

**Commission for Higher Education Kenya
Tanzania Commission for Universities
National Council for Higher Education Uganda**

**CREDIT ACCUMMULATION
AND
TRANSFER SYSTEM

EAST AFRICA**

Minimum Standards for Courses of Study in

**MEDICINE
Undergraduate programmes**

Published by:

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ISBN 978-9970-111-04-6

Edited and Printed by:

TransAfrica Publishers Ltd
P.O. Box 21641 , Kampala, Uganda
Tel: +256-414-253744
Fax: +256-414-253744
E-mail: info@transafricapublishers.net
Website: www.transafricapublishers.net

Preface

In an ever-changing world where academia and industry tend to work together more and more often, it has become a necessity to be in a position to offer young people the best possible education in view of a successful professional career.

Today, higher education is a means through which careers are built, and students wish to find ways and means to reach the best possible deliverer of higher education. The movement of students is becoming more common and academics are offering their services, knowledge, and skills in a greater variety of places. It has, therefore, become important that programmes are offered which enable students to study abroad move freely without jeopardising his/her studies. Therefore, common grounds have to be found, and one way to achieve this is to establish minimum standards for courses of study.

This project entitled the “Credit Accumulation and Transfer Systems” (CATS) intends to reach the East African region. The Rockefeller Foundation financed this project which started in early 2007: we are grateful for their support over these past three years.

Academics from Kenya, Tanzania, and Uganda worked together on this enterprise and have enabled us to produce these four volumes. They cover Human Medicine, Agriculture, Engineering, and Basic Sciences.

I wish to thank all those who worked on the project, especially my colleagues from the Commission for Higher Education, Kenya and the Tanzania Commission for Universities. Without their collaboration the work would never have been completed.

A very special word of thanks ought to go to the dozens of academics from our three nations who contributed to the writing of these minimum standards. Their work has been invaluable and there are no appropriate words to thank them for it. The recognition of their contribution should suffice to state that the work was well done and of high standards. Thanks to you all!

To the publishers who have given us quality work, a word of sincere thanks is due.

We are aware that the work is not completed. However, with this common tool in our hands, we can now work closer together and open the doors of exchange to all students who wish to enhance their learning experiences in different environments. Academics will also be in a better position to help improving these volumes and this ongoing work will certainly benefit the whole academic community of the East African Region.

*Professor Michel LEJEUNE
Deputy Executive Director
Regional Coordinator CATS East Africa*

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ANAESTHESIOLOGY
DERMATOLOGY AND STIs
MENTAL HEALTH
MEDICAL ELECTIVES STUDIES

INTRODUCTION

A. General guidelines

1. The following practical points were agreed upon when it comes to CATS East Africa. These are MINIMA and nothing prevents a university to go above this. The first ten points were agreed unanimously and the last two still need further discussion.
2. Each university is free to decide on their system of study timing division, either semester or term, although it is felt that the semester system should gradually be adopted to ease the transfer system.
3. The duration for each programme is as follows:
 - Agriculture not less than 3 years
 - Human Medicine not less than 5 years
 - Engineering not less than 4 years
 - Basic Sciences not less than 3 years
4. The entry to a programme can be:
 - a. Direct entry after Secondary school training
 - b. Indirect entry through:
 - Mature-Age examination
 - Diploma
 - Bridging course
5. Students applying to join university and producing a Diploma can be accepted (see 3 above). This diploma should carry credits to be carried forward in the university programme. Each university shall decide how many and which credits will be granted.
6. Entry will be accepted if the candidate obtained his/her results in not more than three sittings.
7. The mode of delivery of courses shall be either through lectures, practicals/laboratories, tutorials, seminars, problem-based learning, case-based learning, distance/remote learning or e-learning.
8. Each programme shall have a practical training as a compulsory part of the programme.
9. The credit system shall be set as follows:
 - 1 Credit Unit (CU) for 15 hours of teaching
 - 1 CU for 30 hours of tutorials
 - 1 CU for 45 hours of practicals
10. Credits are transferable within five (5) years of obtaining the results.
11. A student registered in one university must take at least 51% of the courses at this university to obtain a degree from that university. The remaining 49% can be courses followed in other universities.
12. The grading of marks proposed is as follows:

Marks in %	Class or letter grade	Grade value
75 to 100	1 st Class or A	5
60 to 74	2 nd Class upper or B	3 to 4.5
59 to 40 or 50 *	2 nd Class lower or C	2.0 to 2.5
45 to 49	Pass or D	1.0 to 1.5
35 to 39	Pass or D	0.5 to 1.0
Below	Fail	0

* The pass mark may not be the same between all countries but should be aimed at with time.

13. Qualifications of staff

- A Librarian shall have a minimum of a Masters degree in Library and Information Science.
- Persons recruited as technical staff should possess appropriate qualifications in technical fields for each programme offered by the university / institution.
- Persons recruited as academic staff should possess minimum qualifications that are higher than the level of programmes they teach in the same field. Thus:
 - Diploma programmes should be taught by at LEAST Bachelor degree holders.
 - Undergraduate programmes should be taught by at least Masters degree holders at Lecturer grade level.
 - Masters programmes should be taught by PhD holders with teaching and research experience.

- PhD programmes should be taught by PhD holders with extensive teaching and research experience.
- For Medicine, Engineering and Law a relevant Masters degree with extensive teaching, professional and research experience supported by publications in peer reviewed journals may be considered appropriate.
- Academic leadership. each department should be headed by a qualified academic staff with appropriate experience in university teaching, preferably a Professor or Associate Professor, holding a PhD in the relevant field of study on a full-time employment.

B. Nomenclature and Duration

All successful graduates will be awarded the Bachelor of Science (BSc) degree of their respective institutions.

The recommended duration of the BSc degree programme is a minimum of three years.

C. Philosophy of the BSc degree programme

A basic scientist is a specialist who should be competent, skilful, innovative and should always be at the frontiers of knowledge. Furthermore, a scientist should be able to impart scientific skills to others, undertake research for the creation of knowledge, development of methodologies and products.

After graduation, a basic scientist should be able to exhibit competences in the following broad educational areas:

- Scientific knowledge and skills to be imparted to others
- Research skills to engage in problem identification and finding solutions through enquiry and development
- Application of science in the service of society
- Innovation and opening new areas of inquiry
- Being abreast with current advances in science.

CHAPTER I PROGRAMME ORGANIZATION

1. COURSE STRUCTURE

a. Course duration

- i) The programme should extend over a period of not less than 5 years;
- ii) An academic year could either be divided in semesters or terms; and
- iii) The first three years will be regarded as pre-clinical years and the others as clinical 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.

2. CURRICULUM DESIGN

Each medical school must define the curriculum models employed.

The curriculum should encourage students to be responsible for their learning process and should prepare them for lifelong, self-directed learning.

It should aim at reducing the factual burden on students and at integrating basic and clinical sciences

Curriculum models include those based on disciplines, systems, problems and community; and

The curriculum should be based on sound learning principles and should foster the ability to participate in the scientific development of medicine as professionals and future colleagues.

3. LEARNING/INSTRUCTIONAL METHODS (GENERIC)

- a) Each medical school must define the instructional methods employed;
- b) The methods should ensure that students have responsibility for their learning process and should prepare them for lifelong and self-directed learning;
- c) Instructional methods encompass teaching and learning methods and should be based on sound learning principles. They should foster the ability to participate in the scientific development of medicine as professionals and future colleagues;
- d) Learning methods should include:
 - 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) Post-mortem demonstrations;
 - vii) Laboratory practicals;
 - viii) Fieldwork and community based learning;
 - ix) Self-directed learning; and
 - x) E-learning complementary.

4. MODES OF ASSESSMENT (GENERIC)

Assessments should be application or problem-based and include clinical aspects and should be both formative and summative.

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 Semester/Year Examinations (Summative)

- i) Written: MCQs, SAQs, MEQs, LEQs;
- ii) Clinicals: OSCEs, Clinical Short and Long cases;
- iii) Practicals;
- iv) Viva voce;
- v) Generic questionnaires (course and teacher evaluation);
- vi) Focus group discussions.

c. Examination regulations

- i) Certification will be an M.B.Ch.B. Degree and it should not be classified;
- ii) Distribution of marks will be specified by individual institutions. However, continuous assessment should cover 30-50% of the final mark;
- iii) For the clinical years, it is a mandatory to pass clinical exams in order to proceed into the next year of study;

Grading:

- 70-100% A (Distinction)
- 60-69% B (Credit)
- 50-59% C (pass) (in some institutions it is still 40-59%)
- 0-49%: D (Fail)

S/No	COURSES TITLE	CREDIT HRS	UNITS
Pre-Clinical			
1.	Introduction to Computers	30	2
2.	Human Anatomy	210	14
3.	Medical Biochemistry	180	12
4.	Medical Physiology	180	12
5.	Behavioural and Social Sciences (Anthropology, Sociology and Psychology)	120	8
6.	Nutrition and Dietetics	30	2
7.	Communication Skills	30	2
	Total	780	52
Pathology/ Laboratory Medicine			
1.	Immunology, Microbiology and Parasitology	165	11
2.	General and Systemic Pathology	150	10
3.	Haematology and Blood Transfusion	45	3
4.	Clinical Chemistry	45	3
	Total	405	27
Population Health, Health Systems and Research			
1.	Biostatistics and Demography	30	2
2.	Epidemiology	30	2
3.	Environmental Health	30.	2
4.	Occupational Health and Safety	30	2
5.	Community Medicine	60	4
6.	Health Services Management	30	2
7.	Entrepreneurship	30	2
8.	Research methodology and Research project	90	6
	Total	330	22

