Dow University of Health Sciences

FOUNDATION MODULE

8 weeks, 9 credit hours

First Year MBBS

5 YEAR CURRICULAR ORGANIZATION

<table>
<tr><th>Spiral</th><th>year</th><th colspan="5">Modules</th></tr>
<tr><td rowspan="3">First Spiral</td><td rowspan="2">I</td><td colspan="2">FND1- Foundation
Cell, Genetics & Cell Death
(Basics of Anatomy, Physiology, Biochemistry, Gen. Pathology, Gen. Pharmacology, Community Medicine & Behavioral Sciences)
6 Weeks</td><td>Foundation Sub Module
Genetics, Microbiology, Bioethics
2 Weeks</td><td colspan="2">HEM1- Blood Module
Immunity, Inflammation, Tissue repair, Antimicrobials & Neoplasia
8 Week</td></tr>
<tr><td colspan="3">LCM1- Locomotion
Bones, Joints, Nerves & Muscles, 8 weeks</td><td>RSP1- Respiratory System 4</td><td>CVS1- Cardiovascular System 4 weeks</td></tr>
<tr><td>II</td><td colspan="3">NEU1- Nervous System
8 weeks</td><td>HNN1- Head & Neck & Special</td><td>END1- Endocrinology 4 weeks</td></tr>
<tr><td rowspan="4">Second Spiral</td><td rowspan="2">III</td><td colspan="3">GIL 1-GIT and Liver
8 weeks</td><td>EXC1- Renal and Excretory System</td><td>REP1- Reproductive System 4 weeks</td></tr>
<tr><td>IDD 1- Infectious diseases 4 weeks</td><td colspan="2">HEM2- Hematology
4 weeks</td><td>RSP2- Respiratory System 4 weeks</td><td>CVS2- Cardiovascular System 4 weeks</td></tr>
<tr><td colspan="3">GIL 2-GIT and Liver (including Nutritional Disorders)
8weeks</td><td>EXC2- Renal & Excretory</td><td>END2- Endocrinology 4 weeks</td></tr>
<tr><td rowspan="2">IV</td><td colspan="2">ORT2 Orthopedics, Rheumatology, Trauma, 6 weeks
PMR-</td><td>Physical Medicine & Rehabilitation 2 weeks</td><td colspan="2">REP2- Reproductive System
8 Weeks</td></tr>
<tr><td>DPS- Dermatology Plastic Surgery / Burns 2 weeks</td><td>GEN- Genetics 1 week</td><td>NEU2- Neurosciences and Psychiatry 8 weeks</td><td>OPH / ENT* 3 week</td><td>ENT/OPH * 3 week</td></tr>
<tr><td rowspan="3">Third Spiral</td><td rowspan="3">V</td><td colspan="5">Half of the class will cover Medicine & Allied and the other half will cover Surgery & Allied modules in first half of teaching session. The two halves will exchange in latter half of year.</td></tr>
<tr><td colspan="3">Clinical Rotation 8:30 to 1:00 (with Ambulatory, Emergency, Intensive care)
In Medicine, Pediatrics, Cardiology and Neurology units
▪ Lecture on problem based approach, twice a week
▪ Ward tutorial twice a week
▪ Student research presentation once a week</td><td colspan="2">Clinical Rotation 8:30 to 1:00 (Inpatient, Ambulatory, Emergency, Intensive care and Operation Theatres)
In Surgery, Gynae & Obstetrics, Orthopedics and Neurosurgery.
▪ Lecture on problem based approach, twice a week
▪ Ward tutorial twice a week
▪ Student research presentation once a week</td></tr>
<tr><td colspan="5">PARALLEL THEMES:
The following themes are not part of any individual module but shall run concurrently:
Communication Skills, Clinical Skills, Writing and Presentation Skills, Article Writing, Ethics</td></tr>
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RATIONALE:

A Student stepping into a medical school requires orientation, and introduction to medical sciences with respect to health & disease. The student also needs certain guidelines to achieve goals to become a successful but ethical doctor in future.

