**Foundation Module I**

**First Professional Year MBBS**

**6 Weeks**

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# General Learning Outcomes

By the end of this module the students would be able to;

## Knowledge

1. Familiarize with the MBBS system-based curriculum
2. Recognize the role of different disciplines in studying human body and its diseases.
3. Describe the structure, function and biochemical composition of cell.
4. Describe the cell division, its types and genetic material along with its clinical correlation.
5. Describe the basic organization of human body.
6. Explain the maintenance of homeostatic mechanism.
7. Describe the various stages of pre embryonic human development and correlate them with various malformations.
8. Describe the importance of buffer and PH system.
9. Describe various cellular adaptations during cell growth, differentiation and cell injury.

## Skills

1. Describe the basic laboratory techniques and use of microscope.
2. Follow the basic laboratory protocols.
3. Perform biochemical analysis of carbohydrates.

## Attitude

1. Follow the basic laboratory protocols.
2. Participate in class and practical work efficiently.
3. Maintain discipline of the college.
4. Follow the norms of the college properly.
5. Communicate effectively in a team with colleagues and teachers.
6. Demonstrate professionalism and ethical values in dealing with patients, cadavers, colleagues and teachers.
7. Communicate effectively in a team with colleagues and teachers.
8. Demonstrate the ability to reflect on the performance.

# THEMES FOR FOUNDATION MODULE

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| **SNO** | **Theme** | **Duration** |
| 1 | Orientation | 1 week |
| 2 | Cell | 1 week |
| 3 | Growth & Development of Human Body | 2 weeks |
| 4 | Human Body tissues, bones & joints | 2 weeks |

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| THEME–I: Orientation | | |
| SNO | Topic | Learning Outcomes |
| ANATOMY | | |
| 1 | Anatomy and its subbranches | Define anatomy and its branches  Describe purpose of study of anatomy and its branches |
| PHYSIOLOGY | | |
| 2 | Physiology and its subbranches | Enumerate the branches of physiology |
| BIOCHEMISTRY | | |
| 3 | Introduction to biochemistry and its implication in medicine | Define biochemistry  Discuss the role of biochemistry in medicine. |
| PATHOLOGY | | |
| 4 | Introduction to pathology and its implication in medicine | Define pathology  Enumerate the different branches of pathology.  Identify different sampling and processing techniques in different branches of pathology. |
| PHARMACOLOGY | | |
| 5 | Introduction to pharmacology and its role in modern medicine | Define pharmacology and role of pharmacology in medicine.  Define the pharmaco dynamics and pharmacokinetics |
| COMMUNITY MEDICINE | | |
| 6 | Introduction to community Medicine and its implication | Describe Role of community medicine/public health in health care system. |
| FORENSIC MEDICINE | | |
| 7 | Introduction to Forensic Medicine and Toxicology | Define Forensic Medicine, forensic pathology and state Medicine.  Identify the Branches of Forensic Medicine.  Describe the History of Forensic Medicine.  Discuss the scope of Forensic Medicine.  Identify the essential facilities for medico legal investigation.  Define Medical Jurisprudence (not included for assessment in foundation module first year MBBS) |
| 8 | Pakistan Medical Commission, Consent. | Describe the structure and functions of Pakistan Medical Commission. |
| MEDICAL EDUCATION | | |
| 9 | Curriculum structure  Teaching learning strategies | Discuss the curriculum and modules.  Describe the use of study guides. (not to be assessed)  Differentiate between various teaching & learning strategies.  Enlist various assessment tools & assessment policy. (Not to be assessed). |
| IT Skills | | |
| 10 | Importance of IT skills | Define IT and its importance |
| 11 | MS word skills  PowerPoint skills  Excel sheet | Prepare the assignment on MS word  Prepare the presentation on power point  Use the excel sheet |
| Library | | |
| 12 | Literature search and library resources | Literature search skills |

