SYLLABUS OF

FIRST PROFESSIONAL

PART-I

M.B.B.S.

(A) ANATOMY AND HISTOLOGY

(B) PHYSIOLOGY

(C) BIOCHEMISTRY

(D) BEHAVIOURAL SCIENCES

(A) ANATOMY AND HISTOLOGY

The course outline is as follows :-

1. History of anatomy and the different disciplines of the subject
2. Explain anatomical nomenclature

GENERAL ANATOMY

Skeletal System

1. Axial skeleton
2. Different bones of human body
3. Axial and appendicular skeleton
4. Functions of bone
5. Classification on the basis of development, region and function
6. General concepts of ossification of bones
7. Parts of young bone
8. Blood supply of long bones
9. Anatomical factors in bone injury (clinical).

Joints

1. Structural , regional and functional classification of joints
2. Characteristics of synovial joints
3. Classification of synovial joints
4. Movements of synovial joints
5. Anatomy of joints with reference to dislocation and injury (clinical).

Muscle

1. Parts of a muscle
2. Classification of muscle
3. Blood supply and nerve supply of muscle
4. Anatomy of the neuromuscular junction
5. Anatomy of muscle with reference to sprain, spasm and injury

Cardiovascular System

1. The cardiovascular system
2. Arterial and venous system

Lymphatic System

1. Anatomy of lymph node
2. Anatomy of lymph vessels
3. Function of lymphatic system

Nervous System

1. Nervous system in general
2. Different parts of nervous system and their functions
3. Anatomical arrangements of the cranial and spinal nerves in general
4. Autonomic nervous system

Skin and Fascia

1. Brief anatomy of the skin, superficial and deep fascia

GENERAL HISTOLOGY

1. Cell as a whole
2. Different components of a cell and description of its functions
3. Anatomy of cell membrane
4. Different parts of a microscope and their function
5. Types of epithelium and their anatomical location
6. Connective tissues and its function
7. Histological appearance of cartilage
8. Histological appearance of bone
9. Cartilage and bone
10. Identification of connective tissue, cartilage and bone under microscope
11. Histological features of muscle
12. Identification of muscle tissues under microscope
13. Histological features of central venous system
14. Histological features of peripheral nerve and spinal cord
15. Identification of nerve under microscope
16. Histology of lymphoid tissue
17. Identification of lymphoid tissue under microscope
18. Histology of blood vessel
19. Identification of blood vessel under microscope
20. Histology of skin
21. Identification of skin under microscope

GENERAL EMBRYOLOGY

1. Male and female reproductive organs
2. Cell division and gametogenesis
3. Fertilization, cleavage, blastocyst formation and implantation of the embryo
4. Stages of early embryonic development in second and third week of intrauterine life
5. Development of embryo and foetus
6. Foetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and placenta)

GENETICS

1. Basic principles of genetics
2. Structure and function of genes and DNA
3. Relationship of genes and DNA
4. Teratogenesis

GROSS ANATOMY

The study of gross anatomy must lay emphasis on applied anatomy as related to clinical medicine and surgery, radiological anatomy, surface anatomy and cross sectional anatomy

Dissection, dissected specimens, models, and computer aided programs, x-rays and CT scans can be used.

Upper Limb

Duration 11 weeks

Lower Limb

Duration 11 weeks

Thorax

Duration 7 weeks

Clinical Module

1. Common developmental anomalies
2. Clinical effects of nerve injuries of the upper limb
3. Clinical effects of nerve injuries of the lower limb
4. Clinical importance of coronary circulation

RECOMMENDED 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.