Foundation module provides integration of core concepts that underlie the foundation of basic sciences and their use in clinical medicine. This will eventually lead to develop critical thinking for integration and application of basic knowledge for clinical application

TERMINAL OBJECTIVE:

By the end of Foundation module, the student shall be able to:

- Define levels of organization of human body
- Identify homeostatic mechanism and its importance in body functions
- Describe the anatomy, biochemistry & physiology of cell
- Explain different modes of transportation across the cell membrane
- Interpret the biochemistry of carbohydrates, proteins and fats
- Define & illustrate stepwise mechanism of human development
- Discuss histology of epithelium, glands, connective & muscular tissue.
- Recognize morphologic alterations in cell injury & cell death.
- Define behavioral sciences and its role in medical sciences
- Discuss community medicine and its application for a medical doctor

MODULE OBJECTIVES:

1. Conceptualize the integrated assembly of structures and functions in human body by relating with the arrangement of different LEVELS
2. Recognize the role of physiochemical aspects for the maintenance of homeostasis.
3. Identify the different types, occurrence and role of macromolecules for health
4. Use light microscope to identify the various tissues stained by H/E staining.
5. Relate organization and structure of different components of a cell and arrangement of cells in organ system manner in a living human body.
6. Correlate the composition and basic structure of cell membrane with its functional importance and adaptation.
7. Interpret the physiological basis of different types of transport mechanisms through cell membrane
8. Recognize the exact location of a dissected/prosected part /organ of human body with respect to various TERMS of POSITIONS,

9. Discuss the pathological aspects of cell and different mechanisms associated with morphological spectrum of injury at simple and electron microscopic levels.
10. Differentiate between normal and abnormal cell division
11. Describe the organization of cells in the epithelium and other basic tissues of body
12. Differentiate a human cell from a bacterial cell for the recognition of disease caused by bacteria
13. Application of basic principles of chemistry in body homeostasis
14. Use the knowledge of CARBOHYDRATE chemistry for health
15. Classify protein on the basis of structure, function and chemical reactions and recognize their importance in balanced diet and health
16. Justify the importance of LIPIDS for balanced diet and health
17. Appreciate the function of Support and Protection by using the general knowledge of SKIN, FASCIA and BONES and their component tissues
18. Associate the Movement and Posture of human body with the structure of MUSCLES and JOINTS.
19. Explain the process of energy flow within the cell.
20. Explain the Physiological functions of Transportation and Exchange by applying knowledge of structure of BLOOD VESSELS.
21. Integrate the function of Defense with the structure of LYMPH NODES AND LYMPHATICS.
22. Correlate the functions of Control and Regulation with the knowledge of arrangement and distribution of NERVOUS SYSTEM.
23. Apply the basic concepts of Chemistry of Nucleic acids and their types for understanding the mechanism of transfer of genetic characters and for protein synthesis.
24. Identify the various stages of development of human embryo to understand the mechanism of developmental disorders and anomalies.
25. Conceptualize the interchange of substances between maternal and fetal blood by applying the knowledge of structure and functions of placenta and fetal membranes
26. Relate various birth defects with genetic factors and environmental teratogens
27. Recognize the importance of procedures for assessing fetal status for the wellbeing of newborn infant
28. Effect of endogenous (physiological) and exogenous (drug) molecules on functioning of cells
29. Correlate the principles of general pharmacology for the appropriate therapy of disorders / diseases
30. Recognize the importance of Community medicine for the development of public health
31. Recognize the importance of behavioral sciences
32. Recognize the importance of medical ethics for future practice.

