بسم الله الرحمن الرحيم

CURRICULUM / STATUTES/ REGULATIONS

FOR 2 YEARS

DIPLOMA PROGRAM IN

CLINICAL PATHOLOGY

Faisalabad Medical University

Faisalabad

Contents

Section A

VISION STATEMENT:

Faisalabad Medical University has been established since 05-05-2017 for purpose of imparting better medical education and encouraging and arranging extensive research and publication in the field of medical science. The vision of university is:

"Striving to achieve national and international stature in undergraduate and postgraduate medical education with strong emphasis on professionalism, leadership, community health services, research and bioethics"

MISSION STATEMENT

The mission of the University is:

"Educate Healthcare professionals to prevent, diagnose and treat human illnesses to practice evidence-based medicine with focus on lifelong healthcare in order to meet the challenges of community needs and competitive medical profession at the same time"

STATUTES

Nomenclature

The name of degree is Post Graduate Diploma / PGD.

Course Title:

Diploma in Clinical Pathology / DCP.

Training Centers

Department of Pathology affiliated with Faisalabad Medical University, Faisalabad.

Duration of Course

The duration of course shall be 2 years with structured training in a recognized department as per university rules and curriculum

Course structure:

The course is structured in two parts:

Part I: The candidate shall undertake the training in the basic sciences as per curriculum. 75% content will be uniform for all the specialties, approved by the Dean basic Sciences and academic council, while 25% will be subject specific, provided and approved by the relevant department and academic council. At the end of 6-months, Part-I Examination will be held by the examination department of Faisalabad Medical University as per the table of specification in the basic medical Sciences subject with same percentage of the content from uniform and subject specific content as indicated above i.e. 75% and 25% respectively. All the candidates will attend class in basic sciences departments as per the time table for 5 days (Monday-Friday) and on Saturday, they will attend their class in their respective specialty as per the time table approved by the university during first Six months.

Part II: The candidate shall undertake training in the specialized department as per the curriculum. At the end of 2 years, Part II Examination will be held by the examination department of Faisalabad medical University as per the table of specification in the subject concerned.

Section B:

Admission and Eligibility Criteria:

Applications for admission to DIPLOMA will be invited through advertisement in print and electronic media and according to guidelines and rules approved by the Faisalabad Medical University

Candidates shall have MBBS or equivalent classification, valid PMDC registration, one year House job (Three-year house job in relevant specialty will be preferred), secured pass percentage in entry test conducted by The Faisalabad medical university, qualify the interview successfully

Required Documents:

1. Completed application Form
2. Copy of MBBS degree with mark sheets of Professional Examinations and certificate of number of attempts in Professional Examination
3. Copy of PMDC Registration certificate.
4. Certificate of completion of required experience.
5. Reference letters from two consultants, with whom the applicant has worked
6. Three latest passport size photographs

Accreditation Related Issues of The Institution

A. Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC).

B. Adequate resources

The university will provide adequate resources Including class-rooms (with audiovisual aids), demonstration rooms, computer lab, clinical pathology lab, theaters, instruments and other equipment etc. for proper Training of the residents as per their course outcomes and objectives.

C. Library

Departmental library should have latest editions of recommended books, reference books and latest journals (National and International).

Section C:

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of two years Diploma programme in Department of Pathology Faisalabad Medical University, Faisalabad is to equip medical graduates with relevant professional Knowledge, skill and ethical values to enable them to apply their acquired expertise at health care institutions.

LEARNING OBJECTIVES:

GENERAL OBJECTIVES:

- Acquire comprehensive knowledge of quality assurance and quality control practices across all pathological disciplines.
- Demonstrate a thorough understanding of the critical role played by pre-analytic, analytic, and post-analytic processes, minimizing errors in pathology practice.
- Proficiently manage the collection and timely dispatch of patient samples to both local and referral laboratories across all four disciplines of pathology.
- Gain expertise in operating and maintaining the latest semi-automated and fully automated laboratory equipment.
- Develop a strong theoretical foundation to interpret laboratory results, correlating them with the clinical profile of patients, and effectively communicate findings with consultants when necessary.
- Demonstrate the ability to work independently and efficiently organize laboratory staff at District Headquarter (DHQ) and Tehsil Headquarter (THQ) labs.
- Stay abreast of the latest advancements in laboratory equipment, kits, techniques, and international clinical pathology service guidelines.

SPECIFIC LEARNING OUTCOMES

- Demonstrate comprehensive knowledge of the theoretical foundations of General and Special Pathology, Microbiology, Hematology, and Chemical Pathology, encompassing detailed understanding and critical analysis of key concepts within the specified course contents.
- Exhibit independent proficiency in the organization, administration, and execution of laboratory procedures within the context of DHQ & THQ health services, ensuring adherence to rigorous quality control measures.
- Apply a judicious approach to the selection of alternative techniques, manual procedures, and reagents, when necessary.
- Demonstrate adept troubleshooting skills within the laboratory setting, swiftly identifying and resolving issues to maintain the seamless flow of diagnostic processes.
- Implement and adhere to international health and safety protocols within the laboratory, ensuring a safe and secure working environment for both staff and patients.
- Provide effective training to laboratory personnel, instilling proficiency in laboratory techniques, protocols, and best practices, fostering a culture of continuous improvement and adherence to quality standards.
- Develop and implement protocols for the ethical conduct of Pathology services, demonstrating a commitment to patient confidentiality, informed consent, and responsible use of laboratory resources.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Synthesize theoretical knowledge with practical application, showcasing a holistic understanding of the interplay between academic concepts and real-world laboratory scenarios in the delivery of effective and ethical pathology services.

