SYLLABUS OF

FIRST PROFESSIONAL

PART-II

M.B.B.S.

(A) ANATOMY AND HISTOLOGY

(B) PHYSIOLOGY

(C) BIOCHEMISTRY

(D) BEHAVIOURAL SCIENCES

(E) ISLAMIAT & PAKISTAN STUDIES

(A) ANATOMY AND HISTOLOGY

The course outline is as follows :-

SYSTEMIC HISTOLOGY

Digestive System

1. Oral cavity, tongue, gums, hard palate, soft palate, pharynx and lips.
2. Oesophagus, stomach, duodenum, small intestine, large intestine, appendix.
3. Salivary gland.
4. Liver.
5. Pancreas and the difference between the endocrine and exocrine pancreas.
6. Gallbladder.

Respiratory System

1. Nasal cavity, paranasal sinuses. Larynx and trachea.
2. Bronchi and lungs.

Male Reproductive System

1. Testis, genital ducts and accessory genital glands.

Female Reproductive System

1. Ovaries, fallopian tube and uterus.
2. Vagina.
3. Mammary gland.

Urinary System

1. Kidney.
2. Ureter and urinary bladder.
3. Urethra.

Endocrine System

1. Pituitary gland.
2. Thyroid and parathyroid gland.
3. Adrenal gland and differences between the cortex and medulla.

Eye and Ear

1. Histological structure of the Eye.
2. Histological structure of the Ear.

SYSTEMIC EMBRYOLOGY

Head Neck and Branchial Apparatus

1. Development of the branchial apparatus and the structures which develop from each arch.
2. Development of the tongue.
3. Development of the thyroid and parathyroid.

4. Development of the pituitary and thyroid.
5. Development of the respiratory system.
6. Development of the face and palate.

Clinical Module

1. Tracheo – oesophageal fistula.
2. Cleft lip and palate.

Digestive System

1. Development of the body cavities, mesenteries and diaphragm.
2. Development of the liver, pancreas and gallbladder.
3. Development of the spleen.

Clinical Module

1. Developmental defects of the diaphragm.
2. Developmental defects of the intestine and viscera.

Respiratory System

1. Development of the respiratory system

Cardiovascular System

1. Development of the heart and great vessels.
2. Foetal circulation and changes at birth.

Clinical Module

1. Common congenital anomalies of the heart.

Urinary System

1. Development of the kidneys, urinary bladder and urethra.

Male Reproductive System

1. Development of the testis and genital duct.
2. Causes undescended testis.

Female Genital System

1. Development of the ovaries, uterus and vagina.

Musculoskeletal System

1. Development of the musculoskeletal system.

Nervous System

1. Development of the nervous system.

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, computer aided programs, x-rays and CT scans can be used.

Head and Neck 12 weeks
Abdomen and Pelvis 12 weeks
Brain 8 weeks

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 :

Body Fluids and Kidney

1. Components and quantitative measurements of body fluids.
2. Fluid compartments, tissue and lymph fluid.
3. Structure of the kidney and nephron. General function of the kidney.
4. GFR and its regulation.
5. Formation of urine including filtration, re-absorption and secretion.
6. Plasma clearance.
7. Mechanism of concentration and dilution of urine.
8. Water and electrolyte balance with reference to the kidney.
9. Role of the kidney in blood pressure regulation.
10. Hormonal functions of the kidney.
11. Acidification of urine and its importance.
12. Acid base balance with reference to the kidney.
13. 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.

Nervous System

1. General organization of the nervous system.
2. Classification of nerve fibers.
3. Properties of synaptic transmission.
4. Function of neurotransmitters and neuropeptides.
5. Type and function of sensory receptors.
6. Function of the spinal cord and ascending tracts.
7. Reflex action and reflexes.
8. Muscle spindle and muscle tone.
9. Mechanism of touch, temperature and pain.
10. Functions of the cerebral cortex.
11. Difference between the sensory and motor cortex and their functions.
12. Motor pathways including pyramidal and extrapyramidal.
13. Basal Ganglia and its functions.
14. Cerebellum and its function.
15. Control of posture and equilibrium.
16. Physiology of sleep.
17. Physiology of memory.
18. Mechanism and control of speech.
19. Function of the thalamus.
20. Function of the hypothalamus and limbic system.