Clinical Courses - Junior Clerkships			
1.	Pharmacology and Therapeutics	120	8
2.	Junior Clerkship: Child Health and Paediatrics	90	6
3.	Junior Clerkship: Internal Medicine	90	6
4.	Junior Clerkship: Reproductive Health	90	6
5.	Junior Clerkship: Surgery	90	6
	Total	480	32
Special subjects			
1.	Forensic Medicine and Applied Toxicology	30	2
2.	Anaesthesiology and Critical Care Medicine	45	3
3.	Ear, Nose, Throat, Head and Neck Surgery	45	3
4.	Ophthalmology	45	3
5.	Dermatology and STIs	30	2
6.	Orthopaedics and Traumatology	90	6
7.	Radiology and Imaging	60	4
8.	Medical Electives Studies	90	6
	Total	435	29
Senior Clerkships			
1.	Senior Clerkship: Mental Health	120	8
2.	Senior Clerkship: Child Health and Paediatrics	90	6
3.	Senior Clerkship: Internal Medicine and Geriatrics	90	6
4.	Senior Clerkship: Reproductive Health	90	6
5.	Senior Clerkship: General Surgery	90	6
6.	Medical Ethics, Professional Conduct and Medico-Legal Issues	45	3
	Total	525	35
	GRAND TOTAL	2955	197

5. CREDIT TRANSFERS

1. It will depend on the curriculum model or design between the institution where the credit transfer will take place (PBL vs traditional);
2. A student must have taken at least 51% of the programme in the awarding institution;
3. The students seeking transfer must have cleared and passed all the relevant courses and the information about the candidate shall be contained in a transcript;
4. The students seeking transfers should have taken the course not more than three years prior to their seeking of credit transfer
5. The duration of the programme should not be more than eight years;
6. There will be a uniform format for the transcripts;
7. Transfer of credits will be subjected to the availability of space in the institution.

6. COURSE DESCRIPTION

Each course description should have:

1. Course weighting;
2. Course aims/purpose;

3. Learning objectives/outcomes;
4. Comprehensive Course Content;
5. Attitudes and teaching and assessment methods;
6. Expected skills; and
7. Recommended readings.

CHAPTER II
COURSE DESCRIPTIONS AND WEIGHTINGS

PRE-CLINICAL COURSES

I. INTRODUCTION TO COMPUTER (2 Units)

1. COURSE OBJECTIVE

To equip the student with computer skills and knowledge 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

- a) 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
- b) Principles of data management: Setting up files; modifying; storing; data coding; data entry; data processing and analysis; databases
- c) 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
- d) Computer applications in health services and research. Medical literature search, medical record keeping, and retrieval; and searching for information; Telemedicine; Virtual reality

II. HUMAN ANATOMY (14 UNITS) *

A. CELL AND TISSUE BIOLOGY, GENETICS AND EMBRYOLOGY

1. COURSE OBJECTIVE

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

2. COURSE OUTCOMES

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

- a) Describe cell and tissue structure and function
- b) Describe and explain the principles and concepts of human genetics.
- c) Describe development of the human embryo

* Any university is free to break up the courses in smaller units provided the total units remain within the set Credit Units.

3. COURSE CONTENT

Cell and Tissue Structure and Function:

- a) Cell: cell theory, cell structure and organelles; cell functions and functional specialization, cell cycle regulation and disorders.
- b) Supporting tissue: Classification, cell types, structure, functions and disorders of fibrous tissue, cartilage, bone and blood.

- c) Propulsion tissue: classification, structure, characteristics, regeneration, distribution and functions.
- d) Nervous tissue: structural features of neurons and neuroglial cells; organization of peripheral nerves and ganglia.
- e) Epithelial tissue: characteristics, structural features, classification, distribution, functions and disorders.

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:

- a) Reproductive cycles and female reproductive system
- b) Gametogenesis. Gamete viability and transport. Fertilization: definition, events and results. Formation and transport of the molecular. Blastula, normal and abnormal implantation. Bilaminar germ disc, gastrulation, neurulation
- c) Embryonic folding and organogenesis. Placenta and foetal membranes. Umbilical cord and twinning. Tetrotology and tetrotogenesis

B. SYSTEMIC ANATOMY

1. COURSE OUTCOMES

At the end of the course, students will 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.

2. COURSE CONTENT

a. Topographic Anatomy:

- Lower Limbs: Bones, joints, muscles, nerves and vessels. Layers and arches of /he 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 arched, finger movements and prehension
- Back: features, articulations and movements of the vertebrae. Vertebral venous exuses and their communications. Layers of the extensor muscles of the back.0 ead 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 orbit. Opite 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 shear, pretracheal and prevertebral. Pharynx - layers and subdivisions, nerves and vessels. Larynx - cartilages, muscles, nerves, vessels and the internal features. Thyroid and parathyroid glands. Oral cavity; organization of the tongue, palate, gums and the salivary glands. 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 ischioanal 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

b. Microscopic organization of human body organs:

- Skin: structure appendages and adaptations
- 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 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
- Nervous System: Structural and functional organization of the spinal cord, brain, peripheral nerves, ganglia, receptors of general and special sensation

c. Developmental Anatomy and birth defect:

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

III. MEDICAL BIOCHEMISTRY and MOLECULAR BIOLOGY COURSE (12 UNITS)

1. COURSE OBJECTIVE

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 will be able to:

1. Explain the basic chemistry of the constituents of the body.
2. Describe the structure and functions of biomolecules including enzymes; vitamins; hormones and neurotransmitters.
3. Outline the principles of the various intermediary metabolic processes.
4. Demonstrate knowledge of cell, and molecular biology and genetics applicable contemporary

- medical practice.
5. Outline the basic chemistry of microorganisms relevant in medicine.
 6. 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: IUPAC nomenclature. Classification of organic compounds. Organic structure representation; structural diagrams, condensed formulas, bond line notation, Newman projection, Fischer projections, Haworth projection, stereo projection. Electrophiles, nucleophiles and their reactions. Nomenclature, structures. physical and chemical properties and reactions of alkanes, alkyl halides, alkanes, alkynes, alcohols, aldehydes and ketones, ethers, esters. Covalent bond formation and molecular orbitals. Hydrogen, dative, hydrophilic and hydrophobic bonds. Carboxylic acids and amines. Aldol condensation and claisen reaction

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 hypovitaminoses
- 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. ATP, NADPH and other high energy compounds
- Carbohydrate metabolism; glycolysis, tricarboxylic acid cycle, anaplerotic reactions and glyoxylate cycle electron transport chain, oxidative phosphorylation, mitochondria shuttle system, gluconeogenesis, phosphogluconate pathway. Glycogen synthesis and glycogenolysis
- Lipid metabolism; fatty acid biosynthesis, beta oxidation, ketone bodies synthesis and utilization. Cholesterol 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

Cell Biology, molecular biology and genetics:

- Cell biology: Cell membranes, organelles, functions and disorders. Cell cycle, its regulation and disorders
- Molecular biology: DNA 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

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 OBJECTIVE

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 will 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) Describe 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; 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, 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, Donnan-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. 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 Coocoeptive tissues: The physiology of connective tissue proper- cells, fibres and ground substance. Interstitial fluid composition, function and disorders. Physiology of cartilage and bone: Functional organization, functions, metabolism and disorders. Composition and functions of synovial membranes and fluids
- Body fluids; Blood and the immune mechanisms: Blood composition and functions; plasma, serum, formed elements. and the immune system. Physiology of blood transfusion. 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 neonatal circulation; Circulation through special regions.
- Respiratory system: Functional organisation. Gas laws and physical properties of gases; Breathing, ventilation, lung volumes and capacities. Lung morphometry; Alveolar function; Air-blood barrier. Pulmonary circulation and ventilation perfusion ratios. Integrated control mechanisms and acid base balance. None one atmosphere respiratory function. Non respiratory functions of the lungs
- Gastrointestinal system: Functional organization and design. Humoral and neuromyogenic control of regional gut functions. Gut motility and secretion. Gastrointestinal intrinsic and extrinsic glands. Basic nutrition and regional metabolism. Appetite and satiety: regulation of food and water intake; Digestion, absorption, and assimilation
- 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 AND ETHICS (3 UNITS)

1. COURSE OBJECTIVE

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) Demonstrate knowledge of the psychological and social factors influencing patient behaviour.
- d) Describe the role of society in health and disease.
- e) Apply knowledge of the 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.
- What is personality?; 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; unemployment and health; labelling and stigma.

Illness and disability:

- Heart disease; social aspects of HIV/AIDS; cancer; anxiety; depression; inflammatory bowel disease; physical disability; learning disability; post traumatic stress disorder; diabetes; stress and health; respiratory; 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.

VI. NUTRITION AND DIETETICS COURSE (2 UNITS)

1. OBJECTIVE

This course aims at equipping students with knowledge on nutrition and its application in health and disease.

2. COURSE OUTCOMES

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

- a) define and explain the principles of nutrition and dietetics.
- b) discuss requirements for energy and other essential nutrients in relation to different phases of life, physiological conditions and disease.
- c) identify disease states resulting from malnutrition and describe aetiology, prevalence, manifestation and consequences.
- d) describe principal methods used in assessment and the indicators of the nutritional status of an individual, a family and the community.
- e) discuss the major means of tackling malnutrition at individual and community level, including nutrition interventions.
- f) discuss the relevance and applicability of international growth standards in growth monitoring.
- g) discuss the role of nutrition in the management of HIV / AIDS.

