural factors, including socio-economic status
- Adaptive behavioural responses to stress and illness
- Maladaptive behavioural responses to stress and illness
- Interactions between the patient and the physician or the health care system.

Society and health

- Understanding 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.

(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.

vi. **Nutrition and Dietetics Course** (2 Units)

1. Course Purpose

To equip students with knowledge on nutrition and dietetics in health and disease.

2. Course Outcomes

At the end of the course, the student should be able to:

Explain the principles of nutrition and dietetics.

a) Discuss requirements for energy and other essential nutrients in relation to different phases of life, physiological conditions and disease.

b) Describe aetiology, prevalence, manifestation and consequences of disease states resulting from malnutrition.

c) Describe principal methods used in assessment and the indicators of the nutritional status of an individual, a family and the community.

d) Discuss the major means of tackling malnutrition at individual and community level, including nutrition interventions.

e) Discuss the relevance and applicability of international growth standards in growth monitoring.

f) Discuss the role of nutrition in the management of HIV / AIDS, chronic diseases and critically ill patients.

3. Course Content

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.

Nutrition in the life cycle

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

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.

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.

Community Nutrition interventions

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

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; Nutritional management of common symptoms
- Nutritional management in disease states.

vii. **Communication Skills For Health Workers** (2 Units)

1. Course Purpose

To enable the graduate develop the knowledge, skills and attitudes necessary for effective and sensitive communication with patients, families, care givers professional colleagues and other stakeholders.

2. Course Outcomes

a) Explain the theories and principles of relating to human communication

b) Demonstrate interviewing skills appropriate for the doctor patient interactions.

c) Explain the importance of socio-cultural knowledge, age, gender and emotional status during doctor patient interactions.

d) Cope when communicating with patients in difficult or delicate circumstances.

e) Demonstrate empathy to the patient's experience of illness and health care.

f) Demostrate effective communication with relevant stakeholders.

3. Course Content

- Concept and principles of human communication: verbal and non-verbal communication; Language; Interviewing; definition, environment; behaviour, techniques. Interview; recording reproduction.
- History taking and communication skills: Questioning and active listening: open questions, focused and closed questions, probing questions; Listening: effective listening, verbal and non-verbal cues, appropriate body language, facilitative comments; Encouraging; Summarizing Socio-cultural variations

in human communication. Use of appropriate communication skills for the patients' culture during interviews, Ethics in interviewing.

- Challenging patients: angry patients; reticent patients; talkative patients; those with physical impairments which hinder communication i.e. deafness, speech impediments. Communicating about sensitive subjects (breaking bad news):what constitutes a sensitive subject; factors that can make us reluctant to impart bad news; empathy with the patient; sexual history-importance of a sexual history both in physical and psychological illness, sexual history from eg. 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.

2.2 Pathology and Laboratory Medicine

i. Microbiology and Parasitology (8 Units)

1. Course Purpose

To equip the student with knowledge of microorganisms and its application to the practice of medicine.

2. Course Outcomes

At the end of the course, the student should be able to:

a) Classify and characterize microorganisms of medical importance.

b) Describe the pathophysiology of infections caused by medically important bacteria, viruses, parasites and, fungi

c) Apply the principles of sterilization and disinfection

d) Discuss the principles of antibiotic use and chemotherapy of bacterial, viral, parasitic, fungal and entomologic infections

e) Outline the principles of public health bacteriology

f) Describe the principles of laboratory methods and diagnosis for pathogenic organisms.

3. Course Content

Definitions and classification of medically important microbes

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;
- Enterobactericceae; 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.

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 with in pharmacology/internal medicine).

Mycology

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

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.

Medical entomology

- Medically important vectors of parasitic infections
- Ecology, physiology, population biodynamics, vectoral capacity and control
- Ectoparasites, blow flies, bot flies, venomous bites and stings
- Laboratory methods: Collection, handling of clinical specimens, identification of pathogenic organisms.

ii. **Immunology and Immunopathology** (3 Units)

1. Course Purpose

This course aims at equipping the student with knowledge of the organization and function of the immune system in health and disease.

2. Course Outcomes

At the end of the course, the student should be able to:

a) Describe the functional organization of the immune system.

b) Describe the structure and function of antibodies and antigens and their interactions.

c) Describe the immune effecter mechanisms.

d) Explain immune responses found in healthy and disease states.

e) Outline the principles of vaccination.

f) Describe laboratory methods in immunology.

3. Course Content

Introduction to immunology

- **Functional organization of the immune system:** Innate and acquired immunity; active, passive and adaptive immunity; hum oral 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 effecter 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.
- **Compliment systems:** Classical pathway, alternate pathway, terminal pathway; biological activities of compliment fractions; compliment and disease.
- **Cell mediated immunity:** Effecter cells in CMI, effecter responses, assessment of cell mediated cytotoxicity.
- **Hypersensitivity reactions:** Type I (lgE-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.

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 immuno-histocompatibility 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 hemolytic anemia, myasthenia gravis, Graves' disease, systemic lupus erythematosus (SLE), multiple sclerosis, insulin-dependent diabetes mellitus, Hashimoto's thyroiditis, rheumatoid arthritis; Autoimmune diseases resulting from compliment 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; fetal-maternal relationship

- **Tumour immunology:** Tumour antigens categories; immunologic factors and cancer; effectors mechanisms in tumour immunity; B-cell responses; cell-mediated responses; cytokines; limitations of tumour immune response; Immunodiagnosis; Tumor 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-idiotype 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; Immunoflourescence, Fluorescence activated cell-sorting analysis; comparison of immunoadsorption and immuno absorption, Monoclonal and genetically engineered antibodies.

iii. **General and Systemic Pathology** (10 Units)

1. Course Purpose

This course aims at equipping the student with knowledge of the etiology and pathophysiology of disease.

2. Course Outcomes

At the end of the course, the student will be able to:

a) Describe the biology of tissues and their response to disease.

b) Discuss the classification, biology, immunology, spread and effects and diagnosis of tumours.

c) Demonstrate knowledge of pathology as relates to genetic/ congenital and acquired disorders of the various body systems.

d) Accurately determine causes of death.

e) Demonstrate knowledge of laws related to medicine.

3. Course Content

Introduction to anatomic pathology

- Principles of pathology, terminology, definitions and concepts.

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.

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.

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.

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.

iv. **Haematology and Blood Transfusion** (3 Units)

1. Course Purpose

To equip the student with knowledge of haematological, and lymphoreticular disorders and their management including blood transfusion.

2. Course Outcomes

At the end of this course, the student should be able to:

a) Describe anatomy and functional organization of the haemopoietic and lymphoreticular tissues.

b) Describe blood groups, blood group serology and the blood transfusion service.

c) Describe the red cell abnormalities, their laboratory evaluation and principles of management.

d) Explain normal and abnormal haemostasis and the principles of laboratory evaluation ofhaemostatic defects.

e) Apply principles of blood transfusion and use of blood and blood products.

f) Describe and classify the benign leucocytes abnormalities.

g) Describe neoplastic haematological disorders and outline their management.

h) Discuss the principles and practice of laboratory evaluation in haematology and blood transfusion.

3. Course Content

Normal Hematological 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.

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 extracorpuscular 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.

Benign leucocvte disorders

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

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.

Neoplastic disorders

- Acute leukaemias -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.

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.

v. **Chemical Pathology** (3 Units)

1. Course Purpose

To equip the student with knowledge of the biochemical basis of disease

2. Course Outcomes

At the end of the course, the student should be able to:

a) Describe specimen handling, in Chemical pathology

b) Describe the biochemical basis of normal and abnormal metabolic, physiologic and regulatory pathways

c) Demonstrate knowledge of the biochemical assessment of organ systems

d) Describe the biochemistry of neoplastic disorders

e) Describe the principles of clinical toxicology

f) Describe the laboratory methods and quality assurance processes used in Clinical Chemistry.

3. 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

Normal metabolic, physiologic and regulatorv 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 porphyrynuria
- Vitamins, trace elements.

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 ofpoisoning, therapeutic drug monitoring
- Biochemistry of neoplastic disorders: Biomarkers, paraneoplastic endocrine syndromes, ectopic hormone production
- Laboratory methods in Clinical Chemistry and their interpretation.

2.3 Population Health, Health Systems and Research

i. Biostatistics and Demography (3 Units)

1. Course Purpose

To equip the student with knowledge of the principles of biostatistics and demography and their application to health care delivery and research.

2. Course Outcomes

On completion of the course, the student shall be able to:

a) Describe the concepts and terminologies used in biostatistics

b) Apply the principles of biostatistics in health care delivery and research

c) Describe principles of demography.

3. Course Content

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.

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.

Demography

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

ii. **Epidemiology** (3 Units)

1. Course Purpose

To equip the student with knowledge of disease occurrence its' determinants and its application in health care research.

2. Course Outcomes

On completion of the course, the student shall be able to:

a) Describe and apply the concepts of epidemiology and its role in the identification and solving of health problems in the community

b) Apply the principles of epidemiology in medical practice and research

c) Apply statistical methods in epidemiology.