21. Production of CSF.
22. Mechanism of temperature regulation.
23. Function of the autonomic nervous system.
24. 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.
6. Hydrocephalus.

Endocrinology

1. Classification of endocrine glands.
2. Mechanism of action, feedback and control of hormonal secretion.
3. Functions of the hypothalamus.
4. Hormones secreted by the anterior and posterior pituitary and their mechanism of action and function.
5. Function of the thyroid gland.
6. Function of the parathyroid gland.
7. Calcium metabolism and its regulation.
8. Secretion and function of calcitonin.
9. Hormones secreted by the adrenal cortex and medulla and their function and mechanism of action.
10. Endocrine functions of the pancreas.
11. Control of blood sugar.
12. Hormones secreted by the gastrointestinal system and their function.
13. Function of the thymus.
14. The endocrine functions of the kidney.
15. Physiology of growth.

Clinical Module

1. Acromegaly, gigantism and dwarfism.
2. Effects of panhypopitutiarism.
3. Diabetes insipidus.
4. Thyrotoxicosis and myxoedema.
5. Pheochromocytoma.
6. Cushing’s disease.
7. Adrenogenital syndrome.
8. Diabetes mellitus and hypoglycaemila.

Gastrointestinal Tract

1. General function of gastrointestinal tract
2. Enteric nervous system, control of gastrointestinal motility and secretion
3. Mastication, swallowing and their control
4. Function, motility and secretions of stomach
5. Function, motility and secretions of small intestine
6. Function, motility and secretions of large intestine
7. Function of GIT hormones
8. Mechanism of vomiting and its control pathway
9. Defecation and its control pathway
10. Functions of liver
11. Functions of gallbladder and bile in digestion
12. Endocrine & exocrine pancreas and functions of pancreas in digestion

Clinical Module

1. Dysphagia
2. Physiological basis of acid peptic disease
3. Causes of vomiting
4. Diarrhea and constipation in clinical settings
5. Jaundice and liver function tests in clinical settings

Reproduction

1. Function of the male reproductive system.
2. Spermatogenesis.
3. Mechanism of erection and ejaculation.
4. Production and function of testosterone.
5. Physiological changes during male puberty.
6. Function of the female reproductive system.
7. Production and function of oestrogen and progesterone.
8. Menstrual cycle.
9. Physiological changes during female puberty and menopause.
10. Pregnancy and the physiological changes taking place in the mother.
11. Function of the placenta.
12. Parturition and lactation.
13. Neonatal physiology.

Clinical Module

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

PHYSIOLOGY PRACTICAL

Nervous System

1 Examination of superficial and deep reflexes.
2 Brief examination of the motor and sensory system.
3 Examination of the cranial nerves.

Special Senses

1 Measurement of the field of vision.
2 Measurement of light reflex.
3 Ophthalmoscopy.
4 Colour vision.
5 Hearing tests.
6 Testing taste and smell.

Pregnancy tests

Measurement and interpretation of body temperature

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 :

1. Bioenergetics and Biological Oxidation

1. Endergonic and exergonic reactions, their coupling through ATP.
2. Biologic Oxidation and reduction, methods of electron transferring, redox potential, enzymes and coenzymes of biologic oxidation and reduction
3. Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers
4. ATP synthesis coupled with electron flow, phosphorylation of ADP coupled to electron transfer.
5. ATP-synthase, their relation to proton pump, PMF and active transport
6. Uncouplers and inhibitors of oxidative phosphorylation

2. Introduction to Metabolism:
Metabolism of Carbohydrates

1. Glycolysis
- Phases and reactions of glycolysis
- Energetics of aerobic and anaerobic gylcolysis and their importance
- Regulation of glycolysis
- Cori's cycle
- The fate of pyruvate

2. The Citric Acid Cycle

3. Reactions, Energetics , Regulation and Importance of Citric Acid Cycle
- Amphibolic nature of citric acid cycle. The anpoleratic reactions and regulations of TCA cycle

4. Gluconeogenesis
- Important three bypass reaction of gluconeogenesis
- Entrance of amino acids and intermediates of TCA cycle and other nutrients as gluconeogenic substrates
- Clinical significance of gluconeogenesis