Content list:

Part-I:

A : Basic Sciences

Anatomy:

Gross Anatomy of Head & Neck

- Scalp & Face
- Mandible & Cervical vertebra
- Temporal fossa, infra temporal fossa & Mandible
- Eye ball & Extra ocular muscle
- Fascia & Triangles of neck
- Tongue Oral Cavity & Salivary gland
- Pharynx
- Ear
- Nose & para nasal air sinus
- Vessels of head and neck
- Lymphatic drainage of Head and Neck
- Radiography of head and neck
- Cranial cavity

Gross anatomy of Abdomen and Pelvis

- Anterior Abdominal wall
- Anterior abdominal wall & Rectus Sheath
- Inguinal canal & Hernia, Scrotum & External Genitalia
- Peritoneum
- Stomach & small Intestine
- Liver, Pancreas, Spleen & Extra Hepatic Biliary apparatus
- Blood Supply & Nerve supply of abdomen
- Large intestine + appendix
- Posterior abdominal wall
- Bony pelvis + Joints of pelvic
- Female reproductive system
- Anal region
- Nerves & vessels of pelvis

- Female Reproductive system
- Radiographs of abdomen & pelvis

Neuroanatomy

- Dural Venous Sinus & Meninges
- Brainstem 1
- Brainstem 2
- Brainstem 3
- ANS
- Cerebrum 1
- Cerebrum 2
- Diencephalon 1
- Diencephalon 2
- Ventricular System
- Cranial 1
- Cranial 2

GROSS ANATOMY OF SPINAL CORD

General and Special Embryology

General & Special Histology

Physiology

CLINICAL DIPLOMA COURSE OF PHYSIOLOGY

Conceptual and considered approach to

1. Cell physiology
2. Basic and clinical Neurophysiology
3. Blood physiology
4. Heart and overview of circulation
5. Renal physiology
6. Advance endocrinology
7. Respiratory physiology
8. Molecular and physiological aspects of Nerves and Muscles

CELL PHYSIOLOGY

1. Function of cell, cell membrane and its organelles
2. Homeostasis
3. Necrosis
4. Apoptosis

BASIC AND CLINICAL NEUROPHYSIOLOGY

1. Nerve Physiology
2. Action potential in nerve fiber, mechanism of generation action potential in a nerve fiber
3. Parts of central, peripheral nervous system and their physiology
4. Autonomic nervous system
5. Special sense vision (eye)
6. Pathophysiology of the diseases involved

BLOOD PHYSIOLOGY

1. Component of blood, functions of blood plasma and plasma proteins
2. Blood grouping & principles of transfusion
3. The body defense system (Immunology)
4. Disorders of blood

RENAL PHYSIOLOGY

1. Basic structure and function of kidney
2. Glomerular filtration, tubular function and urine formation.
3. Role pf kidney in acid base, Na, K, Ca balance
4. Endocrine and regulatory functions of the kidney.

ADVANCE ENDOCRINOLOGY

1. Endocrine glands, classification their functions
2. Feedback control mechanisms
3. Disorders of endocrine glands

Biochemistry

1. Buffers
   - Ionization of water
   - Henderson – Hasselbach equation
   - Body buffers and regulation of Acid base balance human body
   - Acids produced in the body, mechanisms of regulation of pH, role of lungs and kidney in buffering mechanism.
   - Disorders of acid base metabolism
2. Enzymes:
   - Classification/nomenclature, Properties of enzymes and catalysts, regulation of enzyme activity
   - Functions of enzymes and catalysts,
   - Therapeutic use and application of enzymes in clinical diagnosis
   - Enzyme kinetics, Factors affecting enzyme activity (Michaelis – Menten and Lineweaver Burk equations)
   - Classification of enzyme inhibitors and their biochemical importance
3. Carbohydrates:
   - Definition, biochemical function and classification of carbohydrates, Structure and functions of monosaccharides and their derivatives
   - Disaccharides, Oligosaccharides, Polysaccharides and their Biochemical importance.

4. Proteins:
    - Definitions, biochemical importance and classification of proteins based on physiochemical properties, Structure of proteins and their significance in pH maintenance
    - Amino acids and their structure, properties, functions, Classification and nutritional significance of amino acids,
    - Immunoglobulins and their biomedical significance
    - Plasma proteins and their clinical significance
5. porphyrins and Hemoglobin:
    - Chemistry and biosynthesis of porphyrins and related disorders
    - Structures, functions and types of hemoglobin, Oxygen binding capacity of hemoglobin, factors affecting and regulating the oxygen binding capacity of hemoglobin,
    - Haemoglobinopathies (Sickle cell disease, Thalassemia etc.) and their biochemical causes
    - Degradation of haem, formation of bile pigments, its types, transport and excretion
    - Hyperbilirubinemias, biochemical causes and differentiation
6. Lipids and Fatty Acids:
    - Classification of lipids and their biochemical functions,
    - Structure and biochemical function of neutral lipids phospholipids, glycolipids and sphingolipids
    - Classification of fatty acids and their biochemical functions.
    - Eicosanoids and their function in health and disease
    - Steroids and their biochemical role, Cholesterol, its structure, chemistry and functions
    - Bile acids and bile salts
    - Lipid peroxidation and its clinical significance
7. Vitamins and minerals:

- Vitamins and their different types, Classification of vitamins, their chemical structure and biochemical function, Absorption of vitamins and minerals
- Daily requirements, sources of water- and fat-soluble vitamins
- Clinical effects of vitamin deficiency, Role of vitamins as co-enzymes, Hypo- and hypervitaminosis
- Minerals in human nutrition, sources, biochemical actions and recommended daily allowance (RDA), Sodium, potassium, chloride, calcium, phosphorus, magnesium, sulfur, iodine, fluoride, Trace elements: Iron, Zinc, Selenium, Iodine, Copper, Chromium, Cadmium, Manganese (Fe, Zn, Se, I, Cu, Cr, Cd and Mn)

8. Endocrinology:
    - Introduction of hormones, mechanism of hormone action, classification of hormones
    - Endocrine hormones of human body (Synthesis, Secretion, Mechanism of Action, effects on target tissues, regulation, related disorders)
        a. Anterior Pituitary Hormones
        b. Posterior Pituitary Hormones
        c. Hormones of Adrenal Cortex, Adrenal Medulla
        d. Sex Hormones of male & female reproductive system
        e. Hormones of thyroid gland
        f. Parathyroid Hormone g. Endocrine portion of Pancreas
9. Nucleotides and Nucleic acids:
    - Chemistry of purines and pyrimidines, their derivatives, structure and function, Derivatives of purines and pyrimidines, their role in health and disease
    - Chemistry and structure of nucleoside and nucleotide and their biochemical role, Nucleic acids (DNA & RNA) their types, structure and functions
10. Bioenergetics and Biological oxidation:
    - Endergonic and exergonic reactions, coupling through ATP
    - Oxidation and reduction, methods of electron transfer, redox potential, enzymes and coenzymes of biologic oxidation and reduction

- Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers
- ATP synthesis coupled with electron flow
- ADP coupled to electron transfer
- Uncouplers and inhibitors of oxidative Phosphorylation

11. Metabolism of carbohydrates:
    - Glycolysis, Phases and reactions of glycolysis
    - Energetics of aerobic and anaerobic glycolysis and their importance, Regulation of glycolysis
    - Cori's cycle, The fate of pyruvate
    - Citric Acid Cycle, Reactions, energetics and regulation and importance of citric acid cycle
    - Amphibolic nature of citric acid cycle (tricarboxylic acid cycle –TCA or the Krebs's cycle)
    - Anpoleratic reactions and regulations of TCA cycle
    - Gluconeogenesis
    - Important three by-pass reactions of gluconeogenesis
    - Entrance of amino acids and intermediates of TCA cycle and other nutrients as gluconeogenic substrates
    - Significance of gluconeogenesis
    - 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)
    - Secondary pathways of carbohydrate metabolism
    - Hexose Mono Phosphate (HMP) shunt, its reactions and importance
    - Glucuronic acid pathway, its reactions and importance
    - Metabolism of fructose, galactose and lactose
    - Regulation of Blood Glucose level

- Hyperglycemia, hypoglycemia and their regulating factors
- Biochemistry of Diabetes Mellitus, its laboratory findings and diagnosis

12. Metabolism of Lipids:
    - Mobilization and transport of fatty acids, triacylglycerol and sterols
    - Oxidation of fatty acids
    - Activation and transport of fatty acid in the mitochondria
    - β-oxidation, fate of acetyl CoA, regulation of β-oxidation
    - Other types of oxidations, i.e., αoxidation, ω-oxidation, peroxisome oxidation, oxidation of odd number carbon-containing fatty acids and unsaturated fatty acids etc.
    - Ketogenesis
    - Mechanism and utilization of ketone bodies and significance
    - Ketosis and its mechanism
    - Biosynthesis of fatty acids
    - Eicosanoids, synthesis from arachidonic acid, their mechanism and biochemical functions
    - Triacylglycerol synthesis and regulation
    - Synthesis and degradation of phospholipids and their metabolic disorders
    - Cholesterol synthesis, regulation, functions, fate of intermediates of Cholesterol synthesis, hypercholesterolemia, atherosclerosis
    - Plasma lipoproteins, VLDL, LDL, HDL, and chylomicrons, their transport, functions and importance in health and disease
    - Glycolipid metabolism and abnormalities
13. Metabolism of proteins:
    - Amino acid oxidation, metabolic fates of amino acid, transamination, deamination decarboxylation, deamidation and transamination
    - 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