3. Course Content

Introduction to concepts and principles of epidemiology

- Epidemiologic concepts: definition; scope; variations in severity of disease; methods of disease causation
- Descriptive epidemiology ("Person, Time and Place"); classification of diseases; measures of morbidity and mortality; incidence and prevalence rates; crude, specific, and adjusted rates

- Determinants of disease transmission and causation; host, agent, and environmental factors; natural history of disease; levels of disease prevention
- Importance of screening of diseases; types of screening and screening tests: sensitivity; specificity; predictive values.

Epidemiology in medical practice and research

- Disease surveillance and outbreak investigation: definition of outbreak, epidemic, pandemic and endemic;attack rate and their investigation of disease out breaks
- Epidemiologic methods: observational studies- cross sectional, cohort, case control, case series, community surveys. Experimental study designs (Clinical trials, community intervention trials)
- Sampling 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

- Measurements: relative risk; risk ratio; odds ratio; attributable risk; confidence intervals; sensitivity; specificity; validity.
- 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.

iii. **Environmental Health** (2 Units)

1. Course Purpose

To equip the student with the knowledge of the relationship between the environment and health.

2. Course Outcomes

By the end of the course the student will have learnt and will be able to:

a) Describe the principles in environmental health

b) Discuss clean water provision and environmental sanitation

c) Discuss the management of solid and liquid waste

d) Describe the causes and effects of pollution

e) Describe the relationship between human shelter and health

f) Demonstrate understanding of the national and/international environmental regulatory frameworks.

3. Course Content

Principles of Environmental Health

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

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 Treatment: Rural and urban water treatment processes; Quality control tests; WHO drinking water guidelines/standards; Local Water Act requirements.

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.

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 eg. 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, eg. NEMA, Polution Control Protection Board (PCPB); Appropriate handling procedures.

Human Shelter Environment and Health

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

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.

iv. **Occupational Health and Safety** (2 Units)

1. Course Purpose

To equip the student with knowledge of the relationship between occupation, workplace and health.

2. Course Outcomes

By the end of the course the students will be able to:

a) Describe the principles of occupational health

b) Explain the cause-effect relationship between occupational risk factors and the health of workers

c) State the aims and functions of occupational health and safety services

d) Describe the causes, effects and control/management of occupational diseases and accidents at the work place

e) Describe the regulatory frameworks in occupational health and safety.

3. Course Content

Introduction to Occupational Health

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

Specific hazardous agents in work environment

- Chemical hazards
- Biological hazards eg. blood borne pathogens
- Physical agents
- Psychosocial hazards eg. Stress
- Ergonomic hazards
- Radiation hazards.

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).

Occupational diseases and accidents

- Occupational Chest/Lung Diseases: Pneumoconiosis; Asbestosis; Silicosis; Byssinosis, Baggossis; 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.

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.

v. **Leadership, Management and Governance in Health Systems** (3 Units)

1. Course Purpose

To equip the student with knowledge and skills required for effective leadership, management and governance of health care systems.

2. Course Outcomes

On completion of the course, the graduate shall be able to:

a) Describe the basic concepts, theories, functions and principles of leadership and management.

b) Describe the organization and management of health services.

d) Describe the health management information system.

e) Apply practical approaches to improvement of health care.

f) Describe organizational and leadership skills

g) Apply resource management skills in provision of healthcare

h) Describe communication skills

i) Describe National health sector governance and health policy development and implementation

j) Discuss the principles of project management

k) Describe skills in quality management in health service delivery

l) Principles of performance appraisal and improvement

m) Describe the governance structures, systems and their operations.

3. Course Content

Principles and theories of leadership and management

Leadership and Management concepts

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

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.

vi. **Introduction to Entrepreneurship** (1 Unit)

1. Course Purpose

To equip the students with knowledge of entrepreneurship and its application to their well being.

2. Course Outcomes

By the end of the course, the student should be able to:

a) Describe what is entrepreneurship and its fundamental concepts.

b) Describe the processes involved in starting a new business.

c) Describe alternative ways of investment and entrepreneurial financing.

3. 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.

vii. **Research Methodology and Research Project** (6 Units)

1. Course Purpose

To equip the student with the knowledge and skills to undertake a scientific research and utilize research findings.

2. Course Outcomes

By the end of the course the students will be able to:

a) Explain the scope of scientific enquiry

b) Write a research proposal

c) Collect data, analyse and interpret results

d) Discuss and disseminate research findings.

3. Course Content

Research

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

Types of research

- Basic; Applied; Operational; Evaluative.

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.

Proposal design

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

Disseminating of findings

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

viii. **Health Services Attachment** (4 Units)

1. Course Purpose

To expose the student to the practical aspects of the overall functioning and management of health and health care systems in a county.

2. Course Outcomes

At the end of the attachment, the student should be able to:

a) Describe the various aspects of health services of a county.

b) Participate in and be able to explain the delivery of health services in a county.

c) Conduct community diagnosis that provide practical solution to an operational bottleneck within the county.

3. Course Content

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.

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.

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).

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.

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.

ix. Medical Jurisprudence and Applied Toxicology (4 Units)

1. Course Purpose

To equip the student with medical knowledge for application in the legal field.

2. Course Outcomes

a) To describe the collection and analysis of medical samples for use in the legal system

b) Statutory provisions for autopsy; exhumation laws and procedures; contested parentage

c) Medical-legal aspects of therapeutic substances, drug and alcohol abuse and dependence

d) Important laws in medicine: Medical Practitioners and Dentists Act, Public Health Act,Human Tissue Act

e) Forensic odontology, radiology and psychiatry

f) Legal and ethical knowledge of physicians

g) Civil rights of individuals and of the physician (legal and ethical rights) with respect to medicine

h) Physical and sexual abuse

i) Liability.

3. 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; 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

- Refer to mental health unit (cf – pp 80-81).

Liability and litigation

- Definition and types of liability; legal aspects; Due process for establishing the liability; Disciplinary procedures.

2.4 Clinical Courses

i. Pharmacology and Therapeutics (8 Units)

1. Course Purpose

To equip students with knowledge in principles of basic and clinical pharmacology.

A. Basic Pharmacology

2. Course Outcomes

At the end of the course, the students should be able to:

a) Discuss the general principles of pharmacodynamic and pharmacokinetic processes

b) Describe the general properties of autacoids, neurotransmitters and endocrine, anti infectives, anti neoplastic agents.

3. Course Content

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, overdosage, 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
- Adrenergics: Pharmacological actions of noradrenaline; comparison with adrenaline; actions and uses of (α- and β- 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. alkyl ting 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 and RNA targeting, aptomers, gene therapy, DNA repair and resistance inhibition. Novel delivery systems
- Inhibition of angiogenesis and the metastatic cascade
- Radiation and chemotherapy sensitisers and protectors.

B. Clinical pharmacology

1. Course Purpose

(See number 1 on page 52)

2. Course Outcomes

At the end of the course, the students should be able to:

a) Describe the therapeutic principles of the drugs used in the treatment of disease in the various systems of the body (mechanisms of action, main therapeutic indications, contra indications, adverse effects and clinically significant drug interactions).

b) Discuss the rational evidence based use of drugs

c) Describe the principles of prescription writing and monitoring of patient compliance.

d) Describe the role of the pharmacy and poisons board.

3. Course Content

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, – adrenoreceptor 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 – a 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-inflammatorv / Musculoskeletal drugs

- 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/laws/pharmacy and poisons board act Cap 244
- Public health/ environmental issues/protection of environment.

ii. **Child Health and Paediatrics** (12 Units)

1. Course Purpose

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

2. Course Outcomes

At the end of this course, the student should be able to:

a) Describe principles of new born care.

b) Describe normal growth and development of children and adolescents

c) Make a diagnosis from relevant history, physical examination and investigations.

d) Participate in the management of common paediatric conditions.

e) Perform routine clinical procedures in neonates and children.

f) Apply preventive measures and carry out health promotion.

g) Apply research principles in solving paediatric health problems.

3. Course Content

Principles of new born care

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

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.

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.

Comprehensive paediatric examination

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

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.

Investigations and Data Interpretation

- Laboratory tests; haematology, blood bi~chemistry, 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.

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
- Palliation and care of the terminally ill child.

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, haemoragic 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. 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. Skeletal systems: congenital, inflammatory, infective, traumatic, degenerative and neo plastic.
- Paediatric accident and emergencies**.**

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.

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.

iii. **Internal Medicine** (12 Units)

1. Course Purpose

To equip students with knowledge, skills and attitudes in general and specific areas of internal medicine.

2. Course Outcomes

At the end of the course the student should be able to:

a) Make a diagnosis from relevant history, physical examination and investigations.

b) Participate in the management of the common disorders in internal medicine

c) Describe influence of ageing on medical conditions, particularly care of the elderly.

d) Describe the principles of human genetics and gene therapy.

e) Perform routine clinical procedures and carry out basic laboratory investigations.

3. Course Content

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.

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.

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); urianalysis; peripheral blood film; blood slide for malaria parasites; Cerebro Spinal Fluid (CSF) analysis, bone marrow aspiration, nebulisation, arterial gas sampling.