5. Glycogen Metabolism
- Reactions of glycogenesis and glycogenolysis
- Importance of UDP-Glucose
- Regulation of glycogen synthase and glycogen phosphorylase
- Glycogen phosphorylase 'a' and the blood glucose sensor
- Disorders of glycogen metabolism (Glycogen storage diseases)

6. Secondary Pathways of Carbohydrate (Hexose) Metabolism
- Hexose Mono Phosphate Shunt, its reactions and importance
- Glucoronic acid pathway, its reactions and importance

7. Metabolism of Fructose, Galactose and Lactose

8. Regulation of Blood Glucose Level
- Hyperglycemia, hypoglycemia and their regulating factors
- Biochemistry of Diabetes Mellitus, its laboratory findings and diagnosis

3. Metabolism of Lipids:

1. Mobilization and transport of fatty acids, tricylglycerol and sterols
2. Oxidation of fatty acids
   - Activation and transport of fatty acid in the mitochondria
   - B-oxidation, fate of Acetyl CoA, regulation of B-oxidation
   - Other types of oxidation, i.e. alpha-oxidation, w-oxidation, peroxisome oxidation, oxidaton of odd number carbon containing fatty acids and Unsaturated fatty acids etc.
3. Ketogenesis
   - Mechanism and utilization of ketone bodies and significance
   - Ketosis and its mechanism
4. Biosynthsis of fatty acids
5. Eicosanoids, synthesis from archidonic acid, their mechanism and biochemical functions
6. Triacylgycerol synthesis and regulation
7. Synthesis and degradation of phospholipids and their metabolic disorders
8. Cholesterol synthesis, regulation, functions, fate of intermediates of cholesterol synthesis, hypercholesterolemea, atherosclerosis
9. Plasma lipoproteins, VLDL, LDL, HDL, and chylomicrons, their transport, functions and importance in health and disease
10. Glycolipid metabolism and abnormalities

4. Metabolism of Proteins and Amino Acids:

- Amino acid oxidation, metabolic fates of amino acid, transamination, deamination decarboxylation, deamidation and transdeamination
- Transport of amino group, role of pyridoxal phosphate, glutamate, glutamine, alanine
- Ammonia intoxication, nitrogen excretion and urea formation, urea cycle and its regulation, genetic defects of urea cycle
- Functions, pathways of amino acid degradation and genetic disorders of individual amino acids

5. Integration and Regulation of Metabolic Pathways in Different Tissues:

6. Metabolism of Nucleotide:

- De novo purine synthesis
- Synthesis of pyrimidine
- Recycling of purine and pyrimidine bases (the salvage pathway)
- Degradation of purine, formation of uric acid
- Disorders of purine nucleotide metabolism

7. Biochemical Genetics (Informational Flow in the Cell):

1. The structural basis of the cellular information
2. DNA, chromosomes, discovery and organization of DNA in genomes
3. Super coiling of DNA
4. The replication of DNA (DNA dependant DNA synthesis)
   - DNA polymerase, its components and functions
   - Initiation, elongation and termination of replication
   - DNA repair, mutation and cancers
5. The Transcription (DNA dependant RNA synthesis)
   - RNA polymerase, its components and functions
   - Initiation, elongation and termination of transcription
   - RNA processing
   - RNA dependant synthesis of RNA and DNA

- Reverse transcription-DNA synthesis from Viral RNA
- Retroviruses in relation to Cancer and AIDS

6. The Translation (Protein Synthesis)
   - The genetic codes and their characteristics
   - Initiation, elongation, and termination of protein synthesis
   - Post-translational modification
   - Regulation of gene expression

7. Molecular biology technology
   - DNA isolation
   - DNA-recombinant technology
   - Hybridization, blotting techniques

8. Genetic disorders

8. Biochemistry of Endocrine System:

- Chemistry, secretion, mechanism of action, regulation of various hormones.