(B) PHYSIOLOGY

The course outline is as follows :

BASIC AND CELL PHYSIOLOGY

1. Functional organization of human body
2. Homeostasis
3. Control systems in the body
4. Cell membrane and its functions
5. Cell organelles and their functions
6. Genes --their control and function

Blood

1. Composition and general functions of blood
2. Plasma proteins their production and function
3. Erythropoiesis and red blood cell function
4. Structure, function, production and different types of haemoglobin
5. Iron absorption storage and metabolism
6. Blood indices
7. Function, production and type of white blood cells
8. Function and production of platelets
9. Clotting mechanism of blood
10. Blood groups and their role in blood transfusion
11. Complications of blood transfusion with reference to ABO & RH incompatibility
12. Components of reticuloendothelial system their gross and microscopic structure including (tonsil, lymph node and spleen)
13. Development and function of reticuloendothelial system

Clinical Module

1. Anemia and its different types
2. Blood indices in various disorders
3. Clotting disorders (Haemophilia etc.)
4. Blood grouping and cross matching
5. Immunity

Nerve and Muscle

1. Structure and function of neuron
2. Physiological properties of nerve fibers
3. Physiology of action potential
4. Conduction of nerve impulse
5. Nerve degeneration and regeneration
6. Synapses
7. Physiological structure of muscle

8. Skeletal muscle contraction
9. Skeletal, smooth and cardiac muscle contraction
10. Neuromuscular junction and transmission
11. Excitation contraction coupling
12. Structure and function of motor unit

Clinical Module

1. Perform nerve conduction studies and explain their clinical importance
2. Myopathies and neuropathies
3. Peripheral nerve injuries

Cardiovascular System

1. Heart and circulation
2. Function of cardiac muscle
3. Cardiac pacemaker and cardiac muscle contraction
4. Cardiac cycle
5. ECG, its recording and interpretation
6. Common arrhythmias and its mechanism of development
7. Types of blood vessels and their function
8. Hemodynamics of blood flow (local control systemic circulation its regulation and control)
9. Peripheral resistance its regulation and effect on circulation
10. Arterial pulse
11. Blood pressure and its regulation
12. Cardiac output and its control
13. Heart sounds and murmurs
14. Importance, circulation, and control of venous returnon
15. Coronary circulation
16. Splanchnic, pulmonary and cerebral circulation
17. Triple response and cutaneous circulation
18. Foetal circulation and circulatory changes at birth

Clinical Module

1. Clinical significance of cardiac cycle, correlation of ECG and heart sounds to cardiac cycle
2. Clinical significance of cardiac cycle, interpretation of ischemia and arrhythmias
3. Effects of hypertension
4. Clinical significance of heart sounds
5. Effects of ischemia
6. Shock

Respiratory System

1. Function of respiratory tract
2. Respiratory and non-respiratory function of the lungs
3. Mechanics of breathing
4. Production & function of surfactant and compliance of lungs

5. Protective reflexes
6. Lung volumes and capacities including dead space
7. Diffusion of gases across the alveolar membrane
8. Relationship between ventilation and perfusion
9. Mechanism of transport of oxygen and carbon dioxide in blood
10. Nervous and chemical regulation of respiration
11. Abnormal breathing
12. Hypoxia, its causes and effects
13. Cyanosis, its causes and effects

Clinical Module

1. Clinical importance of lung function tests
2. Causes of abnormal ventilation and perfusion
3. Effects on pneumothoax, pleural effusion, and pneumonia
4. Respiratory failure
5. Artificial respiration and uses & effects of O_2 therapy
6. Clinical significance of hypoxia, cyanosis, and dyspnoea

Skin and Body Temperature Regulation

PHYSIOLOGY PRACTICALS

Haematology

1. Use of the microscope
2. Determination of haemoglobin
3. Determination of erythrocyte sedimentation rate
4. Determining packed cell volume
5. Measuring bleeding and clotting time
6. RBC count
7. Red cell indices
8. WBC count
9. Leucocyte count
10. Prothrombin and thrombin time

Respiratory System

1. Pulmonary volume, their capacities and clinical interpretation

Cardiovascular System

1. Cardiopulmonary resuscitation (to be coordinated with the department of medicine)
2. Examination of arterial pulse
3. ECG recording and interpretation
4. Arterial blood pressure

5. Effects of exercise and posture on blood pressure
6. Apex beat and normal heart sounds

RECOMMENDED 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, Latest Ed.
5. **Physiological Basis of Medical Practice** by John B. West and Taylor, 12^{th} Ed.