Common disorders in internal medicine

a. Respiratory disorders

Rhinitis,sinusitis, laryngitis, epiglotitis, 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.

b. 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, dysrrhythmias, peripheral artery disease HIV/AIDS associated cardiovascular disorders congenital heart disease.

c. Endocrine and metabolic disorders

Pituitary and hypothalamic disorders; diabetes insipidus, inappropriate 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, phaeochromocytoma. disorders of lipid metasbolism, disorders of the sex hormones, neoplastic disorders; ectopic hormone production, HIV/AIDS and associated endocrine disorders.

d. Neurological disorders

CNS infections; meningitides, encephalitis, cerebral abscess, neurosyphyllis, poliomyelitis, Guillain-Barre syndrome, neurological manifestations of HIV/ AIDS, cerebrovascular disorders (cerebral infarctions; haemorrhages; aneurysms; carvenous sinus thrombosis, seizure disorders, degenarative 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.

e. Gastro-enteric disorders

Oesophaeal disorders; esophagitis, GERD, motility disorders, oesophageal varices, hiatus hernia o Peptic ulcer, gastritis, Pancreatitis; acute, chronic, Hepato-bilary disease; Hepatitis; liver cirrhosis; metabolic liver disease; liver failure; portal hypertension; Jaundice, prehepaic, 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.

f. 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).

g. Rheumatological disorders

Connective tissue disorders, Rheumatoid arthritis, SLE, polymaylgia rheumatica.

h. Haematopoietic and lymphoreticular disorders

Anaemias; Iron deficiency, megaloblastic anaemias (B 12 and folate deficiency), haemolytic, anaemia of chronic illness, pancytopaenia, Haemolytic disorders (sickle cell anaemia), Bone marrow suppression

Disorders ofhaemostasis; 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 tranfusion reactions.

i. 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.

j. 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.

k. 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, hypoglycaemis, thyroid storm, adrenocortical crisis, urinary retention, hyperkalaemia, hyponatraemia, acute renal failure, status epilepticus, acute complicated malaria, acute psychotic state, meningitis, carvenous sinus thrombosis, cerebbovascular accident, the unconscious patient, acute poisoning, sickle cell crisis, septicaemia, snake bites, haemoptysis, haematemesis, hypertensive emergency, acute coronary syndromes.

l. Health Promotion in Medicine

Factors influencing the medical care of individuals and community; Socio-economic, 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.

iv. **Reproductive Health** (12 Units)

1. Course Purpose

To equip students with knowledge, skills and attitudes in general and specific areas of Reproductive Health.

2. Course Outcomes

By the end of the course, the student should be able to:

a) Describe the scientific foundation of obstetrics and gynaecology and apply this knowledge to solve medical problems

b) Make a diagnosis from relevant history, physical examination and investigation

c) Participate in the management of common obstetric and gynaecological conditions

d) Perform and record procedures in common obstetric and gynaecological conditions.

e) Record portfolios of cases managed.

3. Course Content

- Obstetric anatomy and Reproductive Physiology: anatomy of male and female reproductive organs; the menstrual cycle; 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 fetus; neonatal resuscitation. Abnormal labour; induction; methods of operative delivery; 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, 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, the 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; Laparatomy for ectopic pregnancy; Manual removal of placenta; McDonald stitch insertion; Minilap Bilateral Tubal Ligation; Caesarean section; Oophorectomy; Myomectomy; Drainage of pelvic abscess, laparascopy, basic Cardio Pulmonary Resuscitation (CPR) and Advanced Life Support for Obstetrics (ALSO).

- Communication skills.

- Research methods: quantitative studies- cross sectional, case control, cohort, clinical trials, community trials, qualitative studies - rapid appraisal procedures, research proposal writing

- Paediatric and adolescent \gynaecology.

v. **General Surgery** (12 Units)

1. Course Purpose

To equip the student with the knowledge, skills and attitudes to manage surgical problems.

2. Course Outcome

At the end of this course, the student should be able to:

a) Discuss the principles of surgery

b) Make diagnosis from relevant history, physical examination and investigation

c) Perform and record routine clinical procedures

d) Participate in the management of common surgical problems.

3. Course Content

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.

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.

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 haemorhage; 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.

Investigations and data Interpretation

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

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.

Systemic surgical disorders

Gastro-intestinal tract: acute abdomen; congenital; dysphagia; foreign body; caustic burns; peptic ulcer disease; neoplasms; hepatobilliary 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, inquino-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.

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.

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:

vi. **Orthopaedics and Traumatology** (6 Units)

1. Course Purpose

To equip the student with knowledge, skills and attitudes to handle trauma, orthopaedic emergencies and common orthopaedic problems.

2. Course Outcomes

At the end of this course the student should be able to:

a) Discuss the principles of orthopaedic and traumatology.

b) Make diagnosis from relevant history, physical examination and investigation.

c) Perform and record routine clinical procedures.

d) Participate in the management of common orthopaedic problems.

3. Course Content

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.

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.

Routine clinical procedures

Indications; limitations and complications; perform routine clinical procedures including specimen handling; interpretation of the results of blood biochemistry, urine biochemistry, X-rays, basic *CT,* basic contrast studies among others; 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).

Investigations and data interpretation

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

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

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: soft tissue injuries. 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.

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.

vii. **Radiology and Imaging** (3 Units)

1. Course Purpose

To equip the student with the basic principles of imaging and skills in interpretation of radiological images and reports to enable them make appropriate diagnosis.

2. Course Outcome

At the end of this course, the student will be able to:

a) Describe the scope and basic principles of diagnostic imaging

b) Interpret reports and images of common imaging modalities.

3. 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 utra sound, 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.

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
- Esophagus: tumours and motility disorders
- Stomach and Intestines: tumours, peptic ulceration, perforations
- Billiary 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 gynecology, 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.

viii. **Ophthalmology** (3 Units)

1. Course Purpose

To provide a foundation in ophthalmology to enable the graduate to manage basic ophthalmic conditions and to know when to refer.

2. Course Outcomes

At the end of the course the student should be able to:

a) Discuss the anatomy of the eye and the physiology of vision

b) Describe the human eye as an optical system

c) Explain the principles of common refractive errors and their correction including refractive surgery

d) To take an ophthalmic history and perform a basic ocular examination

e) Demonstrate ability to correctly perform routine clinical procedures and order appropriate investigations

f) To triage other ocular diseases

g) To participate in the management of the common ophthalmic disorders

3. Course Content

Anatomy and Physiology

Ocular Anatomy: Orbit; lids; conjuctiva; 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,

The eye as an optical system

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

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.

Routine clinical procedures

Indications; limitations; potential complications; Visual acuity; External inspection; Papillary 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; Ultra-sound, among others.

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.

Common ophthalmic disorders

- Ocular trauma; blunt and penetrating injuries; orbital trauma and blowout fracture; burns and chemical injuries; ocular foreign bodies
- Red eye diffential diagnosis: Glaucoma; Anterior uveitis; keratitis; Conjuctivitis
- Scleritis; Episcleritis; Adnexal disease; Subconjuctival haemorrhage; Pterygium; Keratoconjuctivitis 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 tumors: Aetiology, Measurement of proptosis, Investigations in proptosis including radiological investigations
- Cataract: Symptoms; Lens examination; and red reflex; Cataract surgery; 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; leucocorea; 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 tumors and metastasis; SCC and Kaposis
- Sudden loss of vision.

Health Promotion in Ophthalmic Surgery

- Vision 2020 and Kenya ophthalmic program
- Prevention of ophthalmic diseases and accidents

ix. **Otorhinolaryngology (ORL)** (3 Units)

1. Course Purpose

To equip the student with knowledge, skills and attitudes to handle common otorhinolaryngology conditions.

2. Course Outcomes

At the end of this course the student should be able to:

a) Discuss the principles of otorhinolaryngology.

b) Make diagnosis from relevant history, physical examination and investigation.

c) Perform and record routine clinical procedures.

d) Participate in the management of common otorhinolaryngology problems

3. Course Content

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.

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.

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.

Common ORL disorders

Diseases of the ear: Acute and chronic otitis media and externa; Acquired deafness and rehabilitation; Dizzines 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 Fbs: 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.

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.

x. **Anaesthesiology and Critical Care Medicine** (3 Units)

1. Course Purpose

To equip the student with knowledge, skills and attitudes in anaesthesiology and critical care medicine.

2. Course Outcomes

At the end of this course the student should be able to:

a) Discuss the principles of anaesthesiology and critical care

b) Make diagnosis from relevant history, physical examination and investigation

c) Perform and record routine clinical procedures

d) Participate in the management of common anaesthesia and critical care

e) Discuss medico-legal and ethical issues in anaesthesia and critical care

f) Discuss the role of intensive care in medicine.

3. 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, delivering bad news. HIV/AIDS; Basic anaesthetic procedures such as Insertion of IV -lines, oropharyngeal airways, laryngeal mask airways, Endotracheal intubation, Insertion of NG-tubes and Urethral Catherterization, 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.

xi. **Dermatology and Venereology** (3 Units)

1. Course Purpose

To equip the student with knowledge, skills and attitudes to handle common dermatology and veneral conditions.