9. Biochemistry of Digestive Tract

- Digestion and absorption
- Composition, function and daily secretion of saliva, gastric juice, gastric acid(HCL), pancreatic juice, bile, and intestinal secretion
- Digestion of proteins, carbohydrates, nucleic acids and lipids
- Biochemical disorders of GIT i.e achlorhydria, acid peptic disease, lactose intolerance and cholelithiasis

LABORATORY PRACTICAL

1) The techniques and instrumentation of clinical biochemistry
   - Spectrophotometry
   - Flame photometry
   - UV Spectrophotometry
   - PH metery

2) Estimation and clinical interpretation of:
   - Blood Glucose
   - Glucose Tolerance Test (Demonstration)

3) Determination of Amino acids in Urine by Paper Chromatography (Demonstration)

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. Pain, Sleep and Consciousness

- Concept of pain
- Physiology of pain, psychosocial assessment and management of chronic /intractable atypical facial pain.
- Stages of sleep.
- Physiology of consciousness.
- Attend states of consciousness.
- Psychological influence on sleep and consciousness.
- Non-pharmacological methods of inducing sleep.
- Changes in consciousness.

2. Communication Skills

- Principles of effective communication.
- Active listening.
- Art of questioning.
- Good and bad listener.
- Counseling: steps, scope, indication and contraindications.
- Dealing with real life crisis and conflict situations in health settings.
- A practical method of communication between the doctor and patient about disease, drugs, prognosis etc.

3. Interviewing

- Collecting data on psychosocial factors in Medicine / Surgery / Reproductive Health / Paediatrics and other general health conditions.
- Types of interview.
- Skills of interviewing.

4. Health Psychology

- Importance of psychological consideration in clinical management of patients.
- Psychological therapies.
- Key concepts in child's social and cognitive development.
- Psychological changes during adolescence and old age and their clinical management.

- Impact of illness on a patient's psychological well being including the ability to cope and understand the association between psychological stress and physical well being.
- Role of doctor in patient reassurance and allaying anxiety and fear.

5. Social and Community Perspective

- Inequalities of healthcare and the relationship of social class.
- Ethnicity, culture and racism. How disease pattern and medical care vary by culture and ethnicity?
- Gender and Healthcare.
- Influence of health and illness on behaviour.

6. Application of Behavioural Principles in Health and Disease

- Mentally / emotionally handicapped.
- Physically handicapped.
- Chronically ill.
- Homebound
- Medically compromised.

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. **Development Psychology for Healthcare Professions** by Katherine A. Billingham.

(E) ISLAMIAT & PAKISTAN STUDIES

A. ISLAMIAT

1. Fundamental Beliefs and Practices of Islam.

- Tauheed (Unity of Allah), Risalat (Finality of the Prophet hood), Akhirat (Day of Judgement).
- Salat, Soum, Zakat, Hajj and Jehad

2. Need of Religion and its role in human life.

3. Morality in Islam.

- Concept of morality.
- Concept of morality and Faith.
- Islamic principles and methods of character – building.
- Moral values in Islam.

4. Rights of the individual in Islam.

5. Quran as a guide for the modern society and scientific development.

6. Holy Prophet (Peace be upon Him) and his life.

7. Islamic concept of state.

8. Islam and society.

- Role of man and women in society.
- Rights of women children in Islam.
- Concept of woman's freedom in Islam.
- Hukook-ul-Ibad.

9. Importance of Rizk-e-Hilal.

10. Contribution of Islamic scholars in science and medicine.

RECOMMENDED BOOKS

1. **Introduction to Islam** by Dr. Hamidullah.

2. **Islam : Its meaning and message** by Khurshid Ahmad.

3. اسلام یک نظر میں مولانا صدرالدین اصلاحی

4. قرآن اور تعمیر سیرت ڈاکٹر میر ولی الدین

B. PAKISTAN STUDIES

1. **Ideology of Pakistan.**
   - Definition and elucidation.
   - Historical aspect.
   - Ideology of Pakistan in the light of speeches and sayings of Allama Iqbal and Quaid-e-Azam.

2. **Pakistan Movement.**
   - Basis for the creation of Pakistan.
   - Historical developments : 1857-1947

3. **Political Developments in Pakistan since 1947.**

4. **Land and People of Pakistan.**
   - Geography.
   - Society.
   - Culture.
   - Natural resources.
   - Health and education with reference to characteristics trends and problems.

RECOMMENDED BOOKS

1. **Ideological Orientations of Pakistan** by Sharif Al Mujahid.

2. **Struggle for Pakistan** by I.H. Qureshi.

3. **The Making of Pakistan** by Richard Symond.