3. COURSE CONTENT

Introduction:

- a) Basic nutrition: Basic principles of nutrition and dietetics, Nutrients: Types, sources and role in the body; Social cultural factors in nutrition
- b) Generation, expenditure and storage of nutrients at the whole body level
- c) Digestion and absorption of nutrients
- d) Functions of essential nutrients
- e) Caloric and nitrogen balance

Nutrition in the life cycle:

Maternal nutrition in the life cycle Pregnancy and Lactation, Infant and Childhood Nutrition, Adolescents Nutrition, Nutrition of Older People

Malnutrition:

- b) Overview of causes
- c) Protein energy malnutrition (pEM); Nutritional Anaemia (IDA); Vitamin deficiency disorders and toxicities; mineral deficiencies and toxicities; Iodine deficiency disorders
- d) Malnutrition and infections
- e) Underlying causes of malnutrition (Food Security, Care and Public Health Factors)
- f) Synergism between malnutrition and infections and its effects on growth and development of children

Community 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

VII. HUMAN COMMUNICATION SKILLS (2 UNITS)

1. COURSE OBJECTIVE

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

2. COURSE OUTCOMES

- a) State and explain the theories and principles of relating to human communication
- b) Practice 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) Develop an awareness of and sensitivity to the patient's experience of illness and health care.

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.

PATHOLOGY AND LABORATORY MEDICINE

I. IMMUNOLOGY, MICROBIOLOGY AND PARASITOLOGY (11 UNITS)

A. MICROBIOLOGY AND PARASTITOLOGY (8 UNITS)

1. COURSE OBJECTIVE

To equip the student with knowledge of microbiology relevant to the practice of medicine

2. COURSE OUTCOMES

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

- a) Classify, characterize and give the pathophysiology of infections caused by medically important bacteria, viruses, parasites, fungi and ectoparasites.
- b) Apply the principles of sterilization and disinfection
- c) Demonstrate knowledge of the principles of antibiotic use and chemotherapy of bacterial, viral, parasitic, fungal and entomologic infections
- d) Outline the principles of public health bacteriology
- e) 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:

- a) Structure, composition, metabolism, physiology and regulation of bacteria
- b) Principles of bacterial genetics
- c) Pathophysiology of infection, virulence
- d) Antibiotics and chemotherapy of bacterial infections
- e) Principles and methods of sterilization and disinfection
- f) Pathogenic bacteria: Gram positive; Gram negative; Acid fast bacilli;
- g) Enterobacteriaceae; Anaerobes. Other bacteria: Spirochaetes, rickettsiae, Chlamydia, mycoplasma
- h) Public health bacteriology: Epidemiology and ecology. Bacteriology of food, water and sewage; food poisoning
- i) 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.
- j) 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:

- a) Classification, general properties related to viral families, physical and chemical properties
- b) Replication and cultivation of viruses
- c) Host response to viral infections
- d) Genetics
- e) Molecular basis of pathogenesis
- f) Latent and persistent infections
- g) Epidemiology
- h) Oncogenic viruses
- i) Principles of cultivation, assay and laboratory diagnosis, laboratory safety
- j) Pathogenic viruses: DNA viruses; RNA viruses
- k) Viral syndromes, HIV / AIDS and other viral sexually transmitted diseases; emerging viral infections including SARS
- l) Viral childhood fevers
- m) Viral CNS infections
- n) Viral skin manifestations
- o) Anti-retroviral agents and mechanisms of action (this section could be dealt with in pharmacology/internal medicine.)

Mycology:

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

Medical Parasitology:

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

Medical entomology:

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

B. IMMUNOLOGY AND IMMUNOPATHOLOGY (3 UNITS)

1. COURSE OBJECTIVE

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 effector 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; humoral and cellular immunity; diversity of immune response; damaging effects of the immune response; regulation of Immune response
- Elements of immune response: Immune response cells; lymphatic system; interrelationship between acquired and innate immunity
- Immunogens and antigens: Immunogenicity, primary and secondary immune response, antigenicity, antigen-binding sites, epitopes, major classes of antigens, cross-reactivity; immunologic adjuvants
- Antibody structure and function: Structure of light and heavy chains, immunoglobulin structural and biological characteristics, kinetics of the immune response, primary and secondary response
- Activation and function of T and B cells: Biology of the T and B lymphocytes, CD 4+ T cell functions, cytotoxic T-cell function, super antigens, B-cell activation and function, T-B cooperation, T-independent immune responses. Immune effector mechanisms
- Cytokines: actions and interactions in the immune responses; properties and functional categories; role in disease especially toxic shock syndrome, bacterial septic shock, cancers, autoimmunity; therapeutic applications of cytokines/cytokine receptors
- Complement systems: Classical pathway, alternate pathway, terminal pathway; biological activities of complement fractions; complement and disease
- Cell mediated immunity: Effector cells in CMI, effector responses, assessment of cell mediated cytotoxicity
- Hypersensitivity reactions: Type I (IgE-mediated) hypersensitivity, Type II (Antibody mediated), Type III (Immune complex-mediated), Type IV (Delayed type) hypersensitivity
- Control mechanisms in the immune response: Tolerance; immune regulation in the individual; immunologically privileged sites; immunosuppression by drugs and radiation

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 complement deficiency
- Transplantation immunology: Allograft rejection - Hyper acute acute and chronic rejection; histocompatibility antigens; tests for histocompatibility Ag's; prolongation of allograft survival; bone marrow 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: Active immunizations; basic mechanisms of protection; precautions; Current methods of vaccine production - Recombinant DNA vaccines, conjugated polysaccharides, synthetic peptide vaccines, anti-idiotypic vaccines, virus-carrier vaccine, toxoids; passive immunization; immunotherapy
- Immune assays and laboratory methods: Principles of antigen-antibody interactions; comparison of agglutination and precipitation reactions, direct binding and solid-phase immunoassays; Immunofluorescence, Fluorescence activated cell-sorting analysis; comparison of immunoadsorption and immuno adsorption, Monoclonal and genetically engineered antibodies

II. GENERAL AND SYSTEMIC PATHOLOGY (10 UNITS)

1. COURSE OBJECTIVES

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

2. COURSE OUTCOMES

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

- Describe the biology of tissues and their response to disease.
- Discuss the classification, biology, immunology, spread and effects and diagnosis of tumours.
- Demonstrate knowledge of pathology as relates to genetic/congenital and acquired disorders of the various body systems.
- Accurately determine causes of death.
- 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, irradiation etc) and adaptation
- Inflammation: acute inflammation - mediators, effects, cellular components, chemo taxis, phagocytosis, vascular responses, chemical mediators, systemic manifestations; chronic inflammation
- Repair, regeneration and degeneration e.g. 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 and immunologic, toxic disorders involving metabolic, physiologic or regulatory processes traumatic, degenerative disorders, neoplasms of:

- a) Central and peripheral nervous systems
- b) Skin, bone and connective tissue
- c) Respiratory system
- d) Cardiovascular system
- e) Gastrointestinal system
- f) Renal/urinary system
- g) Reproductive system
- h) Endocrine system
- i) Pathology of HIV / AIDS disorders, vascular disorders.

III. HAEMATOLOGY AND BLOOD TRANSFUSION (4 UNITS)

1. COURSE OBJECTIVE

To equip the student with knowledge of haemopoietic and lymphoreticular disorders and their management.

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 of haemostatic defects.
- e) Apply principles of blood transfusion and use of blood products.
- f) Describe and classify the benign leucocytes abnormalities.
- g) Describe neoplastic hematological disorders and outline their management.

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 vessel endothelium, coagulation factors, fibrinolysis, natural inhibitors of coagulation.
Laboratory evaluation of blood coagulation
- 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 extracorporeal causes (e.g. immune haemolytic anaemias, parasitic causes, mechanical fragmentation); Anaemia of chronic disease: Bone marrow failure: aplastic anaemia, pure red cell aplasia; Hypersplenism; Laboratory evaluation
- Polycythaemias
- Haematology of HIV/AIDS

Benign leucocyte disorders:

- Leucopenia: Hereditary and acquired causes; reactive leukocytosis, leukamoid reaction

Disorders of haemostasis and coagulation:

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

Neoplastic disorders:

- a) Acute leukaemias -acute lymphoblastic leukaemia, acute myeloid leukaemia
- b) Chronic myeloproliferative disorders - Chronic myeloid leukaemia, myelofibrosis, polycythaemia vera and essential thrombocythaemia
- c) Lymphoproliferative disorders especially chronic lymphocytic leukaemia, lymphoma, multiple myeloma

a) Blood transfusion

1. Clinical indications and use of blood and blood components/products
2. Compatibility testing
3. Transfusion complications; investigation and management of transfusion reactions.

IV. CLINICAL CHEMISTRY (3 UNITS)

1. COURSE OBJECTIVE

This course aims at equipping 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:

1. Handle specimens, interpret results and apply principles of quality assurance
2. Describe the biochemical basis of normal and abnormal metabolic, physiologic and regulatory pathways
3. Demonstrate knowledge of the biochemical assessment of organ systems
4. Describe the biochemistry of neoplastic disorders
5. Describe the principles of clinical toxicology
6. Demonstrate knowledge of laboratory methods 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 regulatory pathways:

- a) Fluid and electrolyte balance: body fluid distribution and regulation; acid base balance
- b) Endocrinology especially anterior Pituitary function, adreno-cortical function, thyroid
- c) Bone metabolism
- d) Plasma enzymes: isoforms and isoenzymes, clinical enzymology
- e) Plasma lipids, serum proteins
- f) Purine metabolism
- g) Biochemical assessment of renal, hepatic, gastric and pancreatic function
- h) Porphyrins and porphyrynia
- i) Vitamins, trace elements

Disorders involving metabolic, physiologic or regulatory pathways:

- a) Disorders of carbohydrate metabolism: Diabetes mellitus and hypoglycaemia
- b) Disorders of lipid and lipoprotein metabolism: hyperlipidaemias
- c) Disorders of protein metabolism: Protein energy malnutrition

- d) Purine metabolism disorders; gout
- e) Disorders of fluid and electrolytes: acid base and electrolyte imbalance
- f) Renal disorders: Biochemical tests in acute and chronic renal failure, renal osteodystrophy, biochemical monitoring of dialysis and renal transplant patients, renal calculi
- g) Liver disorders: Jaundice and classification
- h) Inherited metabolic disorders
- i) Iron metabolism in health and disease
- j) Principles of Clinical toxicology: chemical poisoning including drugs, management of poisoning, therapeutic drug monitoring
- k) Biochemistry of neoplastic disorders: Biomarkers, paraneoplastic endocrine syndromes, ectopic hormone production
- l) Laboratory methods in Clinical Chemistry.