2. Course Outcomes

At the end of this course the student should be able to:

a) Discuss the principles of dermatology and venereology.

b) Make diagnosis from relevant history, physical examination and investigations.

c) Perform and record routine clinical procedures.

d) Participate in the management of common dermatology and venereology problems

3. Course Content

Bacterial infections of skin and soft tissues eg. impetigo, folliculitis; Superficial fungal infections eg. candidiasis, mycoses, tinea; Viral e.g. herpes simplex and zoster, warts, molluscum contangiosum; Parasitic eg. Scabies, pediculosis, jiggers; Sexually transmitted diseases; Skin manifestations of HIV and AIDS infection; Immunologic and allergic disorders eg. 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 emergencis such as drug reactions, photosensitivity; Paraneoplastic skin syndrome; Pigmentary; disorders, vitiligo, melasma;

Disease of the hairs, nails and mucous membranes.

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

xii. **Mental Health** (8 Units)

1. Course Purpose

To equip the student with knowledge and skills that will enable them to identify, manage and refer mental disorders and promote mental health.

2. Course Outcomes

At the end of the course the student should able to:

a) Conduct an interview in a manner that facilitates information gathering and formation of a therapeutic alliance

b) Recognize manifestations, evaluate and manage neuropsychiatry disorders

c) Recognize, evaluate, and manage patients with mood disorders

d) Demonstrate competency in the recognition, evaluation, and refer of persons with psychosis

e) Apply laws and acts governing management and rights of patients with behavioural and mental disorders e.g. mental health act, constitution of Kenya.

3. 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
- Delirium, dementia Alzheimer's disease, Parkinson's disease and HIV encephalopathy; seizure disorders, strokes and head injuries; disorders of eating, sleeping and psychosexual functions, suicide
- Pathology and management of behaviour and personality disorders, phobic and obsessions states, anxiety, neuroses, acute and chronic psychiatric states, organic syndromes, drug and alcohol abuse, acute reaction to stress, somatoform disorders; community liaison, child, adolescent, forensic and geriatric psychiatry; mental retardation
- Schizophrenic, affective disorders

- Mental health legislation; involuntary admission; fitness to plead, testamentary capacity; power of attorney, court report, Appropriate history taking and documentation mental status examination.

xiii. **Medical Ethics, Professional Conduct and Medico-Legal Issues** (3 Units)

1. Course Purpose

To equip the student with the knowledge of ethical and medico-legal issues of the practice of medicine.

2. Course Outcomes

At the end of this course, the students should be able to:

a) Discuss the ethical principles and values which underpin the practice of good medicine and medical research

b) Demonstrate ethical knowledge in the care of special/vulnerable groups

c) Discuss ethical and legal issues in human reproduction and emerging/ re-emerging issues, inappropriate relationships and consequences

d) Discuss the concept of Life, Death, Dying and Killing and apply ethical principles in Medical research Recognize vulnerabilities created by the duties of doctors and medical student

e) Interpret the National and International Codes and Relevant Acts of Parliament relating to the practice of medicine according to the constitution of Kenya 2010.

3. Course Content

Ethical principles and values

- Definitions: ethics, morality, professionalism; characteristics of the medical profession
- Informed consent and refusal of treatment: Why respect for autonomy is so important; adequate information and comprehension, non-coercion; treatment without consent and proxy consent competence;
- The clinical relationship: truthfulness, trust, and good communication-Ethical limits of paternalism; building trust; honesty, courage, and other virtues in clinical practice;

- Confidentiality: Clinical importance of privacy: compulsory and discretionary disclosure; public v private interests; importance of cultural, gender, inter-generational, religious, and racial sensitivity.

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.

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.

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

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.

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.

Patient rights

Human rights bill, new constitution of Kenya, Article 20, 43, 53-57 etc., Helsinki declaration, International recognition of human rights.

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.

xiv. **Medical Electives** (6 Units)

1. Course Purpose

To provide students with opportunities to widen their curriculum based experiences in areas of their interest which will be useful in their career.

2. Course Outcomes

At the end of this course the student should be able to:

a) Provide a report on their elective experience.

3. General Guidelines

a) 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.

b) Develop a plan of their learning activities and the implementation process.

c) The students will be responsible for making arrangements (including finances) pertaining to the elective.

d) The students shall submit a plan of their activities for approval.

e) Upon completion of the elective the students shall submit a written report.

f) A confidential report shall be submitted to the Dean from the host institution regarding the students performance.

g) The institution shall provide students with guidelines of their conduct during the elective.

h) 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

Annexes

Annex 1: List of Suggested Readings and Supplementary Reference Materials

(a) Important Notice to Users

The list provided herebelow 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 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.

(b) Suggested Readings and Reference Materials

COMMUNICATION SKILLS

1. Aggarwal, Shalini (2009). *Communications Skills.* ANE Books.
2. Sen, AnaLeena (2007). *Communication Skills.* Prentice-Hall of India Pvt Ltd.
3. Okoth, Okombo (1990). *A Student's Guide to Writing and Study Skills.* Nairobi University Press.

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

COMPUTER STUDIES

1. Kalicharan, Noel (1988). *An Introduction to Computer Studies.* Cambridge University Press.
2. Clark, James (1991). *Computers and Information Processing: Workbook: Concepts and Applications.* South Western Publishers.
3. Bjelland, Harley and Levy, Joseph R (1995). *Create Your Own Virtual Reality System.* Windcrest; Pap/Dis edition.
4. Villamil-Casanova, John and Molina, Louis(1997). *Multi-Media Production, Planning and Deliver.* Prentice Hall India.
5. Williams, Brian and Sawyer, Stacey (2009). *Using Information Technology: a Practical Introduction to Computers*. Career Education.

HIV AND DRUG ABUSE

1. Bellenir, Karen(ed.) *AIDS Sourcebook* (1999) (Health Reference) Illustrated Hardcover, 2nd illustrated edition Omnigraphics Inc., U.S.
2. Grimes, Deanna and Grimes, Richard (1994). *AIDS and HIV Infection*. Mosby's Clinical Nursing Series.
3. Sen, Amartya (2000). *Development as Freedom:* Anchor.
4. Muindi, et-al (2003). *The Status, Impact and Management of HIV/AIDs in Kenya*: CUEA Publications.
5. Meeks, Linda, et-al (1999). *Drugs Alcohol and Tobacco*: McGraw-Hill.

NURSING SKILLS

1. Perry, Anne Griffin; Porter, Patricia A, Ostendorf, Wendy (2009). *Clinical Nursing Skills and Techniques,* 8th Edition [Paperback]. Prentice-Hall.
2. Lippincott, Williams and Wilkins (2008). *Lippincott's Nursing Procedures.*
3. Ackely, Betty J and Ladwig, Gail B (2007). *Nursing Diagnosis Handbook: Evidence Based Planning.*
4. DeLaune, Sue C and Ladner, Patricia Kelly (2002). *Fundamentals of Nursing: Standards and Practices* (Nursing Education).

MEDICAL PHYSIOLOGY

1. Barett, Kim E, Barman, Susan M, Scott, Boitano, Brooks, Heddwen (2009). *Ganong's Review of Medical Physiology.*
2. Boron, Walter F and Boulpaep, Emile L (2011). *Medical Physiology*. W B Saunders.
3. Hall, John E and Guyton, Arthur C (1996). *Textbook of Medical Physiology*. W B Saunders.
4. Rhoades, Rodney A and Bell, David R (2012). *Medical Physiology. Principles for Clinical Medicine.* Lippincott Williams and Wilkins.

HUMAN ANATOMY

1. Sadler, Thomas W (PhD) (2009). *Clinical Embryology for Medical Students.* Lippincott William and Wilkins.
2. Moore, Keith L and Persaud T. V. N (2011). *The Developing Human: Clinical Oriented Embryology*: W B Saunders.
3. Moore, Keith L, Agur, Anne, M. R., Dalley II, Arthur, F (2013). *Clinically Oriented Anatomy*. Lippincott Williams and Wilkins.

HISTOLOGY

1. Mescher, Anthony (2013). *Junquiera's Basic Histology*: *Text and Atlas*, (thirteenth Edition). Mc Graw-Hill.
2. Ross, Michael H and Pawlina, Wojciech (2005). *Histology*: *A Textbook and Atlas with Cell Molecular Biology.* Lippincott Williams and Wilkins.
3. Snell, Richard (2005). *Snell Clinical Anatomy.* Lippincott Williams and Wilkins.
4. Drake, Richard L, Vogl, Wayne A and Mitchell, Adam W M (2009). *Grays Anatomy for Students.* Churchill Livingstone.

GROSS ANATOMY

1. Tixa, Serge (2008). *Atlas of Surface Palpation: Anatomy of the Neck, Trunk, Upper and Lower Limbs, 2e* (Netter Basic Science). Churchill Livingstone.
2. Lumley, John S P (2008). *Surface Anatomy The Anatomical Basis of Clinical Examination.* Churchill Livingstone.
3. Field, Derek and Hutchinson, Jane Owen (2012). *Field's Anatomy, Palpation and Surface Markings.* Butterworth-Heinemann.
4. Hansen, John T Netter's *Clinical Anatomy* (2009)-with Online Access-(Netter Basic Science). Saunders.