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| THEME–II: CELL | | |
| SNO. | Topic | Learning Outcomes |
| ANATOMY | | |
| 13 | Cell structure and its Organelles | Describe the cell as a living unit of body  Describe the structure of cell and its organelles.  Describe the structure of cytoplasmic organelles of the cell & correlate it with their functions. |
| 14 | Nuclear structure & components | Describe the structure of the nucleus, nucleolus & chromosome and their functions in cell integrity. |
| 15 | Cell division  Mitosis | Explain the process of cell division.  Describe mitotic cell division with its stages. |
| 16 | Meiosis | Explain the process of Meiosis  Describe karyotyping.  Explain the non-disjunction of chromosomes.  Correlate the process of non-disjunction with chromosomal abnormalities |
| PHYSIOLOGY | | |
| 17 | Cell membrane physiology | Explain Intra cellular and extra cellular environment.  Correlate cytoplasmic organelles with their functions. |
| 18 | Homeostasis | Define homeostasis.  Describe the Homeostatic mechanism of major functional systems.  Describe the characteristics of control systems with examples |
| 19 | Membrane potential | Define membrane potential  Describe ionic conc. differences across cell membrane  Explain the Nernst equation.  Explain origin of normal resting membrane potential |
| 20 | Movements of cell | Explain the amoeboid movement of cells.  Describe the ciliary movements |
| 21 | Depolarization & Repolarization | Explain the role of voltage gated Na+ and K+ channels in action potentials.  Discuss the changes in conductance of Na and K channels with changes in membrane potentials |
| BIOCHEMISTRY | | |
| 22 | Biochemical structure of cell  Biochemical structure of Mitochondria | Explain the Bio-chemical composition of cell organelles and cytoplasm  Describe the chemical structure of mitochondrial membrane.  Explain the biochemical importance of mitochondrial membrane. |
| 23 | Nuclear membrane | Describe Bio-chemical structure of nuclear membrane and its functions. |
| 24 | RNA & DNA | Define and explain nucleotides and nucleosides.  Describe the components of nucleotides  Describe the functions of Nucleotides  Describe the types of nucleic acids  Differentiate between RNA and DNA.. |
| 25 |  |  |
| 26 | Buffer | Define Buffer and its role in maintenance of body PH  Define colloidal state and Henderson Hasselbalch equation.  Define adsorption and how it occurs.  Explain ion exchange resin |
| 27 | Cellular membrane transport mechanism | Explain membrane transport.  Discuss passive diffusion, active transport, and facilitated transport via a channel or carrier.  Describe and evaluate the role of ion gradients, co transporters, and ATP in active transport mechanisms. |
| PATHOLOGY | | |
| 28 | Cell injury | Describe the various causes of cell injury.  Describe the response of a normal cell to stimuli.  Describe the mechanisms of cell injury.  Describe the different types of cellular adaptations. |
| PHARMACOLOGY | | |
| 29 | Routes of administration of drugs | Enlist the route of administration of a drug. |
| 30 | Transmembrane drug transport | Explain how drugs are transported across cell membrane and factors affecting it |
| 31 | Receptor and cellular basis | Enlist the types of drug receptors |
| LAB WORK | | |
| 32 | The Microscope | Identify parts of microscope.  Demonstrate operation of microscope.  Describe the method of focusing slide at different magnifications.  Follow the specified norms of lab work. |
| 33 | Lab Equipment | Introduction to lab techniques  Identify the equipment used in lab work |
| 34 | PH and buffer solutions | Define normal solution  Define standard solution.  Prepare 0.1N solution of NaOH.  Prepare 0.1N solution of HCL.  Measure the PH of given solution (practical). |