POPULATION HEALTH, HEALTH SYSTEMS AND RESEARCH

I. BIOSTATISTICS AND DEMOGRAPHY(2 UNITS)

1. COURSE OBJECTIVE

This course aims at equipping the students with knowledge of the principles of biostatistics and their application to health care 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.

3. COURSE CONTENT

Introduction to basic concepts and terminologies:

- a) 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
- b) Sampling methods and sample size; Sampling distribution; distribution of sample mean; population parameters and sample statistics; estimation of standard error
- c) 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 (χ^2 test); comparison of means (student's t-test, z-test, paired t-test etc)
- d) Introduction to design of experiment:
- e) One way analysis of variance

Biostatistics in health care delivery and research:

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

II. EPIDEMIOLOGY (3 UNITS)

1. COURSE OBJECTIVE

The aim of this course is to equip the student with knowledge of disease occurrence and its' determinants

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:

- a) Epidemiologic concepts: definition; scope; variations in severity of disease; methods of disease causation
- b) Descriptive epidemiology ("Person, Time and Place"); measures of morbidity and mortality; incidence and prevalence rates; crude, specific, and adjusted rates; classification of causes of death and their limitations
- c) Determinants of disease transmission and causation; host, agent, and environmental factors; natural history of disease; levels of disease prevention
- d) Screening of diseases and maintenance of health. Purposes of screening
- e) Screening tests: sensitivity; specificity; predictive values

Epidemiology in medical practice and research:

- a) Disease surveillance and outbreak investigation: definition of outbreak and epidemic; attack rate; investigation of disease outbreaks
- b) Epidemiologic methods: observational studies- cross sectional, cohort, case control, case series, community surveys. Experimental study designs (Clinical trials, community intervention trials)
- c) 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:

- a) Measurements: relative risk; risk ratio; odds ratio; attributable risk; confidence intervals; sensitivity; specificity; validity.
- b) 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 OBJECTIVE

This course aims at equipping the student with the knowledge of the relationship between the environment and health.

2. COURSE OUTCOMES

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

- a) Describe the principles and concepts 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/international environmental regulatory frameworks

3. COURSE CONTENT

Principles of Environmental Health:

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

Water and Health:

- a) 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

- b) Biochemical Water Related Health Conditions: Fluorides in water, dental and skeletal fluorosis conditions; Implications of fluoridation and de-fluoridation of drinking water; Appropriate interventions
- c) 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:

- a) Classification of solid wastes; Generation points (sources) and storage; Collection, transportation and disposal methods; Health problems associated with solid wastes
- b) Human Excreta Disposal Systems: Rural excreta disposal methods; Health implications of each system; Advantages and disadvantages of each system; Intervention methods
- c) Municipal and County Excreta Disposal systems: Peri-urban and urban (municipal) 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; Sources and types of 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. 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 from point a to z; 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 OBJECTIVE

This course aims at equipping the students with knowledge to understand 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 concepts and 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:

- a) Concepts and Principles of Occupational Health
- b) Vulnerable groups in Occupational Health

Specific hazardous agents in work environment:

- a) Chemical hazards
- b) Biological hazards eg. blood borne pathogens
- c) Physical agents
- d) Psychosocial hazards eg. Stress
- e) Ergonomic hazards

Aims and Functions of Occupational Health Services:

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

Occupational diseases and accidents:

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

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).

V. COMMUNITY MEDICINE

This element is to be developed by specialists who have a good knowledge of community medicine.

VI. HEALTH SERVICES MANAGEMENT (3 UNITS)

1. COURSE OBJECTIVE

The aim of this unit is to equip the student with knowledge and skills required for the effective management 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 management.
- b) Describe the organization and management of health services.
- c) Describe the health management information system.
- d) Apply practical approaches to improvement of health care.

3. COURSE CONTENT

Principles and theories of management:

- a) Management concepts
- b) Essence of management in health care
- c) Management functions
- d) Problem solving and decision making

- e) Roles and styles of management and leadership
- f) Organizational structures
- g) Team building
- h) Management cycle: Planning, implementation, monitoring and evaluation

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; Managing change

Performance improvement:

- a) Performance appraisal
- b) Quality management
- c) Operations management.

VII. INTRODUCTION TO ENTREPRENEURSHIP (I UNIT)

1. COURSE OBJECTIVE

To equip students with knowledge to understand what is entrepreneurship and to develop entrepreneurial skills that may contribute to their well being in later life.

2. COURSE OUTCOMES

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

- a) Demonstrate knowledge of 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

- a) 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
- b) Core elements of starting new businesses: financial projections and modelling; business development and sales strategies; the investment process; creating and communicating a business plan
- c) New Venture Finance: private equity; investing in private companies, and entrepreneurial finance, the financial tools most relevant to young companies

VIII. RESEARCH METHODOLOGY AND RESEARCH PROJECT (6 UNITS)

1. COURSE OBJECTIVE

This course aims at equipping 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) Distinguish and describe different types of research
- c) Differentiate and explain different research designs and methods
- d) Design research instruments
- e) 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:

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

Proposal design:

- a) Research instruments: questionnaires, interview guides; characteristics and application
- b) 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:

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

IX. HEALTH SERVICES ATTACHMENT (4 UNITS)

1. COURSE OBJECTIVE

The overall aim of this course is to expose the student to the practical aspects of the overall functioning and management of the health and health care systems in a district.

2. COURSE OUTCOMES

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

1. Describe the various aspects of health services of a district.
2. Participate in and be able to explain the delivery of health services in a district.
3. Conceive research questions and conduct a rapid assessment that provides practical solutions to operational bottlenecks within the district.

3. CONTENTS

District Health Services:

Organization, management and delivery of the district health services. Role of the Medical Officer (MO); role of the District Medical Officer of Health (DMOH) and other members of the DHMT; 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; programme implementation; assessment of effectiveness.

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 district levels: Centre for Disease Control (CDC); World Health Organization (WHO); Medical Practitioners and Dentist Board; Pharmacy and Poisons Board; Provincial Health Management Teams (PHMT); District Development Committees (DDC); District Health Management Teams (DHMT); District Health Management Boards (DHMB); Hospital Management Teams (HMT).

Integrated programmes:

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

CLINICAL COURSES

I. PHARMACOLOGY AND THERAPEUTICS (6 UNITS)

A. Basic Pharmacology

1. COURSE OBJECTIVES

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

- Demonstrate knowledge of the general principles of pharmacodynamic and pharmacokinetic processes
- Describe the general properties of autacoids and their role in inflammation
- Demonstrate knowledge of neurotransmitter and endocrine pharmacology
- Demonstrate knowledge of the use of antimicrobials, anti neoplastic and Anti hormonal agents

2. 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
- Regulatory issues(eg drug development, scheduling)

Factors altering drug effects:

- Individual: disease, physiological conditions- age, pregnancy, gender,obesity, compliance, dependance,
- Drug interactions and pharmacogenetics; side effects, overdosage, toxicology
- Drug metabolism in liver, intestine, kidney, lung, brain

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

- c) Viral infections and their treatment including Herpes, Varicella and HIV
- d) Fungal infections including dermatophytes and *Candida albicans* and treatment with amphotericin and azole agents
- e) Treatment of protozoal infections, including malaria. Helminths and arthropods, especially tropical issues such as schistosomiasis, filariasis
- f) Tropical diseases: malaria, tuberculosis, leprosy, trypanosomiasis, leishmaniasis, public health issues

Cancer Drugs (Anti-neoplastic agents):

- a) Introduction and principles of chemotherapy. The mechanisms of action, uses and limitations of the major groups of chemotherapeutic agents, e.g. alkylating and cross linking agents, anti-metabolites, topoisomerase inhibitors, spindle inhibitors and biologicals. New and future therapies
- b) Immunomodulation, monoclonal antibodies and conjugates, pro-drugs, vaccines, gene and RNA targeting, aptamers, gene therapy, DNA repair and resistance inhibition. Novel delivery systems
- c) Inhibition of angiogenesis and the metastatic cascade
- d) Radiation and chemotherapy sensitizers and protectors

B. Clinical pharmacology

1. COURSE OBJECTIVE

This course aims at enabling the student have a critical view that will facilitate the rational selection and prescription of drugs

2. COURSE OUTCOMES

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

- a) Demonstrate knowledge of the therapeutic principles of the drugs used in the treatment of disease in the various systems of the body. They should know the details of:
 - a. Broad mechanisms of action
 - b. Main therapeutic indications
 - c. Adverse effects
 - d. Clinically significant drug interactions
- b) Demonstrate rational evidence based use of drugs
- c) Demonstrate knowledge of the principles of prescription writing and monitoring of patient compliance

3. COURSE CONTENT

Cardiovascular drugs:

- a) Antihypertensive drugs. Diuretics, vasodilators, ACE inhibitors, AT1, antagonists, -adrenoceptor blockers; -adrenoceptor antagonists, calcium entry blockers and CNS active drugs, endothelin antagonists, endopeptidase inhibitors
- b) Ischaemic heart disease and its treatment; nitrates, -adrenoreceptor blockers and calcium channel blockers
- c) Lipid lowering drugs :statins, cholestyramine, nicotinic acid and ACA T inhibitors
- d) 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
- e) Heart failure: ACE inhibitors, I-blockers, adrenoceptor antagonists, inotropic agents and vasodilator drugs in the treatment of heart failure
- f) Anticoagulant therapy - warfarin, heparin, ximelagatran; Fibrinolytic mechanisms.
- g) Pharmacology and therapeutic role of streptokinase and tissue plasminogen activator (tPA)
- h) Anti-platelet drugs and their use in vascular embolic disease
- i) Treatment of anaemia (Haematopoietic agents).

