

THIRD SEMESTER

1. ENGLISH-III (Technical Writing and Presentation Skills)
2. INTRODUCTION TO COMPUTER
3. ANATOMY -III
4. PHYSIOLOGY-III
5. BIOMECHANICS & ERGONOMICS-I
6. BIOCHEMISTRY & GENETICS-I

ENGLISH III (TECHNICAL WRITING AND PRESENTATION SKILLS)

CREDIT HOURS 3(3-0)

Objectives:

Enhance language skills and develop critical thinking

Presentation skills

Essay writing

Descriptive, narrative, discursive, argumentative

Academic writing

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical Report writing

Progress report writing

Note: Extensive reading is required for vocabulary building

RECOMMENDED BOOKS:

Technical Writing and Presentation Skills

Essay Writing and Academic Writing

1. Writing. Advanced by Ron White. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 435407 3 (particularly suitable for discursive, descriptive, argumentative and report writing).
2. College Writing Skills by John Langan. Mc-Graw-Hill Higher Education. 2004.
3. Patterns of College Writing (4th edition) by Laurie G. Kirszner and Stephen R. Mandell. St. Martin's Press.

Presentation Skills

Reading

1. The Mercury Reader. A Custom Publication. Compiled by Northern Illinois University. General Editors: Janice Neulib; Kathleen Shine Cain; Stephen Ruffus and Maurice Scharton. (A reader which will give students exposure to the best of twentieth century literature, without taxing the taste of engineering students).

INTRODUCTION TO COMPUTER

CREDIT HOURS: 3(2-1)

COURSE DESCRIPTION:

This is an introductory course on Information and Communication Technologies. Topics include ICT terminologies, hardware and software components, the internet and world wide web, and ICT based applications.

COURSE OUT LINE:

- Basic Definitions & Concepts
- Hardware: Computer Systems & Components
- Storage Devices , Number Systems
- Software: Operating Systems, Programming and Application Software
- Introduction to Programming, Databases and Information Systems
- Networks
- Data Communication
- The Internet, Browsers and Search Engines
- The Internet: Email, Collaborative Computing and Social Networking
- The Internet: E-Commerce
- IT Security and other issues
- Project Week
- Review Week

RECOMMENDED TEXT BOOKS:

1. Introduction to Computers by Peter Norton, 6th International Edition (McGraw HILL)
2. Using Information Technology: A Practical Introduction to Computer & Communications by Williams Sawyer, 6th Edition (McGraw HILL)
3. Computers, Communications & information: A user's introduction by Sarah E. Hutchinson, Stacey C. Swayer
4. Fundamentals of Information Technology by Alexis Leon, Mathewsleon Leon press.

ANATOMY-III

CREDIT HOURS: 4(3-1)

COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, skeletal, muscle, and circulatory systems is incorporated. Introduction to general anatomy lays the foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosecuted materials and

radiographs are utilized to identify anatomical landmarks and configurations of the head and neck.

COURSE OUT LINE:

EMBRYOLOGY:

GENERAL

- Male and female reproductive organs
- Cell division and Gametogenesis
- Fertilization, cleavage, blastocyst formation and implantation of the embryo. Stages of early embryonic development in second and third week of intrauterine life
- Foetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and Placenta)
- Developmental defects.

SPECIAL:

- Musculoskeletal system
- Cardiovascular system
- CNS.

THE HEAD AND NECK

THE NECK:

- Muscles around the neck
- Triangles of the neck
- Main arteries of the neck
- Main veins of the neck
- Cervical part of sympathetic trunk
- Cervical plexus
- Cervical spine (Vertebrae)
- Joint of neck.

THE FACE:

- Sensory nerves of the face
- Bones of the face
- Muscles of the face
- Facial nerve
- Muscles of mastication
- Mandible
- Hyoid bone
- Temporomandibular joint
- Brief description of orbit and nasal cavity.