14. Metabolism of Nucleotides:
    - De novo purine synthesis
    - Synthesis of pyrimidine
    - Recycling of purine and pyrimidine bases (Salvage pathway)
    - Degradation of purine, formation of uric acid
    - Disorders of purine nucleotide metabolism
15. Bio signaling:
    - G-Protein Coupled Receptor
    - Second Messengers
    - Tyrosine Kinase Receptor
    - Role of cGMP
    - Multivalent Adaptor Proteins and Membrane Rafts
    - Gated Ion Channels
    - Bidirectional Cell-Adhesion Receptors
    - Regulation of Transcription by Nuclear Hormone Receptor
    - Regulation of Cell Cycle by Protein Kinases
    - Oncogenes, Tumor Suppressor Genes, Programmed Cell Death
16. Genes and Chromosomes:
    - Chromosomal element

18. RNA Metabolism:

    - DNA dependent synthesis of RNA
    - RNA processing
    - RNA dependent synthesis of RNA & DNA
    - HIV Reverse Transcriptase
    - Methods for generating RNA polymers

19. Regulation and gene expression:

- Principles of gene regulation
- Process of Transcription, Post-Transcriptional Modification
- Regulation of gene expression in bacteria/eukaryotes
- Genetic code
- Process of Translation, Post-Translational Modification

Metabolic disorders and their Clinical importance

1. Metabolic disorders related to Carbohydrate Metabolism
   - Diabetes Mellitus& its complications
   - All types of Glycosuria
   - Classical Galactossemia
   - Hereditary fructose intolerance
   - Essential Fructosuria
   - Essential Pentosuria
   - G-6 PD deficiency
   - Hyperosmolar Nonketotic Diabetic Coma
   - Glycogen Storage Diseases
   - Hypoglycemia
   - Lactose intolerance
2. Metabolic disorders related to Lipid Metabolism
   - Lipid Storage Diseases
   - Ketosis and Ketonuria including Diabetic Ketoacidosis
   - Respiratory Distress Syndrome
   - Hypercholesterolemia
   - All types of Hyperlipidemias including hyperlipoproteinemia
   - Hypo lipoproteinemia
   - Atherosclerosis, CVA, CHD

- Steatorrhea
- Chyluria
- Cholelithiasis/Obstructive Jaundice
- Congenital Adrenal Hyperplasia
- Carnitine Deficiency
- Fatty liver
- Obesity/Metabolic Syndrome
- Disorders related to oxidation of Fatty Acids (Refsum's Disease, Zellweger syndrome, Methyl Malonic Acidemia, SIDS)

3. Metabolic disorders related to Protein Metabolism
    - All types of Uremia
    - Hepatic Encephalopathy
    - Hyperammonemia
    - Arginine-succinic aciduria
    - Citrullinemia
    - Isovaleric academia
    - Glycinuria /Hyperoxaluria
    - Cystinuria / Cystinosis
    - Phenylketonuria/Albinism
    - Tyrosinemia
    - Alkaptonuria
    - Homocystinuria
    - Hartnups disease
    - Maple Syrup Urine Disease
    - Histidinemia
    - Creatinuria
    - Carcinoid syndrome
4. Metabolic disorders related to Nucleotides and Nucleic Acids Metabolism
    - Hyperuricemia &Hypouricemia
    - Gout
    - Lesch-Nyhan Syndrome

- Severe Combined Immunodeficiency Disease (SCID)
- Oroticaciduria
- Purine Nucleoside Phosphorylase Deficiency

5. Metabolic disorders related to heme metabolism
   - Porphyria's
   - Hyperbilirubinemia
   - Jaundice
6. Disorders related to Vitamins and Minerals
   - Vitamin Deficiency Diseases
   - Minerals & Trace elements Deficiency Diseases
7. Clinical Enzymology
   - Principles of Diagnostic Enzymology
   - Isoenzymes and their role in clinical diagnosis
   - Types of various enzymes in human body
   - Functional & Non-Functional Enzymes
   - Enzymes used as reagents and drugs
8. Clinical Nutrition
   - Factors altering nutrition requirements in different conditions
   - Nutritional assessment and support in health & convalescence
   - Diseases that produce nutrition problem
   - Protein Energy Malnutrition (PEM)
9. Single-Gene Disorders:
   - Major Modes of Inheritance (Autosomal Dominant, Autosomal Recessive, X-Linked Recessive)
10. Cytogenetics:
    - Numerical chromosome abnormalities:
    - Euploidy, Aneuploidy
    - Structural chromosome abnormalities:
    - Translocations, deletions
    - Other chromosomal abnormalities:
    - Inversions, Ring Chromosome, Isochromosome, Uniparental Disomy

- Advances in molecular cytogenetics:
- Fluorescence in situ hybridization (FISH), Spectral Karyotyping

11. Genetics of Common Diseases Multifactorial inheritance

12. Gene Mapping Different types of DNA Polymorphism

- Restriction Fragment Length Polymorphisms (RFLPs)
- Variable Number of Tandem Repeats (VNTRs)
- Short Tandem Repeat Polymorphisms (STRPs)
- Single Nucleotide Polymorphisms (SNPs)

13. Gene Mapping: Linkage Analysis

14. Genetic Diagnosis Recombinant DNA Technology

- Isolation of DNA from Blood
- Isolation of DNA from tissues
- RNA isolation from blood and tissues
- Restriction enzymes Practical work:

(A) Basic biochemical practical

1. pH Metery

- Principle of pH metery
- Components and working of pH meter
- Applications of pH metery in Biochemistry laboratory