(C) BIOCHEMISTRY

The course outline is as follows :

Cell Biochemistry

1. Biochemical composition and functions of the cell
2. Cell membranes and their chemical composition
3. Importance of lipids and proteins in cell membranes
4. Chemistry of signals and receptors
5. Membrane transport including active transport, passive transport, simple and facilitated diffusion
6. Methods to study cell biochemistry

Acid Base Balance and Body Fluids

1. Ionization of water, week acids and bases
2. pH and pH scale
3. pK values, dissociation constant and titration curve of week acids
4. Body buffers and their mechanism of action
5. Henderson – Hesselbach equation
6. Acid base regulation in human body
7. Biochemical mechanisms for control of water and electrolyte balance
8. Types of particles in solution
9. Importance of selectively permeable membranes, osmosis and osmotic pressure, surface tension, viscosity also in relation to body fluids

Clinical Module

1. Acid base control in clinical setting

Carbohydrates

1. Carbohydrates, their biochemical function and classification
2. Structure, functions and derivatives of monosaccharides
3. Structure and function of oligosaccharides and disaccharides
4. Polysaccharides and their biochemical role
5. Biomedical importance of carbohydrates

Clinical Module

1. Clinical importance of carbohydrates

Proteins

1. Proteins and their biochemical importance
2. Physicochemical , functional nutritional and structural properties of proteins
3. Structure, functions and properties of amino acids
4. Amino acids and their nutritional significance
5. Importance of amino acids in pH maintenance

6. Separation of proteins, salting out, electrophoreisis, chromatography and centrifugation
7. Immunoglobulins and their biochemical function
8. Plasma proteins and their clinical function

Clinical Module

1. Clinical importance of proteins and amino acids
2. Clinical significance of immunoglobulins
3. Plasma proteins in clinical practice

Nucleotide and Nucleic Acids

1. Nucleotides and their biochemical role
2. Structure, function and biochemical role of nucleotides
3. Synthesis of purines and pyramidines and their clinical role
4. Structure, function and types of nucleic acids

Clinical Module

1. Clinical significance of nucleic acids and nucleotides

Lipids

1. Classification of lipids and their biochemical functions
2. Structure and biochemical function of phospholipids, glycolpids, and sphingolipids
3. Classification of fatty acids and their biochemical functions
4. Functions of essential fatty acids
5. Eicosanoides and their function in health and disease
6. Steroids and their biochemical role
7. Cholesterol, its structure chemistry and function
8. Lipid peroxidation and its significance

Clinical Module

1. Clinical significance of lipids
2. Clinical importance of steroids

Enzymes

1. Classification/ Nomenclature
2. Enzymes and catalysts
3. Function of enzymes and catalysts
4. Co-enzymes and co-factors
5. Iso-enzymes and their clinical importance
6. Factors affecting enzyme activity (Michaelis – Menten and Lineweaverbuk equations)
7. Classification of enzyme inhibitors and their biochemical importance
8. Therapeutic use and application of enzymes in clinical diagnosis

Clinical Module

1. Importance of enzyme in clinical practice

Haemoglobin

1. Porphyrins and metabolism of haem
2. Synthesis and structure of haemoglobin
3. Types and function of haemoglobin
4. O_2 binding capacity of haemoglobin and factors regulating & affecting it
5. Breakdown of haemoglobin, formation of bile pigments their transport and excretion
6. Biochemical causes of hyper-bilirubinaemia and differentiation between different types of jaundice
7. Causes and types of haemoglobinopathies
8. Porphyrias