CELL BIOLOGY AND MOLECULAR GENETICS

1. Sherwood, Lauralee (2012). *Human Physiology: From Cells to Systems*. Cengage Learning.
2. Wolfe, Stephen L (1995). *Introduction to Cell and Molecular Biology*- 1st edition. Brooks Cole.
3. Landowne, David (2006). *Cell Physiology* (LANGE Physiology Series). McGraw-Hill Medical.
4. Becker, Wayne M. Kleinsmith, Lewis J. Hardin, Jeff. Bertoni, Gregory Paul (2008). *The World of the Cell.* Benjamin Cummings.
5. Scanlon, Valerie; Sanders, Tina (2010). *Essentials of Anatomy.* F A Davis Company.

CREATIVE AND CRITICAL THINKING

1. Paul, Richard and Elder, Richard (2013). *Critical Thinking: Tools for Taking Charge of Your Professional and Personal Life*. F T Press.
2. Paul, Richard and Elder, Richard (1999). *Miniature Guide to Critical Thinking Concepts and Tools:* Foundation for Critical Thinking.
3. Browne, Neil. M and Keeley, Stuart. M (2011). *Asking the Right Questions: A Guide to Critical Thinking.* Pearson.
4. 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.
5. 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.
6. Gilovich, Thomas. Griffin, Dale and Kanheman, Daniel (2002). Heuristics and Biases. *The Psychology of Intuitive Judgment.* Cambridge University Press.

DEVELOPMENT STUDIES

1. Ghosh, R. N and Gupta, K. R (2010). *Development Studies.* Atlantic Publishers and Distributors (P) Ltd.
2. Todaro,Michael (1999). *Economics for a Developing World: An Introduction to Principles, Problems and Policies for Development.* Longman.
3. Sen, Amartya (2000). *Development as Freedom.* Anchor.

4. Ghosh, R. N. and Gupta, K. R (2010). *Development Studies.* Atlantic Publishers & Distributors (P) Ltd.

BIOCHEMISTRY

1. Nelson, Daniel and Cox, Michael (2012). *Lehninger Principles of Biochemistry*: W H Freeman.
2. Stryer, Lubert and Tymoczko, John (2002). *Biochemistry Illustrated*.
3. Murray, Robert and Bender, David (2012). *Harpers Illustrated Biochemistry*: McGraw Hill Medical.
4. Lehniger, Albert and Nelson, David (2000). *Principles of Biochemistry:* Worth Pub.

BEHAVIOURAL SCIENCES

1. William, Simon, J; Gabe, Jonathan and Michael Calman (2000). *Health Medicine and Society, Key Theories, Future Agendas* (classic text). Routledge.
2. Gabe, Jonathan; Calnan, Michael and Bury, Michael (1991). *The Sociology of the Health Service*: Routledge.
3. Yacorzynski, G. K (1951). *Medical psychology: A Basis for Psychiatry and Clinical Psychology.* New York : Ronald Press Company.
4. Inglehart, Marita Rosch (1991). *Reactions to Critical Life Events: A Social Psychological Analysis:* Praeger
5. Sargent, Carolyn (1996). *Medical Anthropology: Contemporary Theory and Method:* Praeger.

MEDICAL MICROBIOLOGY AND PARASITOLOGY

1. Tortora, Gerald (2012). *Microbiology: An Introduction* (11th Edition). Benjamin Cummings.
2. Gladwell, Mark and Trattler, Mark (2011). *Clinical Biology Made Ridiculously Simple:* MedMaster Inc.
3. Capuccino, James and Sherman, Natalie (2013). *Microbiology: A Laboratory Manual:* Benjamin Cummings.
4. Nester, Eugene; Anderson, Denise and Roberts, Evans (2011). *Microbiology: A Human Perspective:* McGraw-Hill.
5. Bauman, Robert (2010). *Microbiology with Diseases by Taxonomy* (3rd Edition) (Symbiosis: The Pearson Custom Library for the Biological Sci. Benjamin Cummings.

6. Black, Jacquelyn (2012). *Microbiology: Principles and Explorations*-8th Edition. Wiley.

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

EPIDEMIOLOGY AND BIOSTATISTICS

1. Aschengrau, Anne and Searge, George R (2007). *Essentials Of Epidemiology In Public Health:* Jones & Barlett Learning.

2. Rothman, Kenneth and Lash, Timothy (2012). *Modern Epidemiology* (Third, Mid-cycle revision edition. Lippincott Williams & Wilkins.

3. Friis, Robert and Sellers, Thomas (2013). *Epidemiology for Public Health Practice* ('Friis, Epidemiology for Public Health Practice'-5th edition). Jones & Bartlett Learning.

4. McCusker, Jane (1978). *Epidemiology in Community Health.* Nairobi: AMREF.

5. Gordis, Leon (2008). *Epidemiology*-4th Edition. Saunders.

6. Lilienfield, David and Stolley, David (1994). *Foundations for Epidemiology.* Oxford University Press.

7. Rothman, Kenneth. J. (2012). *Epidemiology:* An Introduction: Oxford University Press.

8. Moon, Graham and Gould, Myles (2000). *Epidemiology* (Social Science for Nurses and the Caring Professions). Buckingham: Open University Press.

9. Gertsman, Burt (2013). *Epidemiology Kept Simple: An Introduction to Traditional and Modern Epidemiology.* Wiley-Blackwell.

10. Gregg, Michael (2008). *Field Epidemiology:* Oxford University Press.

11. Trichopoulos, Dimitrous and Olsen, Jorn (2010). *Teaching Epidemiology* (A guide for teachers in epidemiology, public health and clinical medicine). Oxford University Press.

12. Oleske, Denise (2010). *Epidemiology and the Delivery of Health Care Services, Methods and Applications.* Springer.

HUMAN COMMUNICATION SKILLS

1. Lundlow, Ron and Panton, Fergus (1993). The Essence of Effective Communication: Prentice Hall Trade.

2. Mutua, R W; Omulando, S J and Otiende J E (1992). Study and Communication Skills. Macmillan Education.

3. Bovee, Courtland and Thill, John (2009). Business Communication Today: Prentice Hall.

4. Hybels, Saunders and Weaver, Richard (2011). Communicating Effectively: McGraw-Hill Humanities/Social Sciences/Languages.
5. Sears, Melanie (2007). Choose Your Words: Compassionate Communication. OPA Publishing.
6. Rothwell, Dan (2012). In Mixed Company: Communicating in Small Groups.
7. Clampitt, Philip (2012). *Communicating for Managerial Effectiveness: Problems, Strategies and Solutions.* SAGE Publications.
8. http://www.gobookee.org/introduction-to-business-communication-abe-study-manual/.

IMMUNOLOGY

1. Bain, Barbara J (2006). *Blood Cells: A Practical Guide:* Wiley-Blackwell.
2. Harmening, Denise (2012). *Modern Blood Banking and Transfusion Practices.* F A Davis Company.
3. Harmening, Denise (2008). *Clinical Haematology and Fundamentals of Haematosis.* F A Davis Company.
4. Hillyer, Christopher; Silberstein, Leslie. Ness, Paul; Anderson, Kenneth; Roback, John. (2006). *Blood Banking and Transfusion Medicine: Basic Principles and Practice.* Churchill Livingstone.
5. McCullough, Jeffrey (2004). *Transfusion Medicine*: Churchill Livingstone.
6. Klein, Harvey and Anstee, David (2014). *Mollison's Blood Transfusion in Clinical Medicine*. Wiley-Blackwell.

NUTRITION AND DIETETICS

1. American Dietetic Association (2008). *International Dietetics and Nutrition Terminology Reference Manual;* American Dietetic Association.
2. Escort-Stump, Sylvia (2011). *Nutrition and Diagnosis-Related Care:* Lippincott Williams & Wilkins.
3. Mahan, Kathleen; Raymond, Janice; Escort-Stump, Sylvia (2011). *Krause's Food and Nutrition Therapy:* Saunders.
4. Gropper, Sareen and Smith, Jack (2008). *Advanced Nutrition and Human Metabolism:* Cengage Learning.
5. Long Sarah; Sucher, Kathryn, et-al (2007). *Nutrition Therapy and Pathophysiology.* Cengage Learning.

6. Pronsky, Zaneta, and Crowe Patricia Jeanne, Sr. (2012). *Food-Medication Interactions* Food Medication Interactions.

7. Roth, Ruth (2011). *Nutrition & Diet Therapy:* Cengage Learning.

8. Eschleman, Marian Maltese (1983). *Introductory Nutrition & Diet Therapy:* Lippincott Williams & Wilkins.

9. Peckenpau, Nancy (2009). *Nutrition Essentials and Diet:* Saunders.

10. Grodner, Michelle; Roth, Sarah Long and Walkingshaw, Bonnie (2011). *Foundations and Clinical Applications of Nutrition: A Nursing Approach:* Mosby.

PHARMACOLOGY

1. Katzung, Bertram; Masters, Susan and Trevor, Anthony (2011). *Basic and Clinical Pharmacology:* Mc-Graw Hil.l

2. Brunton, Laurence; Chabner, Bruce, and Knollmann, Bjorn (2010). *Goodman and Gilman's the Pharmacological Basis of Therapeutics*, Twelfth Edition. McGraw-Hill Professional.