THE SKULL:

- Bones of skull
- Anterior cranial fossa

- Middle cranial fossa
- Posterior cranial fossa
- Base of skull
- Structures passing through foramina.

PRACTICAL:

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester/year.

RECOMMENDED TEXT BOOKS:

1. *Gray's Anatomy* by Prof. Susan Standring 39th Ed., Elsevier.
2. *Clinical Anatomy for Medical Students* by Richard S. Snell.
3. *Clinically Oriented Anatomy* by Keith Moore.
4. *Clinical Anatomy* by R. J. Last, Latest Ed.
5. *Cunningham's Manual of Practical Anatomy* by G. J. Romanes, 15th Ed., Vol-I, II and III.
6. *The Developing Human. Clinically Oriented Embryology* by Keith L. Moore, 6th Ed.
7. *Wheater's Functional Histology* by Young and Heath, Latest Ed.
8. *Medical Histology* by Prof. Laiq Hussain.
9. *Neuroanatomy* by Richard S. Snell.

PHYSIOLOGY-III

CREDIT HOURS: 3(2-1)

COURSE DESCRIPTION:

The course is designed to study the function of the human body at the molecular, cellular, tissue and systems levels, The major underlying themes are: the mechanisms for promoting homeostasis; cellular processes of metabolism, membrane function and cellular signaling; the mechanisms that match supply of nutrients to tissue demands at different activity levels; the mechanisms that match the rate of excretion of waste products to their rate of production; the mechanisms that defend the body against injury and promote healing.

These topics are addressed by a consideration of nervous and endocrine regulation of the cardiovascular, hematopoietic, pulmonary, renal, gastrointestinal, and musculoskeletal systems, including the control of cellular metabolism. The integrative nature of physiological responses in normal function and disease is stressed throughout. This course provides the foundation for the further course as exercise physiology, pathology, etc.

COURSE OUT LINE: NERVOUS SYSTEM

- General organization of the nervous system
- Classification of nerve fibres
- Properties of synaptic transmission
- Function of neurotransmitters and neuropeptides
- Type and function of sensory receptors
- Function of the spinal cord and ascending tracts
- Reflex action and reflexes
- Muscle spindle and muscle tone
- Mechanism of touch
- temperature and pain
- Functions of the cerebral cortex
- Difference between the sensory and motor cortex and their functions
- Motor pathways including pyramidal and extrapyramidal
- Basal Ganglia and its functions
- Cerebellum and its function
- Control of posture and equilibrium
- Physiology of sleep
- Physiology of memory
- Mechanism and control of speech
- Function of the thalamus
- Function of the hypothalamus and limbic system
- Production of CSF
- Mechanism of temperature regulation
- Function of the autonomic nervous system and the physiological changes of aging.

Clinical Module

1. Significance of dermatomes.
2. Injuries of the spinal cord.
3. Hemiplegia and paraplegia.
4. Parkinsonism.
5. Effects of cerebellar dysfunction.

REPRODUCTION:

- Function of the male reproductive system, Spermatogenesis
- Mechanism of erection and ejaculation
- Production and function of testosterone and Physiological changes during male puberty
- Function of the female reproductive system
- Production and function of oestrogen, and progesterone
- Menstrual cycle
- Physiological changes during female puberty and menopause
- Pregnancy and the physiological changes taking place in the mother

- Function of the placenta
- Parturition and lactation
- Neonatal physiology.

Clinical Module

1. Male infertility
2. Female infertility
3. Contraception
4. Basis for pregnancy tests.

BODY FLUIDS AND KIDNEY:

- Components and quantitative measurements of body fluids
- Fluid compartments, tissue and lymph fluid
- Structure of the kidney and nephron
- General function of the kidney
- GFR and its regulation
- Formation of urine including filtration, re-absorption and secretion
- Plasma clearance, Mechanism of concentration and dilution of urine
- Water and electrolyte balance with reference to the kidney
- Role of the kidney in blood pressure regulation
- Hormonal functions of the kidney
- Acidification of urine and its importance
- Acid base balance with reference to the kidney
- Micturition and its control.