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| THEME–III: GROWTH & DEVELOPMENT OF HUMAN BODY | | | |
| SNO | Topic | | Learning Outcome |
| 35 | Introduction to Embryology | | Describe the developmental stages.  Describe the embryologic terminology.  Explain significance of embryology. |
| 36 | Spermato-Genesis | | Describe the process of spermatogenesis.  Differentiate between spermiogenesis and spermatogenesis.  Describe the morphological changes during maturation of gametes. |
| 37 | Oogenesis | | Describe oogenesis and its correlation with meiosis.  Compare the male and female gametes. |
| 38 | Transport Of Gametes | | Explain the transport of gametes.  Describe the transport of sperms.  Describe the oocyte transport.  Explain the maturation of sperms. |
| 39 | Female reproductive cycle | | Describe the ovarian cycle.  Discuss the process of follicular development  Explain the process of ovulation.  Correlate ovulation with the phases of menstrual cycle. |
| 40 | Fertilization –Events | | Define fertilization.  Describe the process of fertilization.  Explain assisted reproductive technologies like In-vitro fertilization (IVF), assisted IVF and intra cytoplasmic sperm injection (ICSI). |
| 41 | Fertilization –Clinical Correlates Cleavage & Blastocyst Formation | | Discuss the clinical correlation of the fertilization.  Describe the process of cleavage of zygote.  Discuss the formation of blastocyst.  Summarize the events of first week of development. |
| 42 | Implantation & Its Abnormalities | | Describe the process of implantation.  Enumerate the sites of implantation.  Explain the clinical correlations of the implantation process. |
| 43 | Amniotic cavity | | Describe the formation of amniotic cavity  Describe the development of embryonic disc  Describe the development of umbilical vesicle.  Explain the development of Chorionic sac. |
| 44 | Events Of 2nd Week of Development | | Summarize the events of second week of development.  Explain the clinical correlates of the second week of development. |
| 45 | Formation of Notocord | | Explain the process of formation of Notocord |
| 46 | Events of 3rd Week of Development | | Describe the process of gastrulation.  Explain the process of Neurulation.  Explain the development of somites.  Describe the development of intra-embryonic coelom. |
| 47 | Derivatives of germ layers | | Describe briefly derivatives of germ layers  Ectoderm  Mesoderm  Endoderm |
| 48 | Further development of Trophoblast and Neuralation | | Describe the process of development of Trophoblast and neurulation |
| 50 | Fetal membranes | | Describe the formation of fetal membranes |
| 51 | 4th week: Folding of embryo | | Describe the process and types of folding of embryo |
| 52 | Highlights of 4-8 weeks | | Enlist the events occurring in 4-8 weeks of development |
| BIOCHEMISTRY | | | |
| 47 | Chemistry of Acids and Bases | | Define acids, bases  Describe strong acids and weak acids.  Describe strong bases and weak bases.  List different types and sources of acids and bases in our body  Describe the mechanism of their normal balance and biochemical importance |
| 48 | Importance of surface tension and viscosity in our body | | Explain surface tension, viscosity, vapor pressure, normal boiling point and capillary action |
| 49 | Carbohydrates -I | | Describe carbohydrates and give their Bio-chemical importance.  Classify Carbohydrates  Explain carbohydrate and its Bio-chemical structure.  Describe the different isomers of monosaccharides. e.g. Galactose, mannose, fructose, dextrose.  Describe the role of dextrose in I/V infusion.  Describe the role of mannitol in cerebral edema. |
| 50 | Carbohydrates -II | | Describe the structure of disaccharides and oligosaccharides. |
| 51 | Carbohydrates -III | | Relate the structure of polysaccharides with its clinical importance.  List the functions of carbohydrates in cell membrane, energy provision and nutrition supply to different parts of body. |
| COMMUNITY MEDICINE | | | |
| 52 | Determinants of health | Define health  Describe the Determinants of Health | |
| 53 | Disease causation | Describe Spectrum of Disease  Explain Natural History of Disease  Explain Theories of Disease Causation.  Differentiate between Disease Elimination and Eradication. | |
| 54 | Chain of infection | Describe reservoirs of infection & chain of infection | |
| 55 | Levels of prevention | Discuss /describe Levels of Prevention | |
| LAB WORK | | | |
| 56 | Sterilization | Explain the process of sterilization  Enumerate the different methods of sterilization  Observe the process of autoclaving in the laboratory | |
| 57 | Capillary Blood Sampling | Obtain capillary blood sample for hematological investigations through prick method  Identify the sites for obtaining blood sample with different methods and list the indications for their use. | |
| 58 | Detection of Monosaccharide’s | Define Monosaccharide’s  Discuss structure and types  Perform the sequence of tests to identify the monosaccharides in a given solution. | |
| 59 | Detecting of Reducing and non-reducing Sugars | Define reducing sugars, types.  Discuss structure and types of reducing sugars  Perform Benedicts test | |
| 60 | Detection of Polysaccharides in a given Solution | Define Polysaccharides.  Discuss structures and types of Polysaccharides  Perform the sequence of tests to identify the polysaccharides in a given solution. | |