1. Centrifugation
   - Principle of Centrifugation
   - Types of centrifuge machines
   - Ultracentrifugation
   - Uses in Biochemistry lab

2. Spectrophotometer and Photometry
    - Spectrophotometry
    - LFT's
    - RFT's
    - Lipid Profile
    - Sugar
    - Uric Acid
    - Serum Bilirubin Direct / Indirect
    - Serum Albumin A/G ratio
3. Elisa Based Test
    - Principal of Elisa
    - Thyroid Profile
    - Hepatitis B & C (ICT & Elisa based)
    - Cortisol
    - HIV (ICT & Elisa based)
4. Urine Complete Examination
    - pH, Specific gravity
    - Albumin, Sugar, proteins
    - Microscopy
    - UPT
5. Specimen Collection & Processing; Sources of Biological variation:
    - Sources & composition of blood specimen
    - Types of blood specimen & equipment
    - Venipuncture, skin puncture, arterial puncture, anticoagulants & preservatives of blood, hemolyzed sample
    - Preanalytical considerations
    - Capillary specimen collection
    - Specimen handling & processing for testing
    - Collection of urine, faces, spinal fluid, other fluids for analysis
6. Establishment and use of reference values
    - Introduction to statistical terms & techniques

- Use of reference values

7. Quality assurance
    - Elements of quality assurance

Pharmacology:

1. Cardiovascular system

    a. Antihypertensive drugs

    b. Drugs for heart failure

    c. Antianginal drugs

    d. Anticoagulants

2. Respiratory system

    a. Anti-asthmatic drugs

    b. Antihistamines

3. Central nervous system

    a. General anesthetics

    b. Local anesthetics

    c. Antipsychotics

    d. Antidepressants

4. Drugs acting on uterus

    a. Tocolytic drugs

b. Drugs for labor and delivery

5. Endocrinology

a. Antidiabetic drugs

b. Estrogens and androgens

6. Chemotherapeutic drugs

a. Antibiotics of general use

GENERAL PATHOLOGY:

- Cell as a unit of Disease
- The genome.
- Cellular metabolism & cellular activation.
- Signal transduction pathways, growth factors and receptors.
- Cell cycle and stem cell. Cell injury and adaptation
- Reversible and Irreversible Injury
- Fatty change, Pigmentation, Pathological classification
- Necrosis and Gangrene

Cellular adaptation

- Atrophy, Hypertrophy,
- Hyperplasia, Metaplasia, Aplasia,

Inflammation

- Acute inflammation, Vascular changes, Chemotaxis, Opsonization and Phagocytosis

- Enlist the cellular components and chemical mediators of acute inflammation •Differentiate between exudates and transudate
- Chronic inflammation
- Etiological factors, Granuloma

Cell repair and wound healing

- Regeneration and Repair
- Healing---steps of wound healing by first and second intention
- Factors affecting healing
- Complications of wound healing

Hemodynamic disorders

- Define and classify the terms Edema, Hemorrhage, Thrombosis, Embolism, Infarction & Hyperemia
- Define and classify Shock with causes of each.
- Describe the compensatory mechanisms involved in shock
- Describe the pathogenesis and possible consequences of thrombosis •Describe the difference between arterial and venous emboli.

Neoplasia

- Dysplasia and Neoplasia
- Differences between benign and malignant neoplasm
- Enlist the common etiological factors of Neoplasia
- Define and discuss the different modes of metastasis
- TNM staging system and tumor grade

Immunity and Hypersensitivity

- Humoral and cell mediated immunity and types of Hypersensitivity with examples.

General Microbiology

- General Microbiology
- Introduction to microbiology
- Role of microbes in various human diseases
- Sources of infection
- Classification of microorganisms.
- Morphology and identification of bacteria.
- Bacterial metabolism and growth.
- Sterilization and disinfection, definition, use of physical and chemical disinfectants and their practical utility in clinical practice.
- Infection and immunity pathogenicity, pathology of infection, Resistance and natural immunity, antigens and antibodies.

B: Specialty Specific:

1. **Introduction to Clinical Pathology**
2. **Basic Laboratory Techniques**
    - Principles of laboratory safety and hygiene
    - Quality control and assurance in laboratory testing
    - Specimen collection, handling, and transportation
3. **Hematology**
    - Hematopoiesis and blood cell morphology
    - Basic Principles of / making of Peripheral Blood Film/ smear
4. **Clinical Microbiology**
    - Microbial structure and classification
    - Identification of bacteria, fungi, and parasites
    - Principles of Antimicrobial susceptibility testing
5. **Histopathology**
    - Tissue processing and staining techniques
6. **Cytopathology**
    - Collection and preparation of cytological specimens
    - Fine needle aspiration cytology

Part II:

HISTOPATHOLOGY:

Cardiovascular system:

- Atherosclerosis and ischemic heart disease.
- Aneurysm and vasculitis.
- Hypertensive heart disease.
- Rheumatic heart disease.
- Classification of vascular tumors.
- Histological features of hemangiomas.

Respiratory system:

- Obstructive & restrictive lung diseases.
- Pneumonias and granulomatous diseases.
- Classification of lung tumor.
- Histological features of adenocarcinoma & squamous cell carcinoma.