Dermatological drugs:

- a) Acne treatment; keratolytics, comedolytics, antibiotics, retinoids
- b) Psoriasis - inflammatory and hyperproliferative nature of the disease. Use of topical vitamin D

- analogues, corticosteroids, dithranol; use of intravenous therapy in resistant cases
- c) Alopecia: minoxidil; anti-androgens; antimicrobials and antineoplastics. Endocrine and Reproductive Drugs (Hormones and hormone antagonists)
- d) Drug treatment of diabetes mellitus: Insulin and oral hypoglycaemics
- e) Hormones of the pituitary and hypothalamus; Drugs suppressing prolactin release: vasopressin and analogues
- f) Drugs used in thyroid diseases
- g) Corticotrophin and adrenal steroids
- h) Drugs affecting calcium homeostasis; Osteoporosis and Paget's disease. Use of calcitonins, bisphosphonates, oestrogen receptor modulators, vitamin D analogues; calcium
- i) Hormone replacement therapy; Contraceptive drugs; oestrogens and progestogens. Mechanism of contraceptive action
- j) Drugs affecting the uterus - uterine relaxants and stimulants
- k) Anabolic/androgenic steroids - use and abuse
- l) Antimicrobials and antineoplastics.

Gastrointestinal drugs:

- a) Drugs for peptic ulcer disease - antacids, cytoprotective agents, H₂ antagonists and proton pump inhibitors. Antibiotic treatment to eliminate H. pylori
- b) Drugs for motility disorders - stimulants and anti-spasmodics
- c) Drugs for nausea and vomiting - dopamine antagonists, antihistamines, anticholinergics and 5HT₃ antagonists
- d) Laxatives - bulking agents, stool softeners, stimulant and osmotic laxatives.
- e) Anti-microbial, immunosuppressive and anti-neoplastic agents.
- f) Agents used for Biliary and Pancreatic Disease; pancreatic enzymes

Genitourinary drugs:

- a) Drugs for urinary incontinence - anticholinergics, antidiuretic hormone analogues
- b) Drugs for benign prostatic hypertrophy - α blockers and 5-reductase inhibitors. Antiandrogens and prostate cancer
- c) Drugs for -erectile dysfunction - phosphodiesterase inhibitors; treatment of impotence; anti-microbial agents; immunosuppressive and anti-neoplastic agents.

Anti-inflammatory / Musculoskeletal drugs:

- a) Anti-inflammatory drugs: non-steroidal anti-inflammatory drugs (NSAID); glucocorticoids as anti-inflammatory agents; second-line antirheumatic drugs
- b) 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):

- a) Analgesics: Narcotic and non-narcotic; local and central analgesia
- b) Anaesthetics: local and general, inhalational and intravenous anaesthetics
- c) Anti-convulsants
- d) Hypnotics and sedatives: the barbiturates, benzodiazepines, non-benzodiazepine anxiolytics and sedatives
- e) Psychopharmacologic agents (e.g antidepressants, mood stabilizers, antipsychotic agents); stimulants (e.g amphetamines)
- f) Antiparkinsonian drugs
- g) Skeletal muscle relaxants; neuromuscular blocking agents; antiglaucoma drugs; anti-inflammatory agents
- h) Antimicrobial; immuno-suppressive and antineoplastic drugs
- i) Management of drug dependence

Respiratory Drugs:

- a) Decongestants; cough suppressants and expectorants; anti-microbial agents

- b) Pharmacotherapy of asthma - bronchodilators; b-agonists, xanthines, anticholinergics, leukotriene receptor antagonists. Anti-inflammatory drugs-corticosteroids, cromoglycate, etc. Use of longer acting b-agonists
- c) Pharmacotherapy of chronic obstructive pulmonary disease. - chronic bronchitis, emphysema and smoking
- d) Immunosuppressive and anti-neoplastic agents.

Clinical Toxicology:

- a) Concepts of drug toxicology: Therapeutic index; adverse drug reactions; "predictable" versus unexpected toxic actions of drugs
- b) Non-drug toxicology, industrial and environmental toxicants. (Heavy Metals and Heavy-metals Antagonists, Non-metallic Environmental Toxicants: Air pollutants, Solvents and Vapours, and Pesticides)

II. CHILD HEALTH AND PAEDIATRICS (12 UNITS)

1. COURSE OBJECTIVE

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

2. COURSE OUTCOMES

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

- a) Describe normal growth and development of children and adolescents
- b) Demonstrate ability to elicit and document a comprehensive paediatric history
- c) Demonstrate ability to perform and document a comprehensive paediatric physical and mental examination
- d) Make a diagnostic formulation from the clinical data
- e) Correctly perform routine clinical procedures, carry out appropriate diagnostic tests and interpret the results
- f) Demonstrate ability to participate in the management of common paediatric health problems
- g) Apply preventive measures and carry out health promotion
- h) Apply research principles in solving paediatric health problems

3. COURSE CONTENT

Normal growth and development of children and adolescents:

- a) Normal growth and development stages; components; assessment of growth and development; cognitive and psychosocial development
- b) 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; feeding history; socio-economic history; growth and development; childhood illnesses; use of appropriate non-patient information sources; summarized history

Comprehensive paediatric examination:

including vital signs, general examination, systemic and mental examination

Routine clinical procedures and investigations:

Indications; limitations; potential complications; 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; 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.

Data Interpretation:

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

Management of the sick child:

- a) Designing of an appropriate comprehensive management plan for health problem diagnosed
- b) Patient monitoring: vital signs, biochemical parameters
- c) Consultation and referrals
- d) Clinical use of pharmacotherapeutic agents and other therapeutic modalities In children.
- e) Counselling
- f) Palliation and care of the terminally ill child
- g) Comprehensive care of paediatric HIV
- h) 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.

Common paediatric health problems:

- a) Scientific basis of illness; anatomical; biochemical; microbiological; pathologic;
- b) Sick child; abnormal growth and development; pathophysiology of disease; care for the sick child; care for the terminally ill child
- c) Common paediatric disorders including: malaria; HIV; anaemia; acute respiratory infections; diarrhoeal and vomiting; nutritional disorders and immunizable diseases; paediatric emergencies.
- d) Systemic paediatric disorders; congenital; infective; traumatic; immunologic; metabolic; neoplastic; degenerative; genetic and impact of environmental factors in disease conditions of the systems:
 - i. Respiratory; congenital, inflammatory and infective, immunologic, neoplastic. Neoromuscular; congenital, inflammatory and infections of the brain and meninges, seizure disorders, cerebral palsy, muscle and spinal cord disorders.
 - ii. Reproductive; congenital, inflammatory and infections of the reproductive system, immunologic, neoplastic conditions.
 - iii. Urinary; congenital, inflammatory and infections of the urinary system, immunologic (including nephrotic syndrome), neoplastic conditions.
 - iv. Haematologic and oncologic disorders; anaemias, haemorrhagic disorders, leukemias, solid tumours of childhood.
 - v. Cardiovascular; congenital, inflammatory and infections including rheumatic heart disease and infective endocarditis, cardiac failure
 - vi. Endocrine; hormonal disfunctions including thyroid disorders, diabetes mellitus, growth disorders, precocious puberty.
 - vii. Skin and integumentary; congenital, inflammatory and infections of the skin and connective tissues including atopy, urticaria and dermatoses.
 - viii. Behaviour and psychiatric disorders; phobias; hysteria; anxiety; antisocial behaviour; truancy; drug abuse; behaviour problems associated with physical illness; neurotic and psychotic disorders.
 - ix. Adolescent medicine; neurosis; behaviour disorders; alcohol and substance abuse; psychotic disorders; hysteria; adolescent psychiatry

Prevention and Health Promotion:

- a) Recognition of genetic predisposition, ethnic/cultural, and environmental factors that influence health of children.
- b) Screening programmes
- c) Immunization programmes: EPI schedules
- d) Appropriate and timely intervention programmes
- e) Advocacy for right to health of children
- f) Prevention of disease

Research and Ethics:

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

III. INTERNAL MEDICINE (12 UNITS) COURSE

1. OBJECTIVE

The overall objective of this course is to familiarize students with the general and specific areas of all aspects of internal medicine.

2. COUSE OUTCOMES

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

- a) Discuss basic principles of internal medicine
- b) Elicit a focused medical history and perform a comprehensive physical and mental examination
- c) Make a diagnostic formulation from the clinical data
- d) Order appropriate and rational investigations
- e) Correctly perform routine clinical procedures and carry out basic laboratory investigations
- f) Demonstrate ability to participate in the management of the common disorders in internal medicine

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 e.g. 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.