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| THEME–IV: HUMAN BODY TISSUES, BONES & JOINTS | | | | |
| SN0 | Topic | | Learning Outcome | |
| ANATOMY | | | | |
| 61 | Organization of human body | | Describe the levels of organization of human body | |
| 62 | Anatomical terms | | Describe the anatomical terms for planes, position and movements | |
| 63 | Classification of Bones | | Describe the structure and function of bone  Classify bones on the basis of length and shape.  Identify the markings on bone | |
| 64 | Cartilage | | Describe cartilage  Classify the types of cartilage  Describe the types of cartilages | |
| 65 | Introduction to Joints | | Classify joints on the basis of structure.  Describe the mechanism of movements of   joint | |
| 66 | Muscles | | Describe various muscle types along with structure. | |
| 67 | Skin / Integumentary system  Skin (dermis & epidermis) Skin creases, Nails, Hairs, Glands (Sebaceous & sweat) | | Discuss the anatomical structures of Skin / Integumentary system | |
| 68 | Lymphatic system | | Describe the lymphatic system.  Explain the functions of lymphatic system  Describe the organization of lymphatic system  Explain the mechanisms for the movement of lymph in the body. | |
| 69 | Nervous system  Divisions  (central & peripheral and somatic & autonomic) | | Define the organization of nervous system  Describe the divisions of nervous system  Describe the formation of spinal nerve and concept of dermatome and myotome  Describe the formation of nerve plexus. | |
| 70 | Autonomic Nervous system Sympathetic. parasympathetic nervous system | | Describe the organization of autonomic nervous system  Differentiate between sympathetic and parasympathetic nervous system on the basis of structure. | |
| 71 | Membranes:  Mucous membranes, Serous membranes | | Describe the structure of membranes of human body | |
| 72 | Fascia, ligaments and raphe | | Describe the anatomy and significance of fascia, ligaments and raphe. | |
| 73 | Radiological anatomy | | Identify various anatomical landmarks on radiography.  Describe commonly used radiographs.  Describe various view used for obtaining radiographs. | |
| HISTOLOGY | | | | |
| 74 | Basic Body tissue  Definition of tissue  Epithelial tissue  Connective tissue  Muscular tissue  Nervous tissue | | Define tissue  Describe the basic tissues in human body | |
| 75 | Epithelial tissues  Classification of epithelium  General characteristics and Functions of epithelium | | Classify epithelium  describe the general features of epithelium  explain the specialized functions of different types of epithelial cells  Describe the structure of main types of cell junctions | |
| 76 | Glandular Epithelium | | Enlist glandular epithelia  Classify them on the basis of morphology, nature of secretion and mode of secretion  Differentiate between exocrine & endocrine glands on the basis of structure and function. | |
| 77 | Epithelial Cell Surface Specialization | | Describe the surface specialization of epithelia  Correlate their structure, with their location and function | |
| 78 | Structure & Function of Basement Membrane | | Describe the structure of basement membrane & correlate it with its function. | |
| 79 | Connective tissue | | Define connective tissue.  Classify connective tissues.  Explain the different types of Connective tissues | |
| Physiology | | | | |
| 80 | Autonomic Nervous system | | Describe the functions of the autonomic nervous system.  Compare and contrast the functions of sympathetic and para sympathetic nervous system.  Classify autonomic receptors. | |
| Biochemistry | | | | |
| 81 | | structure and function of GAGS | | Describe the structure and function of GAGS and its clinical importance |
| PATHOLOGY | | | | |
| 82 | Necrosis | | Discuss the Process of necrosis  Explain the process of apoptosis  Differentiate between apoptosis and necrosis | |
| 83 | Inflammation | | Describe acute inflammation  Describe events of acute inflammation  Describe chronic inflammation  Differentiate between acute and chronic inflammation. | |
| FORENSIC MEDICINE | | | | |
| 84 | Death | | Define death.  Describe stages of death.  Describe medico legal importance of stages of death. | |
| LAB WORK | | | | |
| 85 | Tissue Processing | | Describe the process of tissue processing for histo-pathological examination. | |
| 86 | Anatomical terms | | Demonstrate anatomical terms for planes, position and movements.  Demonstrate standard anatomical position and its application. | |
| 87 | H& E staining | | Perform H & E staining of tissue slides under supervision in the laboratory | |
| 88 | Simple Epithelia | | Identify and describe simple epithelia under M/S. | |
| 89 | Stratified Epithelia | | Identify and describe stratified epithelia under M/S. | |
| 90 | Glands | | Identify different types of glands under M/S. | |
| 91 | Smear preparation | | Prepare a blood smear. | |