Gastrointestinal system:

- Inflammatory disease of esophagus, stomach, appendix, pancreas and intestine.
- Mal absorption syndrome.
- Celiac disease and inflammatory Bowel disease
- Classification and pathophysiology of gastrointestinal tract tumors

Hepatobiliary system:

- Infectious, autoimmune, drug induced hepatitis morphology and lab. Diagnosis.
- Infectious and obstructive disease of gall bladder
- Classification of hepatic tumors
- Histological features of hepatocellular carcinomas.

The kidney & lower urinary tract:

- Difference between nephrotic and nephritic syndrome.
- Pyelonephritis and renal stones.
- Classification of tumors of kidney and lower urinary tract.
- Histological features of renal cell carcinoma.

Male Genital tract:

- Semen analysis
- Benign prostatic hyperplasia and evaluation of PSA levels.
- Classification of testicular tumor

Female Genital tract:

- Interpretation of PAP smear.
- Benign diseases of cervix and endometrium
- Classification and lab diagnosis of ovarian tumors
- Role of Beta-hCG in gestational trophoblastic disease

Breast:

- Final Needle Aspiration cytology of breast lesions.
- Classification of breast tumors
- Histological features of Fibro-adenoma, Invasive ductal and lobular carcinomas.

The Skin:

- Squamous cell carcinoma, basal cell carcinoma and melanoma.

Bone, Joints & Soft tissues:

- Osteoporosis, osteomalacia, osteomyelitis.
- Rheumatoid arthritis, osteoarthritis and gout.
- Classification of soft tissue tumors.
- Histological features of lipoma, neurofibroma/ schwannoma, leiomyoma.

The Central Nervous System:

- Meningitis and encephalitis (etiology & CSF findings)
- Molecular classification of CNS tumors
- Histological features of meningioma & glioblastoma multiforme

The Endocrine System:

- Interpretations of Thyroid Function test & FNAC categories of reporting thyroid lesions.

- Diabetes mellitus: Clinical interpretations and Lab. Diagnosis

SPECIAL MICROBIOLOGY:

- Gram positive bacteria; Gram negative bacteria
- Spirochetes
- Anaerobic bacteria
- Mycobacterium tuberculosis, Mycobacterium leprae
- Chlamydia and Rickettsia
- Diagnosis of infections by body systems
- Infections in the compromised host
- Introduction to Parasitology, Virology, Mycology and common organisms encountered in Pathological practices.

CHEMICAL PATHOLOGY:

- Requesting laboratory tests and interpreting the results, units in chemical Pathology.
- Quality control and laboratory management.

SODIUM AND WATER METABOLISM

- Distribution of sodium & water in the body
- Plasma osmotic pressure, osmolarity & osmolality
- Control; renin-angiotensin-aldosterone mechanism
- Disturbances of sodium & water metabolism
- Clinical significance of hypo & hyper natremia
- Biochemical basis of treatment of sodium & water disturbances

THE KIDNEYS

- Reduced GFR with normal tubular function
- Reduced tubular with normal glomerular function
- Renal tubular defects
- Clinical syndromes of renal disease
- Acute and chronic renal failure
- Renal Function Tests and their interpretation
- Glomerular function tests
- Biochemical Principles of treatment of renal disease.
- Renal calculi

ACID–BASE DISTURBANCES

- Hydrogen ion homeostasis: Blood gas levels
- Control systems
- Disturbances of hydrogen ion homeostasis
- Investigation of hydrogen ion homeostasis

POTASSIUM

- Potassium metabolism & Diuretic therapy
- Factors effecting plasma potassium concentration
- Hypokalemia and hyperkalemia
- Relation of potassium and hydrogen ion and diuretics
- Diuretic therapy
- Treatment of potassium disturbances
- Investigations of renal water and electrolyte disorders

CALCIUM, PHOSPHATE AND MAGNESIUM

THE HYPOTHALAMUS AND PITUITARY GLAND

- Hypo and Hyper pituitarism, Investigation protocol.

THEADRENALCORTEX

- Disorders of adrenal cortex and congenital adrenal hyperplasia

THEREPRODUCTIVESYSTEM

- Gonads, Prolactin
- Hypothalamic-pituitary-gonadalaxis
- Hyper-prolactinemia
- Investigation of pituitary, adrenal and gonadal disorders

PREGNANCY AND INFERTILITY

CARBOHYDRATE METABOLISM

- Diabetes mellitus, its latest classification and criteria according to American Diabetes Association and WHO
- Metabolic complications
- Investigation protocol, GTT
- Hypoglycemia, investigation protocol and management

PLASMA LIPIDS AND LIPOPROTEINS

- Physiology and disorders of lipid metabolism,
- Primary disorders
- Risk factor for coronary heart disease
- Principles of treatment, use of statins and other
- Cholesterol lowering agents
- Investigation of suspected hyper lipidemia, proper sample collection

CALCIUM, PHOSPHATE & MAGNESIUM METABOLISM

- Normal control mechanism, interrelation of parathyroid hormone and Vit. D
- Clinical effects of hypercalcemia and hypocalcemia,
- Biochemical aspects of osteoporosis and osteomalacia
- Hyper and hypo parathyroidism

- Investigation protocol for disorders of calcium metabolism and biochemical basis for treatment

LIVER DISORDERS AND GALLSTONES

- Hepatobiliary system:
- Jaundice, types, causes, cholestasis
- Liver Function tests and their interpretation in acute and chronic liver disease and Cirrhosis
- Bile & Gallstones.
- Hepato toxic drugs and their effect on LFTs
- Urine tests in jaundice.