Routine clinical procedures and investigations:

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

Management of Medical Disorders:

- a) Designing an appropriate comprehensive treatment plan for the problem diagnosed; supportive treatment and optimization of the patient; definitive treatment; medical prophylaxis
- b) Patient monitoring; vital signs; laboratory parameters
- c) Consultation and referrals
- d) Rational use of pharmacotherapeutics; other therapeutic modalities
- e) Counselling
- f) Palliation and care of the terminally ill

Common disorders in internal medicine:

a. Respiratory diseases:

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

b. Cardiovascular disorders:

- i. Acute rheumatic fever and rheumatic heart disease
- ii. Valvular heart disease
- iii. Heart failure; chronic and acute including cardiogenic shock
- iv. Arterial hypertension; hypotension
- v. Coronary artery disease: risk factors; clinical syndromes i.e. stable coronary disease, acute coronary syndromes; prevention
- vi. Pericardial disease; acute pericarditis, constrictive pericarditis, pleural effusion and tamponade
- vii. Venous thromboembolism; DVT, pulmonary embolism
- viii. Myocardial diseases; myocarditis, cardiomyopathies (dilated, hypertrophic, restrictive)
- ix. Pulmonary hypertension; primary, secondary e.g. cor pulmonale
- x. Infective endocarditis
- xi. Dysrhythmias
- xii. Peripheral artery disease
- xiii. HIV / AIDS associated cardiovascular disorders
- xiv. Congenital heart disease

c. Endocrine and metabolic disorders:

- i. Pituitary and hypothalamic disorders; diabetes insipidus, inappropriate secretion of ADH, hypopituitarism, acromegaly
- ii. Thyroid disorders; hypothyroidism, hyperthyroidism, thyroiditis
- iii. Parathyroid disorders; hyperparathyroidism, hypoparathyroidism; metabolic bone disorders.
- iv. Disorders of glucose metabolism: diabetes mellitus; acute and chronic complications, hypoglycaemia
- v. Obesity and the metabolic syndrome
- vi. Adrenal disorders; Cushing's syndrome, hyperaldosteronism, corticoadrenal insufficiency, hypoaldosteronism, pheochromocytoma.
- vii. Disorders of lipid metabolism
- viii. Disorders of the sex hormones
- ix. Neoplastic disorders; ectopic hormone production

d. Neurological disorders:

- i. CNS infections; meningitides, encephalitis, cerebral abscess, neurosyphilis, poliomyelitis, Guillain-Barre syndrome
- ii. Neurological manifestations of HIV / AIDS
- iii. Cerebrovascular disorders (e.g. cerebral infarctions; haemorrhages; aneurysms; cavernous sinus thrombosis)
- iv. Seizure disorders
- v. Degenerative disorders eg. Alzheimer's disease, Parkinson's disease, myotrophic lateral sclerosis
- vi. Demyelinating disorders eg. multiple sclerosis
- vii. Diseases of peripheral nerves
- viii. Diseases of the spinal cord and spinal nerve roots
- ix. Congenital anomalies
- x. Neoplasms
- xi. Diseases of muscle and the neuromuscular junction
- xii. Paroxysmal disorders e.g. headache, trigeminal neuralgia
- xiii. Metabolic and nutritional deficiencies e.g. thiamine and cyanocobalamin deficiency
- xiv. Symptoms and signs of ill defined conditions; coma, delirium, confusion, dementia, syncope, ataxia, sleep disorders.

e. Gastro-enteric disorders:

- i. Oesophageal disorders; esophagitis, GERD, motility disorders, oesophageal varices, hiatus hernia, peptic ulcer, gastritis
- ii. Pancreatitis; acute, chronic
- iii. Hepato-biliary disease; Hepatitis; liver cirrhosis; metabolic liver disease; liver failure; portal hypertension; Jaundice, prehepatic, hepatic, post hepatic; cholecystitis and cholelithiasis.
- iv. Small and large bowel disease; Crohn's disease, ulcerative colitis malabsorption syndromes,

- diarrhoeal disease, parasitic infestations food poisoning
v. Peritonitis, ascites

f. Renal disorders:

- i. Pyelonephritis, cystitis, urethritis, prostatitis, glomerulonephritis, interstitial nephritis, transplant rejection; traumatic and mechanical disorders
- ii. Disorders involving metabolic, physiological, or regulatory processes: renal failure, cortical and medullary necrosis, nephrotic syndrome, tubular disorders, disorders of collecting system, renal calculi
- iii. 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

g. Rheumatological disorders:

- i. Rheumatoid arthritis, osteoarthritis, septic arthritis, osteomyelitis, polymyalgia rheumatica,
- ii. Neoplastic disorders: osteoporosis, crystal arthropathies e.g. gout, osteomalacia, systemic lupus erythematosus and other connective tissue diseases

h. Haematopoietic and Lymphoreticular disorders:

- i. Anaemias; Iron deficiency, megaloblastic anaemias (B 12 and folate deficiency), haemolytic, anaemia of chronic illness, pancytopenia
- ii. Haemolytic disorders eg. sickle cell anaemia
- iii. Bone marrow suppression
- iv. Disorders of haemostasis; coagulopathies and platelet disorders e.g. Haemophilia, von Willebrand's disease, DIC, ITP
- v. Neoplastic disorders; Acute and chronic leukaemias, lymphomas, multiple myeloma, polycythaemia rubra vera
- vi. Transfusion and transfusion reactions. Infectious diseases and HIV/AIDS
- vii. Epidemiology; prevention, clinical and community; socio-economic and cultural dimensions
- viii. Mechanisms of disease; aetiology, transmission, pathology, pathogenesis, natural history, behavioural and socio-cultural determinants, clinical course and complications
- ix. 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
- x. Specific infections, mainly covered under organ systems
- xi. Principles of management and anti microbial treatment
- xii. Acute or emergency problems; septicaemia, septic shock; the immuno compromised host
- xiii. Fever of unknown origin

i. Oncology (neoplastic disorders)

- i. 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
- ii. Emergency medicine: Aetiology, pathology, diagnosis, treatment, rehabilitation prevention and epidemiology of common medical emergencies; Epistaxis, airway obstruction, status asthmaticus, tension pneumothorax, pulmonary oedema, acute respiratory failure, pulmonary embolism, shock, arrhythmias, anaphylactic reactions, Diabetic ketoacidosis, hypoglycaemia, thyroid storm, adrenocortical crisis, urinary retention, hyperkalaemia, hyponatraemia, acute renal failure, status epilepticus, acute complicated malaria, acute psychotic state, meningitis, cavernous sinus thrombosis, cerebrovascular accident, the unconscious patient, acute poisoning, sickle cell crisis, septicaemia, snake bites, haemoptysis, haematemesis, hypertensive emergency, acute coronary syndromes.

j. Health Promotion in Medicine

- i. Factors influencing the medical care of individuals and community; Socio-economic, cultural, familial, psychological, economic, environmental, legal, political and spiritual factors.

- ii. Advocacy
- iii. Prevention of diseases and accidents
- iv. Medical appliances
- v. Role of research

IV. REPRODUCTIVE HEALTH (12 UNITS)

1. COURSE OUTCOMES

By the end of the clerkship, the student shall be able to:

- a) Demonstrate the knowledge required for the solid scientific foundation of obstetrics and gynaecology and apply this knowledge to solve medical problems
- b) Comprehensively clinically evaluate patients with and initiate investigations for common obstetric and gynaecological conditions
- c) Offer skilled attendance at normal delivery and detect the common complications of pregnancy, labour and the puerperium; and provide safe emergency management for such complications
- d) Diagnose common gynaecological conditions and institute emergency management of such conditions
- e) Perform procedures for common obstetric and gynaecological conditions safely
- f) Consult OBGYN specialists and refer cases to them appropriately
- g) Work as a leader of a multi-professional reproductive health team
- h) Identify training needs of and implement on the job training for other members of the reproductive health team
- i) Identify community's reproductive health information needs and implement user friendly approaches to respond to such community needs
- j) Develop, implement simple research proposals aimed at informing care policy on common reproductive health problems and disseminate findings

2. COURSE CONTENT

- a) 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
- b) 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,
- c) 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
- d) Vulvovaginitis; salpingitis; pelvic inflammatory disease; toxic shock syndrome; mastitis; breast abscess; orchitis; epididymitis; sexually transmitted diseases, (including HIV/AIDs), abnormal vaginal bleeding, genital tract. trauma; prolapse and incontinence
- e) Gynaecological malignancies: Tumors of the uterus, cervix, ovaries, breast, testis; Radiotherapy and chemotherapy; investigations: PAP smear, colposcopy
- f) Menstrual disorders; infertility; polycystic ovarian disease; endometriosis; sexual dysfunction; IVF and related techniques; Treatment of menstrual disorders; hormone replacement; antimicrobials; antineoplastics; Family planning and pregnancy; population dynamics, the FP programmeme
- g) Catheterization; Rupture of membranes; Normal deliveries; Resuscitation of the newborn; Apgar scoring; Episiotomy and repair; Repair of perineal tears; Clinical pelvimetry; NG-tube insertion; Manual vacuum aspiration; Speculum examination; Pap smear ;Insertion and removal of IUCDs; Venepuncture--Induction of labour; Vacuum delivery; Breech delivery; Breech extraction; Amniocentesis; Paracentesis; Culdoscentesis; HSG; Laparotomy for ectopic pregnancy; Manual

- removal of placenta; McDonald stitch insertion; Minilap BTL; Caesarean section; Oophorectomy; Myomectomy; Drainage of pelvic abscess
- h) Communication skills, feedback, adult learning techniques
 - i) Research methods: quantitative studies- cross sectional, case control, cohort, clinical trials, community trials, qualitative studies - rapid appraisal procedures, research proposal writing

V. GENERAL SURGERY (12 UNITS)

1. COURSE OBJECTIVE

This course is designed to equip the student with the knowledge and skills to manage individual and community surgical problems.