MODULE CONTENTS:

ANATOMY

Gross Anatomy:

1. FND 1 ANG 1Levels of organization of human body
2. FND 1 ANG 2Terminologies: Anatomical positions, Terms of positions, Anatomical planes
3. FND 1 ANG 3Terms of movement
4. FND 1 ANG 4Division and Function of Skeletal System, Classification of Bones, Gross Structure of Adult Long Bone, Parts of Young Long Bone
5. FND 1 ANG 5Bone development (ossification), Blood supply of long bone Cartilage Bone markings
6. FND 1 ANG 6General concepts of muscles
7. FND 1 ANG 7General concepts of joints
8. FND 1 ANG 8General concepts of blood vessels
9. FND 1 ANG 9Introduction to Lymphatic system
10. FND 1 ANG 10Nervous System Division CNS, PNS Neurons: Types Classification Nerve (With Its covering) & Myelin sheath
11. FND 1 ANG 11Typical Spinal Nerve
12. FND 1 ANG 12Autonomic nervous system sympathetic
13. FND 1 ANG 13Autonomic nervous system, Parasympathetic
14. FND 1 ANG 14Integumentary system Parts, function, appendages + fascia

General Histology:

1. FND 1 ANH 1Cell Introduction
2. FND 1 ANH 2Introduction to microscopy
3. FND 1 ANH 3Nucleus
4. FND 1 ANH 4Cell Organelles (Endoplasmic Reticulum, Golgi Apparatus, Ribosomes, Centrioles, Mitochondrion, Lysosomes, Peroxisomes
5. FND 1 ANH 5Inclusions (Lipid, Glycogen, Pigments, Melanin, Lipofuscin, Lutein &Secretory Granules), Cytoskeleton (Microtubules, Filaments : Thick, Thin /Microfilaments, Intermediate)
6. FND 1 ANH 6Epithelium (Types, Location, Functions)
7. FND 1 ANH 7Epithelium:2Types, Location, Functions
8. FND 1 ANH 8Exocrine glands
9. FND 1 ANH 9Cell Surface Modification (Microvilli, Cilia, Flagella)
10. FND 1 ANH 10Cell Junctions
11. FND 1 ANH 11Connective tissue1: components
12. FND 1 ANH 12Connective tissue2: classification description of each type
13. FND 1 ANH 13Muscular tissue

General Embryology:

1. FND 1 ANE 1Mitosis + Cell cycle
2. FND 1 ANE 2Meiosis + Comparison with Mitosis
3. FND 1 ANE 3Gametogenesis: spermatogenesis and spermiogenesis
4. FND 1 ANE 4Oogenesis, Prenatal and Postnatal maturation of oocytes and comparison of gametes
5. FND 1 ANE 5Female Reproductive Cycle Ovarian cycle+ menstrual cycle
6. FND 1 ANE 6Female Reproductive organs
7. FND 1 ANE 7Transportation of ovum and fertilization
8. FND 1 ANE 8First Week of Development After Fertilization

9. FND 1 ANE 92nd Week of Development
10. FND 1 ANE 103rd week of development I, gastrulation, formation of primitive streak and notochord
11. FND 1 ANE 113rd week of development II: Neurulation and development of somites
12. FND 1 ANE 12Fourth to eighth weeks organogenetic period phases of embryonic development
13. FND 1 ANE 13Fourth to eighth weeks organogenetic period highlights of the fourth to eighth weeks
14. FND 1 ANE 14Fetal Period (9th Week till birth)
15. FND 1 ANE 15Fetal Membranes Amnion (including disorders of amniotic fluid) Chorion +umbilical cord, Yolk Sac
16. FND 1 ANE 16Placenta, Multiple pregnancies
17. FND 1 ANE 17Teratogenesis
18. FND 1 ANE 18Prenatal Diagnosis

PHYSIOLOGY

1. FND 1 PHY 1Homeostatic mechanism of major functional system
2. FND 1 PHY 2 Body fluid compartments: Extra cellular fluid and internal environment
3. FND 1 PHY 3Cell membrane and its functions
4. FND 1 PHY 4Functions of Cell Organelle
5. FND 1 PHY 5 Transport across the cell membrane – Passive Transport
6. FND 1 PHY 6Transport across the cell membrane – Active Transport
7. FND 1 PHY 7Transport across the cell membrane – Bulk Transport
8. FND 1 PHY 8Cell signaling mechanisms: 1^{st} & 2^{nd} messengers
9. FND 1 PHY 9Genetic structure and function
10. FND 1 PHY 10Genetic control of protein synthesis (transcription and translation)