Clinical Module

1. Renal function tests and their clinical importance.
2. Fluid excess and depletion.
3. Renal failure and dialysis.
4. Metabolic acidosis and alkalosis.
5. Abnormalities of micturition.

PRACTICALS:

Nervous System

- Examination of superficial and deep reflexes
- Brief examination of the motor and sensory system
- Examination of the cranial nerves.

Special Senses

- Measurement of the field of vision
- Measurement of light reflex
- Ophthalmoscopy
- Colour vision
- Hearing tests
- Testing taste and smell.

Pregnancy tests

RECOMMENDED TEXT BOOKS:

1. *Textbook of Physiology by Guyton and Hall, Latest Ed.*
2. *Review of Medical Physiology by William F. Ganong, Latest Ed.*
3. *Physiology by Berne and Levy, Latest Ed.*
4. *Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards*
5. *Physiological Basis of Medical Practice by John B. West and Taylor, 12th Ed.*

BIOMECHANICS AND ERGONOMICS – I **CREDIT HOURS: 3(3-0)**

COURSE DESCRIPTION:

This course aims to develop appreciation of how mechanical principles can be applied to understand the underlying causes of human movement. It also examines selected anatomical, structural and functional properties of human connective, muscular, and nervous tissues, as well as skeletal structures. Emphasis is placed on the mechanical, neuroregulatory, and muscular events that influence normal and pathological motion

This course will also help to gain an understanding of basic theoretical concepts, principles and techniques of ergonomics as well as an introduction to fundamental ergonomic measurement tools for assessment of physical workload, posture, occupational exposure, and stress

COURSE OUT LINE:

BASIC TERMINOLOGY:

- Biomechanics
- Mechanics
- Dynamics
- Statics
- Kinematics
- Kinetics and anthropometries
- Scope of scientific inquiry addressed by biomechanics
- Difference between quantitative and qualitative approach for analyzing human movements
- Biomechanics of human bone growth and development

KINEMATIC CONCEPTS FOR ANALYZING HUMAN MOTION:

- Common units of measurement for mass, force, weight, pressure, volume, density, specific weight, torque and impulse
- Different types of mechanical loads that act on human body
- Uses of available instrumentation for measuring kinetic quantities.

BIOMECHANICS OF TISSUES AND STRUCTURES OF THE MUSCULOSKELETAL SYSTEM:

- Biomechanics of Bone
- Biomechanics of Articular Cartilage
- Biomechanics of Tendons and Ligaments
- Biomechanics of Peripheral Nerves and Spinal Nerve Roots
- Biomechanics of Skeletal Muscles.

BIOMECHANICS OF THE HUMAN UPPER EXTREMITY:

- Biomechanics of the Shoulder
- Biomechanics of the Elbow
- Biomechanics of the Wrist and Hand
- Factors that influence relative mobility and stability of upper extremity articulation
- Muscles that are active during specific upper extremity movements
- Biomechanical contributions to common injuries of the upper extremity.

BIOMECHANICS OF HUMAN LOWER EXTREMITY:

- Biomechanics of the Hip
- Biomechanics of the Knee
- Biomechanics of the ankle and foot
- Factors influencing relative mobility and stability of lower extremity articulations
- Adaptation of lower extremity to its weight bearing functions
- Muscles that are active in specific lower extremity movements
- Biomechanical contribution to common injuries of the lower extremity.

ERGONOMICS

OVERVIEW AND CONCEPTUAL FRAMEWORK:

- Ergonomics and Therapy: An Introduction
- A Client-Centered Framework for Therapists in Ergonomics
- Macroergonomics.

KNOWLEDGE, TOOLS, AND TECHNIQUES:

- Ergonomic Assessments/Work Assessments
- Anthropometry
- Cognitive and Behavioral Occupational Demands of Work
- Psychosocial Factors in Work-Related Musculoskeletal Disorders
- Physical Environment
- Human Factors in Medical Rehabilitation Equipment: Product Development and Usability Testing.