2. COURSE OUTCOME

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

- a) Discuss the principles of surgery
- b) Demonstrate ability to elicit and document a medical history in a surgical patient
- c) Demonstrate ability to perform and document a physical and mental examination in a surgical patient
- d) Make a diagnostic formulation from the clinical data
- e) Correctly perform routine clinical procedures, carry out appropriate diagnostic tests, and interpret the results
- f) Demonstrate ability to participate in the management of common surgical problems
- g) Apply preventive measures and carry out health promotion
- h) Apply research principles in solving surgical problems

3. COURSE CONTENT

a. 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.

b. 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.

c. Routine clinical procedures and investigations:

Indications, complications and limitations of: venopuncture including blood cultures; starting a peripheral venous access: basic CPR; control of external haemorrhage; insertion of nasogastric tube; sterile techniques; universal precautions; injections; urethral catheterization; fundoscopy; suturing of lacerations; lumbar puncture; incision and drainage of superficial lesions; rectal examination; biopsy of superficial and easily accessible lesions; ascitic tap, abdominal paracentesis; diagnostic peritoneal lavage; thoracocentesis.

d. Data Interpretation:

Laboratory tests; haematology, blood chemistry, urine biochemistry, microbiologic tests, arterial blood gases; coagulation studies; CSF studies; endocrinologic tests; basic imaging studies.

e. Management of surgical disorders:

- i. Designing an appropriate comprehensive treatment plan for the surgical problem diagnosed; supportive treatment and optimization of the surgical patient; definitive treatment; surgical prophylaxis.
- ii. Patient monitoring; vital signs; biochemical parameters;

- iii. Consultation and referrals
- iv. Rational use of pharmacotherapeutics; other therapeutic modalities
- v. Counselling
- vi. Palliation in surgery and care of the terminally ill

f. Common surgical disorders:

Acute abdomen; intestinal obstruction; hernias; gastro-intestinal tract bleeding; carcinoma of the breast; burns; goitre; appendicitis; obstructive jaundice.

g. Systemic surgical disorders:

- i. Gastro-intestinal tract: congenital; dysphagia; foreign body; caustic burns; peptic ulcer disease; intestinal tract perforation; neoplasms; hepatobiliary disorders; peri-anal lesions; trauma
- ii. Cardiovascular: congenital vascular lesions; complication of arterial diseases; trauma to vessels and heart; aneurysms; varicose veins and varicose ulcers; arteriovenous shunts. Endocrine system: congenital disorders; thyroid and parathyroid glands; adrenal glands among others
- iii. Genito-urinary systems; congenital disorders; obstructive uropathy; haematuria, malignancies; acute scrotum; trauma
- iv. Nervous system: congenital lesions; space occupying lesions; head injury; cord compression.
- v. Respiratory system: congenital lesions; chest injury + complications; empyema thoracis; foreign body in bronchus
- vi. Skin and integumentary; congenital skin lesions, benign and malignant lesions, basic reconstructive skin surgery

h. Preventive and Health Promotion in surgery:

- i. Recognition of genetic predisposition, ethnic/cultural factors, occupational risks, exposure and lifestyle
- ii. Screening programmes
- iii. Immunization programmes
- iv. Behaviour modification
- v. Appropriate and timely intervention programmes
- vi. Advocacy for right to health of individuals and community
- vii. Educational programmes and other interventions
- viii. Prevention of disease

i. Research in health:

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

VI. MEDICAL ETHICS, PROFESSIONAL CONDUCT AND MEDICO-LEGAL ISSUES (3 UNITS)

1. COURSE OBJECTIVE

The main objective of this course is to familiarise students with the 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.
- d) Discuss the concept of Life, Death, Dying and Killing
- e) Apply ethical principles in Medical research
- f) Recognize vulnerabilities created by the duties of doctors and medical student
- g) Interpret the National and International Codes and Relevant Acts of Parliament relating to the practice of medicine

3. COURSE CONTENT

Ethical principles and values:

- a) Definitions: ethics, morality, professionalism; characteristics of profession
- b) 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; battery and negligence
- c) The clinical relationship: truthfulness, trust, and good communication-Ethical limits of paternalism; building trust; honesty, courage, and other virtues in clinical practice; narrative and the importance of communication skills
- d) 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:

- a) 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
- b) Mental disorders and disabilities: Ethical and legal justifications for detention and treatment without consent; conflicts of interests between patient, family, and community

Human reproduction and emerging issues:

- a) Ethics and the legal status of the embryo/foetus; maternal foetal relationship; assisted conception; abortion, including prenatal screening
- b) Sterilisation; pre and postnatal screening and testing: informed consent and the interests of the future child
- c) The 'New Genetics: 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

Life, death, dying and killing:

- a) 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: transplantation
- b) Euthanasia and assisted suicide
- c) Transplantation
- d) Death certification

Medical research:

- a) Individual rights, moral tension, 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;
- b) Ethical and legal tensions in doing medical research on patients, human volunteers, vulnerable groups, and animals; the need for effective regulation

Professional vulnerabilities:

- Public expectations of medicine; 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.

Codes and Acts:

- a) National: Medical practitioners' and Dentists' Act; Public Health Act; The Human Anatomy Act;
- b) 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

SPECIAL SUBJECTS

I. FORENSIC MEDICINE AND APPLIED TOXICOLOGY (2 UNITS)

- a) Statutory provisions for autopsy; exhumation laws and procedures; contested parentage
- b) Medical-legal aspects of therapeutic substances, drug and alcohol abuse and dependence;
- c) Important laws in medicine: Medical Practitioners and Dentists Act, Public Health Act, Human Tissue Act
- d) Forensic odontology, radiology and psychiatry
- e) Occupational diseases, radioactivity, irradiation

II. ORTHOPAEDICS and TRAUMATOLOGY (6 UNITS)

1. COURSE OBJECTIVE

The course will equip the student with knowledge and skills that will enable the student handle orthopaedic emergencies, give initial treatment, and refer patients as required.

2. COURSE OUTCOMES

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

- a) Discuss basic principles of Orthopaedics and Traumatology
- b) Demonstrate ability to elicit a focused orthopaedic/trauma history and perform a comprehensive physical and mental examination
- c) Demonstrate ability to correctly perform routine clinical procedures and order appropriate investigations
- d) Make a diagnostic formulation from the clinical data
- e) Demonstrate ability to participate in the management of the common orthopaedic and traumatic disorders
- f) Apply preventive measures and carry out health promotion
- g) Apply research principles in solving orthopaedic and trauma related health 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.

Routine clinical procedures and investigations:

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 and traction.

Management of Orthopaedic Disorders:

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

Common orthopaedic/trauma disorders:

- a) Bone and joint infections; fractures of bones; compartment syndrome; spinal injury and cord compression; neuro-vascular injury; joint dislocations; multiple injuries
- b) Congenital Bone and Joint Disorders: affecting the foot, the knee and hip joints. Achondroplasia, osteogenesis imperfecta
- c) 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
- d) Degenerative bone and Joint Disorders: synovial joint disorders, osteoarthritis, osteoporosis, low back pain. Metabolic Bone Disorders: rickets, gout
- e) Neoplasms: Primary and metastatic musculoskeletal tumours

Introduction to trauma:

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

Supportive treatment:

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;

Definitive treatment:

Rational use of pharmacotherapeutics; other therapeutic modalities Consultation and referrals: Counselling Palliative care of the terminally ill

Health Promotion in Surgery

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

III. RADIOLOGY AND IMAGING (3 UNITS)

1. COURSE OBJECTIVE

This course is designed to equip the student with the basic concepts of imaging and skills of 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

- a) Conventional; plain radiography and contrast procedures
- b) Newer imaging modalities; ultrasound, computerized tomography
- c) Radionuclide scanning and magnetic resonance imaging
- d) Concept of radiographic contrast media and its application
- e) Indications, contraindications and complications of radiological procedures

- f) Principles of therapeutic radiology
- g) Radiation protection, monitoring and legislation

Interpretation of the common imaging outcomes:

- a) 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
- b) Chest: diagnostic features of inflammatory diseases of lungs and bronchi, pulmonary tuberculosis, tumours of lungs and pleura, pulmonary oedema and embolism, air/fluids in pleural-space, mediastinal disorders
- c) Esophagus: tumours and motility disorders
- d) Stomach and Intestines: tumours, peptic ulceration, perforations
- e) Biliary System: stones
- f) Cardiovascular system: abnormalities of the heart, abnormalities of the blood vessels and lymphatics
- g) Special radiological features in children
- h) Central Nervous System: fractures, space occupying lesions, degenerative disorders, pathologies involving the spine
- i) 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
- j) Breast radiology: imaging modalities, breast cancer screening
- k) 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.
- l) Osteoarticular and muscular radiology: imaging modalities; anatomy and physiology; congenital, infectious, neoplastic, inflammatory, metabolic, traumatic, and vascular diseases.
- m) Vascular and interventional radiology: basic concepts.