PRACTICALS:

1. FND 1 PHY 11To test the osmotic fragility of red blood cells.

BIOCHEMISTRY

1. FND1 BIO 1The Importance of macromolecules in Organization of living system.
2. FND1 BIO 2Cell Membrane: Macromolecular organization in composition.
3. FND1 BIO 3Water: Structure and Dissociation.
4. FND1 BIO 4Buffers and pH.
5. FND1 BIO 5Carbohydrates: Structure, Classification and Functions.
6. FND1 BIO 6Carbohydrates: Monosaccharaides and derivatives, isomerism.
7. FND1 BIO 7Carbohydrates: Disaccharide and Polysaccharides.
8. FND1 BIO 8Amino Acids: Structure, Classification and Functions.
9. FND1 BIO 9Proteins: Classification and Functions
10. FND1 BIO 10Proteins: Structure.
11. FND1 BIO 11Extra Cellular Matrix
12. FND1 BIO 12Fatty acids: Structure, Classification and Functions
13. FND1 BIO 13Lipids: Classification and Functions
14. FND1 BIO 14Lipids: Structure
15. FND1 BIO 15Enzymes: Structure and Functions
16. FND1 BIO 16Enzymes: Mechanism of action

17. FND1 BIO 17Water Soluble vitamins
18. FND1 BIO 18Fat Soluble Vitamins
19. FND1 BIO 19Minerals.
20. FND1 BIO 20Energy flow with in the Cell.
21. FND1 BIO 21Nucleic Acids
22. FND1 BIO 22DNA Replication and Repair
23. FND1 BIO 23Transcription
24. FND1 BIO 24Post-Transcriptional Modification
25. FND1 BIO 25Translation
26. FND1 BIO 26Post-Translational Modification
27. FND1 BIO 27Protein Synthesis
28. FND1 BIO 28Regulation of Gene Expression

TUTORIALS:

29. FND1 BIO 29Bicarbonate buffer system
30. FND1 BIO 30Biomedical importance of CHO
31. FND1 BIO 31Biomedical importance of proteins
32. FND1 BIO 32Biomedical importance of lipid

PRACTICAL:

33. FND1 BIO 33Lab Safety
34. FND1 BIO 34Solutions serial dilutions
35. FND1 BIO 35Detection of CHO in body fluid by glucometer uristix
36. FND1 BIO 36Detection of proteins by uristix Biuret /Coagulation
37. FND1 BIO 37Enzyme detection
38. FND1 BIO 38Introduction to Elisa
39. FND1 BIO 39Introduction to PCR

GENERAL PHARMACOLOGY,

1. FND1 PHA 1Introduction to Pharmacology, Routes of administration of drugs
2. FND1 PHA 2Dosage of drugs, Calculation
3. FND1 PHA 3Factors Modifying the Drug Response
4. FND1 PHA 4Pharmaco-kinetics (overview)
5. FND1 PHA 5Pharmaco-dynamics, (overview)
6. FND1 PHA 6Adverse drug reactions/Drug-Drug interactions

GENERAL PATHOLOGY:

CELL INJURY

1. FND1 PTH 1Outline of cellular response to stress and injury
2. FND1 PTH 2Cell injury and cell death
3. FND1 PTH 3Morphologic Alternations in cell
4. FND1 PTH 4Intracellular accumulations
5. FND1 PTH 5Apoptosis

BACTERIOLOGY

6. FND1 PTH 6Structure of bacteria cell
7. FND1 PTH 7Bacterial genetics 1
8. FND1 PTH 8Bacterial genetics 2
9. FND1 PTH 9Normal Flora
10. FND1 PTH 10Classification and growth of bacteria
11. FND1 PTH 11Pathogenesis of Microorganism
12. FND1 PTH 12Lab Diagnosis + Vaccines