3. Frenay, Agnes Claire (1973). *Understanding Medical Terminology.* Catholic Hospital Association.

4. Tripathi, K.D (2008). *Essentials of Medical Pharmacology* –Hardcover. Jaypee Brothers Medical Publishers (P) Ltd.

CLINICAL TECHNIQUES AND BASIC LIFE SUPPORT

1. Glynn, Michael and Drake, William (2012). *Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice.* Saunders Ltd.

2. Douglas, Graham; Nicol, Fiona and Robertson, Colin (2013). *Macleod's Clinical Examination.* Elsevier Health Sciences, 2009.

3. Lumley, J.S. P (2000). *Hamilton Bailey's Demonstration of Physical Signs in Clinical Surgery.* Butterworth-Heinemann, 2000.

4. Williams, Norman. Bulstrode, Christopher and O'Connell, Ronan (2004). *Bailey & Love's Short Practice of Surgery* - 24th edition. CRC Press.

5. Garden, James. Bradbury, Andrew. Forsythe, John and Parks, Rowan (2012). *Principles and Practice of Surgery:* Elsevier Health Sciences.

GENERAL PATHOLOGY AND IMMUNOPATHOLOGY

1. Levison, David (2008). *Muir's Textbook of Pathology* - Fourteenth Edition. Hodder Arnold.
2. Kumar, Vinnay: Kubbas, Abul Aster, Jon and Fausto, Nelson (2009). *Robbins & Cotran Pathologic Basis of Disease*. Elsevier Health Sciences.
3. Majno, Guido and Joris, Isabelle (2004). *Cells, Tissues and Disease: Principles of General Pathology:* Oxford University Press.
4. Underwood, J. Cressee, E (2009). *General and Systematic Pathology:* Churchill Livingstone.
5. Goljan, Edward(2013). *Rapid Review Pathology:* Elsevier Health Sciences, 2011.

CLINICAL CHEMISTRY

1. Walker, Simon and Beckett, Geoffrey (2013). *Lecture Notes: Clinical Biochemistry*. Wiley.
2. Gaw, Allan and Murphy, Michael (2013). *Clinical Biochemistry:* An Illustrated Colour Text: Churchill Livingstone.
3. Bradley, John R (2009). *Lecture Notes: Medical Genetics*. Wiley-Blackwell.
4. Koay, E S C and Walmsley, Noel (1996). *A Primer of Chemical Pathology:* World Scientific Publishing Company Inc.
5. Walmsley, R,N; et-al (1999). *Cases in Chemical Pathology: A Diagnostic Approach*. World Scientific.
6. Walmsley, Noel (1996). *Chemical Pathology: Interpretative Pocket Book:* World Scientific Publishing Company.
7. Vaughan, Victor Clarence (2011). *Lecture Notes on Chemical Physiology and Pathology:* BiblioBazaar.

HAEMATOLOGY AND BLOOD TRANSFUSION

1. Bain, Barbara (2006). *Blood Cells: A Practical Guide*. Wiley-Blackwell.
2. Harmening, Denise (2012). *Modern Blood Banking and Transfusion Practices:* F A Davis.
3. Harmening, Denise (2008). *Clinical Haematology and Fundamentals of Haematosis*. F A Davis.

4. Hillyer, D. Christopher (2007). *Blood Banking and Transfusion Medicine: Basic Principles and Practice:* Elsevier Health Sciences
5. McClough, Jeff (2011). *Transfusion Medicine:* John Wiley & Sons
6. Klein, Harvey (2008). *Mollison's Blood Transfusion in Clinical Medicine.* John Wiley & Sons

SYSTEMIC PATHOLOGY

1. Kumar, Vinay and Abbas, Abul (2009). *Pathologic Basis of Disease:* Saunders.
2. McGee, J.O'D; Wright, Nicholas, A (1992). Oxford Textbook of Pathology/ Vol 1, Vol 2 in Books A and B. Oxford University Press.
3. Harsh, Mohan (2005). *Textbook of Pathology:* Anshan Publishers.
4. Kemp, William and Burns, Denis (2007). *Pathology: The Big Picture.* Mc-Graw Hill.
5. Slauson, O David; Cooper, Barry, J. (2002). *Mechanisms of Disease: A Textbook of Comparative General Pathology.* Mosby.
6. Fenoglio-Preiser, M.C, et-al (2008). *Gastrointestinal Pathology: An Atlas and Text:* Wolters Kluwer Health/Lippincott Williams & Wilkins.
7. Levinson, David; Reid, Robin, et-al (1992). *Muir's Textbook of Pathology.* Hodder Education.

ENVIRONMENTAL AND OCCUPATIONAL HEALTH

1. Rukunga, G. K (2001). *Environmental Health for East Africa.* AMREF.
2. Schilling, Francis, S.R (1981). *Occupational Health Practice.* Butterworths.
3. The Kyoto Protocol on Climate Change: UN/UNEP Publication.

RESEARCH METHODS

1. Taylor, Bev and Francis, Karen (2013). *Qualitative Research in the Health Sciences:* Routledge.
2. Mugenda, Olive (1999). *Research Methodology: Methods and Techniques. Nairobi:* Acts Press.
3. Kothari, C.R (2004). *Research Methodology: Methods and Techniques.* New Age International.
4. McKenzie, James, et-al (2011). *An Introduction to Community Health:* Jones and Bartlett Publishers.

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

COMMUNITY HEALTH

1. McKenzie, James, et-al (2011). *An Introduction to Community Health:* Jones and Bartlett.
2. Wood, C H; Glanvill, D. H and Vaughan, J. P (eds.) (1997). *Community Health-* 2nd Edition. Nairobi: AMREF.

CLINICAL PHARMACOLOGY

1. Graham-Smith, David and Aronson, Jeffrey (2002). *Oxford Textbook of Clinical Pharmacology and Therapy.* Oxford University Press.
2. Kaztung, Bertram and Masters, Susan (2011). *Basic and Clinical Pharmacology:* McGraw-Hill-Medical.
3. Rang, Humphrey and Dale, Maureen, et-al (2011). *Rang & Dale's Pharmacology:* Churchill Livingstone.

MEDICAL LEGAL ISSUES AND PROFESSIONAL ETHICS

1. Veatch, Robert (1989). *Medical Ethics:* Jones and Bartlett Publishers.
2. O'Rouke, Kevin and Boyle, Philip (2011). *Medical Ethics: Sources of Catholic Teachings* . Georgetown University Press.
3. Flint Austin Jnr. (2012). *Medical Ethics and Etiquette: The Code of Ethics Adopted by the American Medical Association (AMA)*.
4. Synder, John and Gauthier, Candace, et-al (2010). *Evidence-Based Medical Ethics: Cases for Practice- Based Learning.* Human Press.
5. Singer, Peter and Viens A. M (2008). *The Cambridge Textbook of Bioethics.* Cambridge University Press.

REPRODUCTIVE HEALTH

1. Philip, Baker and Kenny, Louise (2011). *Obstetrics by Ten Teachers.* CRC Press.
2. Monga, Ash (2011). *Gynaecology by Ten Teachers.* CRC Press.
3. Hanretty, Kevin (2009). *Obstetrics Illustrated.* Churchill Livingstone.
4. Hart, David and Norman, Jane (2000). *Gynaecology Illustrated.* Churchill Livingstone.

5. Smith, Roger (2008). *Netter's Obstetrics and Gynaecology.* Saunders.
6. Anderson, Barbara (2004). *Reproductive Health: Women's and Men's Shared Responsibility.* Jones and Bartlett.
7. 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.
8. DeCherney, Alan et-al (2011). *Current Diagnosis & Treatment: Obstetrics & Gynaecology* . Mc-Graw Hill.
9. Gordon, John (2007). *Obstetrics, Gynaecology and Infertility:* Handbook for Clinicians. Scrub Hill Press.
10. Hoffman, Barbara and Schorge, John (2011). *Williams Gynaecology* ('Schorge, Williams Gynaecology'): Mc-Graw Hill.
11. Cunningham, F and Leveno, Kenneth (2009). *Williams Obstetrics.* Mc-Graw Hill.

CHILD HEALTH

1. Hay, William (2012). *Current Diagnosis and Treatment Paediatrics* -Twenty-First Edition (Current Pediatric Diagnosis & Treatment): McGraw Hill.
2. Rudolf, Mary (2011). *Paediatrics and Child Health:* Wiley-Blackwell.
3. Kliegman, Robert (2011). *Nelson Textbook of Paediatrics:* Wiley Blackwell.
4. Glynn, Michael and Drake, William (2012). *Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice.* Saunders.

INTERNAL MEDICINE

1. Colledge, Nicki and Walker, Brian (2010). *Davidson's Principles and Practice of Medicine.* Churchill Livingstone.
2. Kumar, Praveen and Clark, Michael (2012). *Kumar and Clark's Clinical Medicine.* Saunders.
3. Glynne, Michael and Drake, William (2012). *Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice.* Saunders.
4. Douglas, Graham and Nicol, Fiona (2013). *Macleod's Clinical Examination.* Churchill Livingstone.
5. Longo, Dan; Fauci, Anthony, et-al (2011). *Harrison's Principles of Internal Medicine.* Mc-Graw Hill.