PLASMA ENZYMES IN DIAGNOSIS (CLINICALENZYMOLOGY)

- Physiological and pathological causes of altered enzyme levels
- Transaminases, LDH, CPK, Amylase, ALP, acid phosphatase
- Clinical significance and interpretation in relation to diseases.

PROTEINS IN PLASMA AND URINE

- Classification, Electrophoretic pattern in normal and various disorders
- Acute phase reactants
- Immunoglobulin's structure, types
- Primary and secondary disorders
- Proteinuria causes.
- Testing proteins in blood and urine

PURINE AND URATE METABOLISM

- Normal metabolism
- Hyper and hypouricemia
- Gout
- Lab investigations.

DISORDERS OF HAEM METABOLISM: IRON AND THE PORPHYRIAS

- Causes of low and high iron values
- Investigation of disorders of Iron metabolism.

BIOCHEMICAL EFFECTS OF TUMORS AND TUMOR MARKERS

- Catecholamine secreting tumors
- Pheochromocytoma investigation
- Characinoid syndrome & its investigation

CSF

- Its biochemical testing, significance, procedure
- Appropriate**s sample collection** for various tests in chemical pathology
  Basic principle, applied aspects and scope of Immunopathological techniques with

respect to their importance in clinical pathology diagnoses.

- ELISA
- PCR
- Radioimmunoassay
- Western and southern blot

Hematology:

- Hemopoiesis
- Erythropoiesis and general aspects of anemia
- Hypochromic anemias & Iron overload
- Megaloblastic anemias and other macrocytic anemias
- Hemolytic anemias
- Genetic disorders of hemoglobin
- The white cells 1: granulocytes, monocytes and their benign disorders the white cells 2:lymphocytes and their benign disorders
- The spleen, the etiology and genetics of hematological malignancies.
- Acute myeloid leukemia Chronic myeloid leukemia
- Myeloproliferative disease Myelodysplasia
- Acute lymphoblastic leukemia, the chronic lymphoid leukemia
- Hodgkin lymphoma
- Non-Hodgkin lymphoma
- Multiple myeloma and related disorders
- Aplastic anemia and bone marrow failure Stem cell transplantation
- Platelets, blood coagulation and hemostasis
- Bleeding disorders caused by vascular and platelet abnormalities
- Coagulation disorders
- Thrombosis 1: pathogenesis and diagnosisThrombosis2:treatment
- Hematological changes in systemic disease
- Pregnancy and neonatal hematology
- Blood banking, basic principle, basic practical aspects.

Instructional Strategies:

As a policy, active participation of students at all levels will be encouraged.
Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Conferences and seminars
6. Assignments

7. Self-study, and use of internet

Section D:

Assessment Plan:

Program duration	Course contents	Assessment method
At the end of 6 months of program	Basic medical sciences: • Anatomy including histology • Physiology • Biochemistry • Pathology • Pharmacology These subjects include 75% of total. • Specialty specific =25%	**Part I** to be taken by university. It will include: Written (MCQ)=100(1 each) **Total Marks =100**
At the end of 2nd year	Specialized training in the relevant Department	**Part II Examination** to be conducted by university. It will include: **A) Paper A** • MCQ=50(1 each) =50 • SEQ=10 (5 each) =50

		Total Marks=100 **B) <u>Paper B</u>** • MCQ=50(1 each) =50 • SEQ=10 (5 each) =50 **Total Marks=100** **C) <u>Log Book=20 Marks</u>** **<u>D) Clinical Paper=180</u>** **Paper A =90 marks** • TOACS/OSCE= 60 • Viva= 30 **Paper B=90 marks** • TOACS/OSCE= 60 • Viva= 30 • **Grand Total Marks=400**

Part I Examinations:

Part I would be conducted for the candidate at the end of 6 months of the program.

Components of Part I Examination

<u>MCQ</u> =100 (each 1 mark)

Total = 100

Eligibility Criteria:

To appear in the Part II Examination the candidate shall be required: .

1. At least 75% Attendance in all the basic medical sciences subjects as per the curriculum provided.
2. Evidence of payment of examination fee as prescribed by the university from time to time.
3. The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
4. Candidate remained on institution roll during the period required for appearing in examination.

Declaration of Results

- The candidates scoring 60% marks in the written examination will be considered pass and will then be eligible to appear in the Part II examination.
- A maximum of total SIX (6) consecutive attempts, availed or un availed, will be allowed in Diploma Part I examination. If the candidate fails to pass this examination within the above-mentioned limit of SIX (6) attempts, he/she shall be removed from the program and the seat will fall vacant.