IV. OPHTHALMOLOGY (3 UNITS)

1. COURSE OBJECTIVE

To provide a solid 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) Demonstrate knowledge of the anatomy of the eye and the physiology of vision
- b) Describe the human eye as an optical system and understand the principles of common refractive errors and their correction including refractive surgery
- c) Demonstrate ability to elicit a focused ophthalmic history and perform a basic ocular examination
- d) Demonstrate ability to correctly perform routine clinical procedures and order appropriate investigations
- e) Demonstrate ability to participate in the management of the common ophthalmic disorders
- f) Demonstrate ability to properly triage other ocular diseases

3. COURSE CONTENT

Anatomy and Physiology:

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

The eye as an optical system:

Visual acuity; Refractive states: Emmetropia; Myopia; Hypermetropia; 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:

Focused 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 and investigations:

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:

- a) Designing an appropriate comprehensive treatment plan for the ophthalmic problem diagnosed; supportive treatment and; definitive treatment
- b) Patient monitoring; vital signs; biochemical parameters
- c) Consultation and when to refer
- d) Rational use of pharmacotherapeutics: drops; ointments; local injections; local anaesthesia; other therapeutic modalities
- e) Counselling
- f) Rehabilitation and care of the blind

Common ophthalmic disorders:

- a) Ocular trauma; blunt and penetrating injuries; orbital trauma and blowout fracture; burns and chemical injuries; ocular foreign bodies
- b) Red eye differential diagnosis: Glaucoma; Anterior uveitis; keratitis; Conjunctivitis; Scleritis; Episcleritis; Adnexal disease; Subconjunctival haemorrhage; Pterygium; Keratoconjunctivitis sicca; Abnormal lid function; Symptoms associated with the red eye and steps to differentiate red eye. Indications for referral
- c) 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
- d) Cataract: Symptoms; Lens examination; and red reflex; Lens abnormalities in systemic disease; Cataract surgery; Artificial lenses.
- e) Xerophthalmia; vitamin A deficiency and its effect on the eye; WHO classification; community health aspects
- f) Trachoma: causes; treatment; Complications; SAFE strategy
- g) 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 surgical treatment
- h) Amblyopia: strabismic; refractive; form deprivation; and occlusive.
- i) Strabismus: classification; binocular functions; strabismus testing: corneal light reflex; cover/uncover tests; causes, effects and basics of management
- j) Vitreoretinal disorders: Symptoms: loss of vision; flashes; floaters; leucocoria; Fundus features of important ocular diseases: retinoblastoma; endophthalmitis and panophthalmitis; retinal detachment; age-related macular degeneration; Fundus features of important systemic diseases: diabetes mellitus; hypertension; vaso occlusive disease; HIV/AIDS
- k) Cranial nerve palsies; Myasthenia gravis
- l) Optic nerve diseases: papilloedema; papillitis; optic atrophy; Visual field defects
- m) Neoplasms: Retinoblastoma: clinical presentation; treatment; differential diagnosis malignant melanoma; other intra-ocular tumors and metastasis

- n) Sudden loss of vision

Health Promotion in Ophthalmic Surgery

- a) Factors influencing ophthalmic care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual
- b) Vision 2020 and Kenya ophthalmic programmeme
- c) Prevention of ophthalmic diseases and accidents
- d) Ophthalmic appliances: low visual aids
- e) Role of research

V. OTORHINOLARYNGOLOGY (ENT) (3 UNITS)

1. COURSE OBJECTIVE

This course aims at providing a solid foundation in otorhinolaryngology to enable the graduate to manage basic ENT conditions and to know when to refer

2. COURSE OUTCOMES

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

1. Discuss basic principles of Otorhinolaryngology including knowledge of ENT anatomy and the physiological process involved in hearing and balance
2. Demonstrate ability to elicit a focused ENT history and perform a comprehensive physical and mental examination
3. Demonstrate ability to correctly perform routine clinical procedures and order appropriate investigations
4. Demonstrate ability to participate in the management of the common ENT disorders

3. COURSE CONTENT

Principles of ENT:

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; Physiology of hearing and the auditory pathway; Physiology of balance and the vestibular pathway, Anatomy of the neck including lymphatics and fascial planes.

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

Routine clinical procedures and investigations:

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

Management of Common ENT Disorders:

- a) Designing an appropriate comprehensive treatment plan for the ENT problem diagnosed; supportive treatment and optimization of the patient; definitive treatment; surgical prophylaxis.
- b) Patient monitoring; vital signs; biochemical parameters;
- c) Consultation and referrals
- d) Rational use of pharmacotherapeutics; other therapeutic modalities
- e) Counselling
- f) Radiotherapy and Chemotherapy for common head and neck tumours
- g) Palliation in ENT and care of the terminally ill

Common ENT disorders:

- a) Diseases of the ear: Acute and chronic otitis media and externa; Acquired deafness and

- rehabilitation; Dizziness and vertigo; Tinnitus; Common tumours of the outer, middle and inner ear; Radiology and imaging in ear diseases
- b) Diseases of the nose and sinuses: Rhinitis; Sinusitis; Epistaxis; Nasal Polyps; Fracture of the nasal bones; Carcinoma of the postnasal space, Nasal Fbs
- c) 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
- d) Neck masses, differential diagnosis and management; clinical significance of lymph nodes in the neck and their levels
- e) URTI; Vertigo; Salivary gland tumours; and Foreign bodies in ENT

Health Promotion in ENT Surgery:

- a) Factors influencing surgical care of individuals and community; sociocultural, familial, psychological, economic, environmental, legal, political and spiritual
- b) Advocacy
- c) Prevention of ENT diseases and accidents
- d) ENT appliances
- e) Role of research

VI. ANAESTHESIOLOGY (3 UNITS)

1. COURSE OBJECTIVE

This course aims at providing the graduate with a solid foundation in anaesthesiology and also enables them to carry out basic anaesthetic procedures.

2. COURSE OUTCOMES

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

- a) Demonstrate understanding of the basic principles of anaesthesiology, anaesthetic drugs, anaesthetic techniques and different equipment
- b) Demonstrate knowledge of systematic preoperative, intra-operative and post-operative management of patients, including patient care and monitoring
- c) Discuss medico-legal issues in anaesthesia and their implications
- d) Carry out basic anaesthetic procedures
- e) Describe the role of intensive care in medicine

3. COURSE CONTENT

- a) History of anaesthesia. Introduction to anaesthetic drugs and Anaesthetic equipment: Anaesthetic machine and accessories; Anaesthetic techniques: Local, regional and general anaesthesia
- b) 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
- c) Medical legal issues in anaesthesia: the consent form; anaesthetic accidents; anaesthetic death; Organisation of the intensive care unit. End of life decisions; counselling the patient, guardians, delivering the sad news. HIV/AIDS
- d) Basic anaesthetic procedures such as Insertion of IV -lines, oropharyngeal airways, laryngeal mask airways, Endotracheal intubation, Insertion of NG-tubes and Urethral Catheterization, including the indications and complications

Intensive care medicine:

ICU layout, personnel and equipment, criteria for admission, principles of ICU management. ICU patient management and cardiopulmonary/cerebral resuscitation

VII. DERMATOLOGY AND STIs (3 UNITS)

1. COURSE OBJECTIVE

This course aims at providing the student with a solid foundation in dermatology.

2. COURSE OUTCOMES

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

- a) Identify the different types of common skin rashes and infections. They should be able to give a description and symptoms of the condition, diagnosis, pathology, and principles of treatment.
- b) Identify the different types of tumours and hamartomas that may affect the skin including, description and symptoms of the condition, diagnosis, pathology, and principles of treatment.
- c) Knowledge of the different forms of treatment available for dermatological conditions, including when to hospitalize and the surgical options

3. COURSE CONTENT

Infections and rashes

- a) Bacterial infections of skin and soft tissues eg. impetigo, folliculitis
- b) Superficial fungal infections eg. candidiasis, mycoses, tinea
- c) Viral e.g. herpes simplex and zoster, warts, molluscum contagiosum
- d) Parasitic eg. Scabies
- e) Sexually transmitted diseases; Skin manifestations of HIV infection
- f) Immunologic and allergic disorders eg. contact dermatitis, atopic eczema, urticaria, drug reactions
- g) Idiopathic and degenerative disorders: Psoriasis, seborrheic dermatitis, acne.

Tumours and Hamartomas:

- a) Benign tumours, precancerous lesions and malignant neoplasms of the skin, eg. melanoma, squamous and basal cell carcinoma
- b) Cutaneous manifestations of lupus erythematosus, dermatomyositis and scleroderma
- c) Metastatic skin disease (Skin manifestations of systemic disease)
- d) Drug reactions, photosensitivity
- e) Paraneoplastic skin syndrome

Dermatologic therapeutics

- a) 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
- b) Principles sustaining the prescription of the topical and systemic medications
- c) 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
- d) Surgical procedures, diagnostic techniques and other therapeutic modalities in dermatology such as classic surgery, biopsy (punch, shave and excision), curettage, electrosurgery, cryosurgery, laser and intense pulsed light

VIII. MENTAL HEALTH (8 UNITS)

1. COURSE OBJECTIVE

The course is designed to equip the student with knowledge and skills that will enable student to identify, give initial management of mental disorders, appropriately refer as required and maintenance of good mental of good health

2. COURSE OUTCOMES

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

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

- therapeutic alliance
- b) Recognize manifestations and state the evaluation as well as initial management of neuropsychiatry disorders
- c) Recognize, evaluate, and state the treatments for patients with mood disorders
- d) Demonstrate proficiency in the recognition, evaluation, and management of persons with psychosis
- e) Apply laws and acts governing management and rights of patients with behavioural and mental disorders

3. COURSE CONTENT

- a) 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
- b) 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
- c) 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
- d) Schizophrenic, affective disorders
- e) Mental health legislation; involuntary admission; fitness to plead, testamentary capacity; power of attorney, court report

IX. MEDICAL ELECTIVES STUDIES (6 UNITS)

The overall aim of medical electives is to provide students with opportunities to acquire knowledge, skills and experience in areas of their interest which will be useful in their career. 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.

1. OBJECTIVES

- a) Widen his/her experience in undergraduate education and strengthen his/her areas of weakness.
- b) Develop ability to participate in planning the implementation of his/her learning activities and make rational decisions.
- c) Increase his/her responsibility for self determination in his/her education.

2. GENERAL GUIDELINES

- a) The students will be responsible for making arrangements (including finances) pertaining to the elective.
- b) The students shall submit a plan of their activities for approval.
- c) Upon completion of the elective the students shall submit a written report.
- d) A confidential report shall be submitted to the Dean from the host institution regarding the students performance.
- e) The institution shall provide students with guidelines of their conduct during the elective.
- f) 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.