6. Wiener, Charles; Fauci, Anthony, et-al (2012). *Harrison's Principles of Internal Medicine, Self-Assessment and Board Review.* Mc-Graw Hill.

7. Warrell, David; Cox, Timothy, et-al (2010). *Oxford Textbook of Medicine* ('Warrell, Oxford Textbook of Medicine'). Saunders.

GENERAL SURGERY

1. Williams, Norman and Bulstrode, Christopher (2013). *Bailey and Love's Short Practice of Surgery.* CRC Press.

2. Lumley, J (1997). *Bailey's Physical Signs: Demonstration of Physical Signs in Clinical Surgery.* CRC Press.

3. Garden, James; Bradley, Andrew, et-al (2012). *Principles and Practice of Surgery.* Churchill Livingstone.

4. Wilmore, Douglas (2001). *ACS Surgery: Principles and Practice of Surgery.* WebMD Reference.

5. Tjandra, Joe; Clunie, Gordon, et-al (2006). *Textbook of Surgery.* Wiley-Blackwell.

6. Brunicardi, F; Anderson, Dana, et-al (2010). *Schwartz's Principles of Surgery Self-assessment and Board Review.* McGraw Hill-Professional.

7. Cameron, John and Cameron, Arthur (2013). *Current Surgical Therapy.* Saunders.

8. Velasco, Jones, et-al (2011). *Rush University Medical Centre Review of Surgery.* Saunders.

MENTAL HEALTH

1. Drake, Michael; Lynde, David, et-al (2005). *Evidence-Based Mental Health Practice.* W W Norton and Company.

2. Sadock, Benjamin and Sadock, Virginia (2008). *Kaplan and Sadock's Concise Textbook of Clinical Psychiatry.* Lippincott Williams and Wilcock.

3. Sadock, Benjamin; Sadock Virginia and Ruiz, Pedro (2009). *Comprehensive Textbook of Psychiatry.* Lippincott Williams and Wilcock.

4. Black, Donald and Andreasen, Nancy (2010). *Introductory Textbook of Psychiatry:* American Psychiatric Publishing.

5. Hossain, Fatemi and Clayton, Paula (2008). *The Medical Basis of Psychiatry:* Humana Press.

6. Bhugra, Dinesh; Craig, Tom and Bhui, Kamaldeep (2011). *Textbook of Cultural Psychiatry.* Cambridge University Press.

HEALTH MANAGEMENT AND ECONOMICS

1. Taylor, Robert and Taylor, Susan (1994). *The AUPHA Manual of Health Services Management* . Jones and Bartlett.
2. Williams, Stephen and Torrens, Paul (2007). *Thompson Delmar: Introduction to Health Services.* Cengage Learning.
3. Cleverly, Williams and Cleverly, James (2010). *Essentials of Health Care Finance*. Jones and Bartlett.
4. Wood, C H; Glanvill, D. H and Vaughan, J. P (eds.) (1997). *Community Health*-2nd Edition. Nairobi: AMREF.
5. Ehrlich, Rodney and Joubert, Georgina (2008). *Epidemiology: A Research Manual for South Africa*: Oxford University Press.
6. Walker, James (1992). *Human Resource Planning*. McGraw-Hill.
7. Mckenzie, James, et-al (2011). *An Introduction to Community Health:* Jones and Bartlett.
8. Mckenzie, James; Mckenzie, John, et-al (2007). *An Introduction to Community Health: Student Note-taking Guide*-6th edition. Jones and Bartlett Learning LLC.
9. Bensley, Robert and Brookins-Fisher, Jodi (2008). *Community Health Education Methods- A Practical Guide.* Jones and Bartlett.

DERMATOLOGY

1. Habif, Thomas (1996). *Clinical Dermatology: A Colour Guide to Diagnosis and Therapy.* Mosby.
2. Habif, Thomas, et-al. (2011). *Skin Diseases: Diagnosis and Treatment:* Saunders.
3. Mann, Margaret, et-al (2009). *Handbook of Dermatology: Practical Manual.* Wiley-Blackwell.
4. Pasricha, J. S. and Verma, Kaushal (2013). *Treatment of Skin Diseases.* JP Medical Ltd.
5. Pasricha, J. S. and Gupta, Ramji (2013). *Illustrated Text Book of Dermatology:* JP Medical Ltd.
6. Thaapa, Devinder Mohan (2009). *Text Book of Dermatology, Venereology and Leprology.* Elsevier Health Sciences.
7. Neena Khanna (2002). *Dermatology & Sexually Transmitted Diseases (PB)*. CBS Publishers & Distributors.

8. Bhutani, L. K (1985). *Atlas of Dermatology:* Ishiyaku Euroamerica.
9. Bhutani, L. K (1985). *Atlas of Sexually Transmitted Disease:* Ishiyaku Euroamerica.

RADIOLOGY AND IMAGING

1. Weissleider, Ralph, et-al (2006). *Primer of Diagnostic Imaging with CD-ROM*. Mosby.
2. Major, Nancy, M and Brant, William (2005). *Fundamentals of Body Ct*. Saunders.
3. Huda, Walter (2009). *Review of Radiologic Physics*. Lippincott Williams and Wilkins.
4. Donnelly, Lane (2008). *Paediatric Imaging: the Fundamentals*. Saunders.
5. Mettler, Fred, et-al (2012). *Essentials of Nuclear Medicine Imaging*. Saunders.
6. Shackett, Pete (2008). *Nuclear Medicine Technology: Procedures and Quick Reference*. Lippincott Williams and Wilkins.

OPTHALMOLOGY

1. Bartlett, Jimmy and Jaanus, Siret (2007). *Clinical Ocular Pharmacology:* Butterworth-Heinemannn.
2. Gerstenblith, Adam and Rabinowitz (2012). *The Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease*. Lippincott Williams and Wilkins.
3. Kanski, Jack and Bowling, Brad (2011). *Clinical Ophthalmology: A Systematic Approach*. Saunders.
4. Kanski, Jack (2001). *Parson's Diseases of the Eye:* Mosby.
5. Scheimann, Michelle and Wick, Bruce (2013). *Clinical Management of Binocular Vision, Heterophoric, Accommodative, and Eye Movement Disorders*. Lippincott Williams and Wilkins.

ANAESTHESIOLOGY AND PERIOPERATIVE MEDICINE

1. Smith, Graham and Aitkenhead, Alan (2006). *The Book of Anaesthesia:* Churchill Livingstone.
2. Smith, Tom, et-al (2009). *Fundamentals of Anaesthesia:* Cambridge University Press.

3. Hutton, Peter, et-al (2002). *Butterworth Fundamental Principles and Practice of Anaesthesia.* CRC Press.
4. Longnecker, David, et-al (1998). *Principles and Practice of Anaesthesiology:* Mosby.
5. Marini, John and Wheeler, Arther (2009). *Critical Care Medicine: The Essentials.* Lippincott Williams and Wilkins.
6. Baughan, Verna, et-al (2011). *Anaesthesiology & Critical Care Drug Handbook:* Lexi-Comp.
7. Stoetling, Robert, et-al (2005). *Pharmacology and Physiology in Anaesthetic Practice.* Lippincott Williams and Wilkins.

EAR, NOSE AND THROAT SURGERY

1. Ludman, H.S and Bradley, P. (2012). *ABC of Ear Nose and Throat.* John Wiley & Sons Ltd.
2. Maqbool, Mohamed (2013). *Textbook of Ear, Nose and Throat Diseases:* JP Medical.
3. Gleeson, Michael, et-al (2008). Scott-Brown's *Otorhinolaryngology: Head and Neck Surgery.* CRC Press.
4. Musheer, Hussain (2014). *Logan Turner's Book of ENT.* CRC Press.
5. Gleeson, Michael, et-al (2008). *Scott Brown's Otolaryngology:* CRC Press.
6. Blair, Robin, L(ed.) (2011). *Logan Turner's Text Book of ENT.* Hodder Arnold.
7. Lee, K. J (2012). *Essential Otolaryngology-Head and Neck Surgery.* Mc-Graw Hill.

ORTHOPAEDICS AND TRAUMATOLOGY

1. Miller, Mark, et-al (2012). *Adams's Outline of Orthopaedics.* Saunders.
2. Hablin, David and Simpson, Hamish (2007). *Adams's Outline of Fractures, Including Joint Injuries.* Churchill Livingstone.
3. Ip, David (2008). *Orthopedic Traumatology: A Resident's Guide:* Springer.
4. Berman, Louis, et-al (2006). *A Clinical Guide to Dental Traumatology.* Mosby.
5. Kerschbaumer, Fridun (1987). *Operative Approaches in Orthopedic Surgery and Traumatology.* Thieme.
6. Ip, David (2007). *Orthopedic Rehabilitation, Assessment and Enablement:* Springer.

7. Frontera, Walter, et-al (2008). *Essentials of Physical Medicine and Rehabilitation.* Saunders.

ALTERNATIVE AND COMPLEMENTARY MEDICINE

1. Evans, William Charles (2009). *Trease and Evans Pharmacognosy:* Saunders.
2. Kokwaro, John (2009). *Medicinal Plants of East Africa.* University of Nairobi Press.
3. World Health Organization (1998). *WHO Quality Control Methods for Medicinal Materials.* World Health Organization.