RECOMMENDED TEXT BOOKS:

1. *Basic biomechanics of musculoskeletal system* By: Nordin & Frankel, 3rd edition.

2. *Basic Biomechanics*, By: Susan J. Hall 4th edition.
3. Additional study material as assigned by the tutor.
4. *Ergonomics for the therapist* by Karen Jacobs 3rd edition mosby and Elsevier publishers.

BIOCHEMISTRY & GENETICS-I

CREDIT HOURS: 2 (2-0)

COURSE DESCRIPTION:

This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids. The nutritional biochemistry concludes the course.

COURSE OUTLINE:

CELL:

- Introduction to Biochemistry
- Cell: (Biochemical Aspects)
- Cell Membrane Structure
- Membrane Proteins
- Receptors & Signal Molecules

BODY FLUIDS:

- Structure and properties of Water
- Weak Acids & Bases
- Concept of pH & pK
- Buffers, their mechanism of action
- Body buffers

BIOMOLECULES:

AMINO ACIDS, PEPTIDES & PROTEINS

- Amino acids: Classification
- Acid-Base Properties
- Functions & Significance.
- Protein Structure, Primary, Secondary & Super secondary. &, Structural Motifs
- Tertiary & Quaternary Structures of Proteins
- Protein Domains
- Classification of Proteins
- Fibrous proteins (collagens and elastins) & Globular proteins

ENZYMES:

- Introduction
- Classification & Properties of Enzymes
- Coenzymes
- Isozymes & Proenzymes
- Regulation & Inhibition of Enzyme activity & enzymes inhibitors
- Clinical Diagnostic Enzymology

CARBOHYDRATES:

- Definition
- Classification
- Biochemical Functions & Significance of Carbohydrates
- Structure & Properties of Monosaccharides & Oligosaccharides
- Structure & Properties of Polysaccharides
- Bacterial cell Wall
- Heteropolysaccharides
- GAGS.

LIPIDS:

- Classification of Lipids
- Fatty Acids: Chemistry
- Classification occurrence & Functions
- Structure & Properties of Triacylglycerols and Complex Lipids
- Classification & Functions of Eicosanoids
- Cholesterol: Chemistry, Functions & Clinical Significance
- Bile acids/salts.

NUCLEIC ACIDS:

- Structure, Functions & Biochemical Role of Nucleotides
- Structure & Functions of DNA
- Structure & Functions of RNA.

NUTRITIONAL BIOCHEMISTRY: MINERALS & TRACE ELEMENTS

- Sources
- RDA
- Biochemical Functions & Clinical Significance of Calcium & Phosphorus
- Sources
- RDA
- Biochemical Functions & Clinical Significance of Sodium Potassium & Chloride
- Metabolism of Iron, Cu, Zn, Mg, Mn, Se, I, F.

VITAMINS:

- Sources
- RDA
- Biochemical Functions & Clinical Significance of Fat Soluble Vitamins
- Sources
- RDA
- Biochemical Functions & Clinical Significance of Water Soluble
- Vitamins.

NUTRITION:

- Dietary Importance of Carbohydrates, Lipids & Proteins
- Balanced Diet.

MOLECULAR BIOLOGY:

- DNA Replication & Repair in Prokaryotes
- DNA Replication & Repair in Eukaryotes

RECOMMENDED TEXT BOOKS:

1. *Harper's Biochemistry* by Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Latest Ed.
2. *Lippincott's Illustrated Review of Biochemistry* by Pamela C. Champe and Richard A. Harvey, Latest Ed.
3. *Practical Clinical Biochemistry* by Varley.
4. *Textbook of Biochemistry* by Devlin, 5th Ed.
5. *Textbook of Medical Biochemistry Vol-I and II* by M.A. Hashmi.
Biochemistry by Stryer, Lubert, Latest Ed.