Part II Examination

(At the end of 2nd Calendar year of the program)

Components of Part II Examination

A) Paper A

MCQ=50(1 each) =50

SEQ=10 (5 each) =50

Total Marks=100

Paper B

MCQ=50(1 each) =50

SEQ=10 (5 each) =50

Total Marks=100

C) Log Book=20 Marks

D) Clinical Paper=180

Histopathology & Hematology:

Paper A= 90 Marks
TOACS/OSCE= 60
Viva= 30

Paper B= 90 Marks
TOACS/OSCE= 60
Viva= 30

Total Marks=400

Eligibility Criteria:

To appear in the Part II Examination the candidate shall be required:

1. Result card showing that the candidate has passed Part I Examination.
2. Certificate of completion of 2 Years training as per the curriculum approved by the university.
3. Evidence of payment of examination fee as prescribed by the university from time to time.

4. The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.

Declaration of Results

a. The candidates scoring 60% marks in aggregate of Paper A and Paper B of the written examination will be declared pass and will become eligible to appear in the Clinical Examination.

Clinical, TOACS/OSCE:

Clinical Paper=180

Histopathology & Hematology:

Paper A= 90 Marks
TOACS/OSCE= 60
Viva= 30

Paper B= 90 Marks
TOACS/OSCE= 60
Viva= 30

Log Book=20 marks

Declaration of Results

- A student scoring 60% in Written Paper A& B, 60% in TOACS/OSCE and Viva will be considered pass in the examination.

Section E

Award of Diploma in Clinical Pathology/ DCP

A candidate having declared successful in all the components of examination i.e. ***Theory and Clinical*** shall be declared pass and shall be conferred Diploma in Clinical Pathology.

Section F:

Log Book

As per format approved by Faisalabad Medical University, Faisalabad.

Section G

Paper Scheme

Part I

Written

• General Pathology	(08 MCQs)
• General anatomy & Histology	(20 MCQs)
• Basic Biochemistry	(20 MCQs)
• General pharmacology	(7 MCQs)
• General physiology	(20 MCQs)
• Subject specific	(25 MCQs)

MCQ Paper	100 One Best Type
Total Marks	**100 Marks**

Part II Examination

Paper A (Histopathology & Hematology)

Sr. No	Topics	SEQs	MCQs
1	CVS, Respiration, CNS	1	5
2	Male & Female genital tract & Breast	01	5
3	Head, Neck + GIT, Hepatobiliary.	01	5
4	Kidney, Lower urinary tract, Endocrinology	01	5
5	Soft tissues, Bone, Joints	01	5
6	Erythropoiesis &Anemias	01	5
7	The white cells, spleen & leukemias	01	5
8	Lymphomas	01	5
9	Platelets/ Bleeding Disorders	01	5
10	Hematological changes in systemic diseases / blood transfusion, neonatal hematology	01	5
	Total	**10**	**50**

Marks Distribution

1	MCQS	50
2	SEQs	50
Grand Total Marks		**100**

Paper B (Microbiology Section & Chemical Pathology)

Sr. No	Topics	SEQs	MCQs
1	Gram Positive cocci + Mycology	01	5
2	Gram Positive rods + Virology	01	5
3	Gram Negative cocci + Immunology	01	5
4	Gram Negative rods + Parasitology	01	5
5	Intracellular bacteria + Mycobacteria + Mycoplasma + Spirochetes	01	5
6	Water & Sodium, Renal + Acid Base Disturbance + Potassium	01	5
7	Thyroid Function + Basic Immunopathological techniques	01	5
8	Carbohydrate metabolism + plasma, lipid & lipoproteins	01	5
9	Liver +GIT + CVS	01	5
10	Plasma enzymes + Proteins in plasma + urine + Biochemical effects of tumor & tumor markers	01	5
	Total	**10**	**50**

Marks Distribution

1	SEQs	50
2	MCQs	50
Total Marks		**100**

TOACS Station distribution:

PAPER A: Histopathology & Hematology (90 Marks)

Practical	Slide/Gross	Marks	Total	Viva Voce Marks	Total Marks
Spotting of Slide/Gross Picture Histopathology	15	02 Marks of each	30	15	45
Spotting of Slide(Peripheral smears / Bone marrow Trephine)	15	02 Marks of each	30	15	45

Paper B: Microbiology & Chemical Pathology (90 Marks)

Practical	Total	Viva Voce Marks	Total Marks
Streaking, incubation and isolation of all bacteria (06)	30	15	45
Staining & Microscopy result (06)			
Biochemical test Performance (06)			
Culture &sensitivity report (06)			
Urine or Stool R/E (06)			
To Separate Serum & plasma from the provided blood sample (10)	30	15	45
To perform RFT, LFT, Enzymes & other parameters on semi-automated instruments. (20)			

Section H

Resources and references (books and other resource material)

- Robbins and Cotran pathologic basis of disease
- Robbins and Cotran atlas of pathology
- Michael L. Bishop Edward P. Fody Larry E. Schoeff
- Warren E. Levinson- 15th Review of Medical Microbiology and immunology.
- Hoff brand's Essential Hematology
- AFIP Manual of laboratory Medicine (Armed Forces Institute of Pathology).
- Monica Chesbrough District laboratory practice in tropical countries Part-I
- Monica Chesbrough District laboratory practice in tropical countries Part-II

Section I

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Signed by Head of the Department.