DENTAL HEALTH

1. Bonner, Michael (2003). *The Oral Health Bible.* Basic Health Publications.
2. Breiner, Mark and Atkins, Robert (1999). *Whole-body Dentistry:* Quantum Health Press.
3. Sutton, Anne (2008). *Dental Care and Oral Health Sourcebook*: Omnigraphics Inc.
4. Sutton, Amy (2008). *Dental Public Health: Contemporary Practice for the Dental Hygienist.* Omnigraphics Inc.
5. Nathe, Christine (2010). C*ontemporary Practice for the Dental Hygienist:* Prentice Hall.
6. Neil-Gehrig, Jill and Willmann, Donald (2008). *Foundations of Periodontics for the Dental Hygienist.*Lippincott Williams and Wilkins.
7. Haveles, Elena (2010). *Applied Pharmacology for the Dental Hygienist.* Mosby.
8. Ibsen, Olga and Phelan, Joan Andersen (2008). *Oral Pathology for the Dental Hygienist.* Saunders.

FORENSIC MEDICINE AND TOXICOLOGY

1. Reddy, K.S.N (1978) *The Essentials of Forensic Medicine & Toxicology.* Reddy.
2. Subrahmanyam, B. V (2005). *Modi's Textbook of Medical Jurisprudence and Toxicology.* Butterworths.
3. Parikh, C. K (2007). *Parikh's Textbook of Medical Jurisprudence Forensic Medicine and Toxicology.* CBS Publishers and Distributors.
4. Bardale, Rajesh (2011). *Principles of Forensic Medicine.* J P Brothers Medical Lab.

5. Vij, Krishan (2008). *Text Book of Forensic Medicine & Toxicology – Principles and Practice*. Elsevier, India.

ENTREPRENEURSHIP

1. Kuratko, Donald (2008). *Entrepreneurship Theory Process and Practice*. Cengage.
2. Drucker, Peter (2006). *Innovations and Entrepreneurship*. Harper Business.
3. Spinelli, Stephen and Adams, Rob (2011). *New Venture Creation: Entrepreneurship for the 21st Century*. McGraw-Hill/Irwin.

ONCOLOGY AND PALLIATIVE MEDICINE

1. Colledge, Nicki, et-al (2010). *Davidson's Principles and Practice of Medicine* .Churchill Livingstone.
2. Kumar, Parveen and Clark, Michael (2012). *Kumar and Clark's Clinical Medicine*. Saunders.
3. Glynne, Michael and Drake, William (2012). *Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice*. Saunders.
4. Douglas, Graham, et-al (2013). *Macleod's Clinical Examination*. Churchill Livingstone.
5. Longo, Dan, et-al (2011). *Harrison's Principles of Internal Medicine*. McGraw-Hill.
6. Wiener, Charles, et-al (2012). *Harrison's Principles of Internal Medicine, Self-Assessment and Board Review*. McGraw-Hill.
7. Warrell, David, et-al (2010). *Oxford Textbook of Medicine* (Warrell, Oxford Textbook of Medicine). Oxford University Press.

THERAPEUTICS

1. Brunton, Laurence, et-al (2010). *The Pharmacological Basis of Therapeutics*. McGraw-Hill.
2. Katzung, Bertram, et-al (2011). *Basic & Clinical Pharmacology:* McGraw-Hill.
3. Bennett, Peter, et-al (2012). *Clinical Pharmacology:* Churchill Livingstone.
4. Tripathi, K. D (2013). *Essentials of Medical Pharmacology*. Jaypee Brothers Medical Pub.

5. Rang, Humphrey, et-al (2011). *Rang & Dale's Pharmacology:* Churchill Livingstone.

HEALTH INFORMATICS AND ELECTRONIC RECORDS SYSTEM

1. Norton, Peter (2004). *Introduction to Computers:* McGraw-Hill.
2. Downs, Timothy Edward (2003). *How Computers Work:* Que.
3. Hoyt, Robert and Yoshihashi, Anne (2012). *Medical Informatics: Practical Guide for Healthcare and Information:* Lulu.com.
4. Wager, Karen, A; Lee, Francis W and Glaser, J.P (2009). *Health Care Information Systems.* Jossey-Bass.
5. Wager, Karen, et-al (2013). *Health Care Information Systems: A Practical Approach for Health Care Management.* Jossey-Bass.

Annex 2: List of Contributors

1.	Prof. George A. O. Magoha	-	Chairman
2.	Dr. Francis Kimani	-	DMS/Registrar
3.	Prof. Alice Mutungi	-	Vice Chair
4.	Prof. Jacob Kaimenyi	-	Member, MPDB
5.	Prof. Barasa Khwa Otsyula	-	Chair, ESRC, MPDB
6.	Prof. Zipporah Ngumi	-	Member ESRC, MPDB
7.	Dr. Samson Wanjala	-	Member, MPDB
8.	Dr. Fatmah Abdallah	-	Member, MPDB
9.	Dr. Tom Ocholla	-	Member, MPDB
10.	Dr. Elly NyaimOpot	-	Member, MPDB
11.	Dr. Josephine Omondi	-	Member, MPDB
12.	Dr. Stephen Ochiel	-	Member, MPDB
13.	Dr. Judith Bwonya	-	Member, MPDB
14.	Dr. Mahendrah Pancholi	-	Member, MPDB
15.	Mr. Daniel M. Yumbya	-	CEO/Secretary, MPDB
16.	Dr. James Mwanzia	-	Chief of Party, FUNZOKenya
17.	Prof. Stephen Okeyo	-	Assistant Director, Systems Strengthening FUNZO Kenya
18.	Dr. John Tole	-	Dean, Aga Khan Hospital University
19.	Dr. Kennedy Onyango	-	Lecturer, Maseno University
20.	Dr. Frederick Ndede	-	Snr. Lecturer, Kenya Methodist University
21.	Dr. Bernard Mua	-	Lecturer, University of Nairobi Dental School
22.	Dr. Tonnie K. Mulli	-	Lecturer, University of Nairobi Dental School
23.	Dr. Elizabeth Dimba	-	Lecturer, University of Nairobi Dental School

24.	Dr. Tom Mboya Dienya	-	Lecturer, University of Nairobi Dental School
25.	Dr. Daniel K. Ojuka	-	Lecturer, University of Nairobi Medical School
26.	Prof. Maged Lotfy	-	Senior Lecturer, Moi University Dental School
27.	Dr. Brenda Okumu	-	Lecturer, Moi University
28.	Dr. Pamela Tsimbiri Fedha	-	Dean, Egerton University
29.	Dr. Reuben Thuo	-	Dean, JKUAT
30.	Dr. Okello Agina	-	Dean, Kenyatta University
31.	Dr. Joseph Nkuranga	-	In-Service Lab, PACE University of Maryland
32.	Dr. Marybeth Maritim	-	Pre-Services Lecturer, PACE University of Nairobi
33.	Dr. Jessie Githanga	-	Trainer Lecturer, PACE University of Nairobi
34.	Dr. Wambeti Njiru	-	Trainer Lecturer, PACE University of Nairobi
35.	Prof. Francis G. Macigo	-	Acting Dean, Dental School University of Nairobi
36.	Dr. Caroline Kibosia	-	Dean, Dental School, Moi University
37.	Prof. Mark L. Chindia	-	School of Dental Sciences, University of Nairobi
38.	Dr. Bernina Kisumbi	-	School of Dental Sciences, University of Nairobi
39.	Dr. Mary A. Masiga	-	School of Dental Sciences, University of Nairobi
40.	David Maingi	-	Senior Manager, Regulatory Systems FUNZOKenya project
41.	Peter Shikuku	-	Curriculum and Instructional design Manager, FUN ZOKenya project
42.	Irene Chami	-	CPD and Accreditation Manager, FUNZOKenya project
43.	Rose Wafula	-	Compliance and Training Officer, FUNZOKenya project
44.	Josephine Mbiyu-Kinyua	-	Management Sciences for Health
45.	Millicent Olulo	-	PharmAccess / Safecare
46.	Nicole Spieker	-	PharmAccess / Safecare
47.	Shakirah Hudani	-	IFC/Health Initiative in Africa

48. Christine Muriu - Medical Practitioners and Dentists Board
49. Rose Wafukho - Medical Practitioners and Dentists Board
50. Beverly Cheptoo - Medical Practitioners and Dentists Board
51. Sarah Were - Medical Practitioners and Dentists Board

Medical Practitioners and Dentists Board
Woodlands Rd, Off Lenana Rd.
P.O. Box 44839-00100 Nairobi.
Tel: +254 020 2724994 / 2711478 / 2728752
E-mail: Ceo@kenyamedicalboard.org
Website: www.medicalboard.co.ke

Disclaimer

KENYANS AND AMERICANS IN PARTNERSHIP TO FIGHT HIV/AIDS

USAID FROM THE AMERICAN PEOPLE

FUNZO Kenya
TRANSFORMING HEALTH WORKFORCE TRAINING