COMMUNITY MEDICINE

1. FND1 COM 1Introduction to community medicine
2. FND1 COM 2Origin and determinants of disease
3. FND1 COM 3Health system research
4. FND1 COM 4Healthy city

BEHAVIORAL SCIENCE

1. FND1 BEH 1Introduction to behavioral science web
2. FND1 BEH 2Culture, cultural influences, belief
3. FND1 BEH 3Delivery culturally relevant care
4. FND1 BEH 4Value & attitudinal transformation

MEDICAL ETHICS

1. FND1 MES 1Introduction to bioethics (Definition of terms and Major Principals of Bioethics)
2. FND1 MES 2Clinical Ethics (Autonomy {Informed Consent/Choices}, Maximum Benefits {Beneficence}, No Harm {Non-maleficence}, Resource allocation/fairness/Distributive Justice).
3. FND1 MES 3Truth Telling
4. FND1 MES 4Privacy and confidentiality
5. FND1 MES 5Human Subject research Ethics
6. FND1 MES 6Plagiarism

The contents are subjected to be altered according to requirement of academic calendar.

TEACHING STRATIGIES

LARGE CLASS FORMATS

- Lectures

SMALL GROUP DISCUSSION

- Demonstrations
- Tutorial
- Practical
- Skill labs
- Case based learning sessions

CASE BASED LEARNING

1. **CBL :1**
   - Define Osmosis and how hypernatremia disturbs the osmolarity and cellular function
   - Enumerate the Factors affecting the movement of water and electrolytes across cell membrane (Between extracellular and intracellular compartment)
   - Enumerate the causes of Hypervolemia Hypernatremia , Isovolumic Hypernatremia and Hypovolemic Hypernatremia
   - How homeostasis is achieved if water and electrolytes are disturbed

2. **CBL :2**
   - What is menstrual cycle.
   - What are the phases of menstrual cycle.
   - Which hormones are released during the cycle?
   - How they are controlled?
   - What are their effects?
   - Explain histological changes in ovary and endometrium.

3. **CBL :3**
   - Structure, function and different parts of cell.
   - Importance of cell membrane in regulating various function and defects in disease states.
   - Importance of nucleus in defining cell function and determining phenotype and genotype of the species.
   - Structure, number and types of chromosomes.
   - Effects of Chromosomal anomalies on gross appearance and physiological functions of human body
   - Clinical feature of this syndrome and name it.
   - Social and ethical issues associated with this syndrome.
   - Other syndromes of numerical and structural chromosomal abnormalities.

4. **CBL :4**
    - Define Twin pregnancy.
    - Classify the twin pregnancy on the basis of fetal membranes.
    - Describe the predisposing factor leading to twin pregnancy
    - Explain the types and complications of twin pregnancy.

LEARNING OBJECTIVES OF SKILL LAB

I. **First aid Skills part 1 (bleeding, soft tissue injuries)**

II. **First aid Skills part 2 (burns, fractures, vertebral injury)**

- Assemble a First Aid Kit with at least twelve essential contents.
- Demonstrate appropriate communication skills while handling a patient requiring first aid. (especially reassurance to patient)

Following five common injuries will be addressed: -

I- Bleeding

- Demonstrate the appropriate methods of managing external bleeding. (Direct pressure, compressing pressure points, elevation).

II- Soft Tissue Injuries

- Demonstrate proper management of wounds including assessment, cleaning and dressing (head, forearm and hand, leg and ankle).

III. Vertebral column Injury

- Demonstrate correct rolls, moves, and lifts in transporting a patient to avoid spinal cord injury (log roll, spine stabilization)

IV. Bony Injuries (Fractures)

- Demonstrate the correct method of splinting fractures in leg and arm.

V. Burns

- Demonstrate the correct method of first aid management of burns.