Vitamins and Minerals

1. Vitamins and their different types
2. Classification of vitamins, their chemical structure & biochemical function
3. Absorption of vitamins and minerals
4. Daily requirements, sources of water and fat soluble vitamins
5. Effects of vitamin deficiency
6. Role of vitamins as co-enzymes
7. Hypervitaminosis
8. Minerals in human nutrition, sources, biochemical actions and recommended daily allowance (RDA).
9. Sodium, potassium, chloride, calcium, phosphorus, magnesium, sulfur, iodine, fluoride etc.
10. Trace elements as Fe, Zn, Se, I, Cu, Cr, Cd and Mn

Nutrition

1. Caloric requirements of the body
2. Balanced diet
3. Protein energy malnutrition
4. Marasmus
5. Kwashiorkor
6. Marasmic-kwashiorkor
7. Nutritional requirements in:
   - Pregnancy
   - Lactation
   - New born
   - Nutritional disorders

BIOCHEMISTRY PRACTICALS

1. Introduction to laboratory technique / equipment
2. Preparation of solution / normal solution and normal saline
3. Qualitative analysis on carbohydrates, proteins, and fats
4. Chemical analysis of urine (normal and abnormal specimens)

RECOMMENDED BOOKS

1. **Harper's Biochemistry** by Robbert 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.

6. **Biochemistry** by Stryer, Lubert, Latest Ed.

(D) BEHAVIOURAL SCIENCES

The course outline is as follows :

1. Introduction

- Behavioural Sciences and their importance in health.
- Bio-Psycho-Social Model of Healthcare.
- Desirable attitudes.
- Correlation of brain, mind and Behavioural Sciences.
- Roles of a doctor.

2. Understanding Behaviour

- Sensation, sense organs / special organs.
- Perception and factors affecting it.
- Attention and concentration.
- Memory and its stages, types and methods to improve it.
- Types and theories of thinking.
- Cognition and levels of cognition.
- Problem solving and decision making strategies.
- Communication. Its types, modes and factors affecting it. Non-verbal cues.
- Characteristics of a good communicator.

3. Personality and Intelligence

- Stages and characteristics of psychological growth and development.
- Personality and development theories of personality. Factors affecting personality development.
- Assessment of personality. Influence of personality in determining reactions during health, disease, hospitalization, stress, etc.
- Intelligence and its types. Relevance of IQ and EQ. Methods of enhancing EQ and effectively using IQ. Factors affecting intelligence and their assessment.

4. Stress Management

- Definition and classification of stress and stressors.
- Relationship of stress and stressors with illness.
- Stress and health.
- Anxiety.
- Coping skills.
- Psychological defence mechanisms
- Conflict and frustration.
- Adjustment and maladjustment.
- Patient anxiety / stress.

- Psychological theories of pain perception and patients' experience of pain.
- Treatment adherence and compliance.
- Psychological techniques including hypnosis.

5. Doctor – Patient Relationship

- Concept of boundaries and psychological reactions in doctor – patient relationship (such as transference and counter transference)

6. Medical Ethics

- Introduction of Ethics in health professionals.
- Hippocratic Oath – Do's and Don'ts.
- Responsibilities of health professionals.
- Responsibilities of health professionals.
- Concept of medical ethics.
- Interaction with patients and colleagues.
- Standards of ethical medical practice.
- Common ethical dilemmas in doctor – patients relations. Interaction with families, teachers, pharmaceutical industry.
- Rights of patients and doctor (in international law, constitution of Pakistan, PMDC, Islam).
- Informed consent.
- Patient confidentiality.
- Disclosure of information.
- Code regarding advertisement of services and publicity.

RECOMMENDED BOOKS

1. **A Handbook of Behavioural Sciences for Medical and Dental Students** by Mowadat H. Rana, Sohail Ali and Mansoor Mustafa, 2006, University of Health Sciences Lahore.

2. **Medicine in Society ; Behavioural Sciences for Medical Students,** edited by Christopher Dowrick, 2001, Arnold Publisher.

3. **Behavioural Sciences in Clinical Medicine** by Wolf, Stewert, 1976.

4. **Developmental Psychology for Healthcare Professions** by Katherine A. Billingham.