ASSESSMENT PLAN

FOUNDATION MODULE

	WEIGHTAGE
ANNUAL EXAM	80%
MODULE EXAM INTERNAL EVALUATION	
THEORY	10%
PRACTICAL	10%

CREDIT HOURS	
Foundation	**9**

CONTACT HOURS (DISCIPLINE WISE)	
Discipline	**Contact Hours**
Gross Anatomy	**14**
Histology	**13**
Embryology	**18**
Biochemistry	**44.5**
Physiology	**13**
General Pathology	**5**
Bacteriology	**7**
Pharmacology	**6**
Community Medicine	**4**
Behavioral Sciences	**4**
Medical Ethics	**6**
CBL	6
Skill Lab	6

BOOKS

ANATOMY

- **CLINICALLY ORIENTED ANATOMY**
  KEITH.L.MOORE, Arthur F. Dalley, Anne M.R. Agur
  7th or Latest EDITION

- **GRAY'S ANATOMY FOR STUDENTS**
  Drake & Vogl & Mitchell
  3rd or Latest EDITION

- **CLINICAL ANATOMY BY REGIONS (REFERENCE BOOK)**
  Richard S. SNELL
  9th EDITION

- **LAST'S ANATOMY: REGIONAL & APPLIED (REFERENCE BOOK)**
  Chummy S. Sinnatamby
  12th or Latest EDITION

- **ATLAS OF HUMAN ANATOMY**
  FRANK H.NETTER
  6th EDITION

EMBRYOLOGY

- **LANGMAN'S MEDICAL EMBRYOLOGY**
  T.W.SADLER
  13th EDITION

- **THE DEVELOPING HUMAN CLINICALLY ORIENTED EMBRYOLOGY (REFERENCE BOOK)**
  MOORE & PERSAUD & TORCHIA
  10th EDITION

HISTOLOGY

- **MEDICAL HISTOLOGY**
  LAIQ HUSSAIN SIDDIQUI
  5TH or Latest EDITION

- **WHEATERS FUNCTIONAL HISTOLOGY**
  BARBARA YOUNG
  5th EDITION

- **BASIC HISTOLOGY(TEXT AND ATLAS) (REFERENCE BOOK)**
  LUIZ JUNQUEIRA, JOSE CARNEIRO
  11th or Latest EDITION

PHYSIOLOGY

- **GUYTON AND HALL TEXTBOOK OF MEDICAL PHYSIOLOGY**
  GUYTON AND HALL
  13th EDITION

BIOCHEMISTRY

- **LIPPINCOTT'S ILLUSTRATED REVIEWS SERIES**
  DENISE R. FERRIER
  6th EDITION

- **HARPERS ILLUSTRATED BIOCHEMISTRY (REFERENCE BOOK)**
  VICTOR RODWELL, DAVID BENDER, KATHLEEN M. BOTHAM, PETER J. KENNELLY, P. ANTHONY WEIL
  28th EDITION

PATHOLOGY

- **ROBBINS BASIC PATHOLOGY**
  KUMAR & ABBAS
  9TH EDITION

- **ROBBINS & COTRAN PATHOLOGIC BASIS OF DISEASE (REFERENCE BOOK)**
  KUMAR & ABBAS & ASTER
  9th EDITION

COMMUNITY MEDICINE

- **PUBLIC HEALTH AND COMMUNITY MEDICINE**
  SHAH, ILYAS, ANSARI
  7th EDITION

PHARMACOLOGY

- **LIPPINCOTT'S ILLUSTRATED REVIEW PHARMACOLOGY**
  KAREN WHALEN
  6th or Latest Edition

- **BASIC AND CLINICAL PHARMACOLOGY (REFERENCE BOOK)**
  BERTRAM G. KATZUNG
  11th EDITION

MICROBIOLOGY

- **REVIEW OF MEDICAL MICROBIOLOGY AND IMMUNOLOGY**
  WARREN LEWINSON
  14th EDITION

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