BIOCHEMISTRY LABORATORY

INTRODUCTION

This laboratory introduces students to basic experiments and techniques used in the biochemistry laboratory. Initially, emphasis is placed on the buffer concept and preparation. The principle of kinetic analysis of enzymes is covered with experiments to show the effect of pH, temperature, and substrate concentrations on the activities of enzymes. Experiments on carbohydrates, lipids and vitamins are also conducted.

EQUIPMENT

- Spectrophotometers
- Centrifuges
- Automatic Pipettes
- Water Bath
- Glassware and Test Tubes
- pH Meters

EXPERIMENTS

- Basic Calculations, Dilution, and Spectrophotometric Concept, Components, and Utilization (2 Sessions)
- Determination of Unknown Concentration Using Spectrophotometer
- Buffer Preparation and Titration of a Weak Acid With Strong Base
- Effect of pH on the Salivary Amylase Activity
- Effect of the Substrate Concentration Upon the Rate, Velocity, of an Enzymatic Reaction
- Determination of the Iodine Number of Fat
- Estimation of Blood Cholesterol
- Determination of Vitamin C in Various Fruit Drinks
- Alkaline and Acid Hydrolysis of Nucleic Acid
TEST SERVICES

The test services available in this laboratory are research-based services that utilize state-of-the-art machines and equipment.
BIOLOGY LABORATORY

INTRODUCTION

The Biology Laboratory focuses on learning experimental methods using the microscope to recognize different types of human body tissues, study cell structures and chemical compositions, and analyze chemical aspects of digestion and enzymes activity. This lab also provides an introduction to DNA structure and replication, mitosis, meiosis, inheritance patterns in humans and microbiology.

EQUIPMENT AND INSTRUMENTS

- Compound Microscope
- Stereomicroscope Microscope
- Prepared Slides
- Models (Skeleton, Torso, Human Body Systems...etc.)
- Charts

EXPERIMENTS

- Introduction to Laboratory Safety, Laboratory Basic Instruments and Tools, the Metric System & the Scientific Experimental Method
- Using and Identifying Parts of the Microscope, Preparing Wet Mounts and Prepared Slides Observation
- Chemical Composition of Cells
- Cell Structure and Function
- Human Body Tissues
- Mitosis & Meiosis
- Chemical Aspects of Digestion
- Basic Mammalian Anatomy
- Studying the Systemic Homeostasis
- Infectious Diseases& Bacterial Cultures
- Cardiovascular System & Sheep Heart Dissection
- Introduction to DNA Biology
BLOOD BANKING LABORATORY

INTRODUCTION

This laboratory introduces students to basic techniques and procedures used in blood banking. Emphasis is placed on quality control and quality assurance to make sure that donor blood is compatible with the recipient blood. Tests include ABO grouping and Rh typing, compatibility and cross matching, antibody screening and antibody identification, and the Coombs Test.

EQUIPMENT AND REAGENTS

- Microscopes
- Centrifuges
- Rh View Box
- Blood Banking Reagents

EXPERIMENTS

- Preparation of Normal Saline and 2-5% Cell Suspension, Washed RBC Cells
- Preparation of Check Cells
- Test Tube Determination of ABO Grouping, Both Forward and Reverse
- Determination of Rh Typing Including Du
- Performing Crosshatching and Compatibility Testing
- Performing the Antibody Screening Test
- Determining Antibody Titer and Score
- Combs’ Test, Both Direct and Indirect
- Antibody Identification, Cell Panel

TESTS AND SERVICES

- ABO Grouping
- Rh Typing
- Cross Matching and Compatibility
- Anti Body Screening and Antibody Identification
- Antibody Titer and Score
- Coombs’ Tests
INTRODUCTION

This laboratory introduces students to the manual procedures and techniques commonly conducted in the clinical chemistry laboratory. Clinical significance and interpretation of lab results is highly emphasized. Investigations included in this lab are the liver function test, kidney function test, lipid profile, carbohydrate metabolism, and endocrine function tests. Experiments cover subjects in both Clinical Chemistry 1 and 2.

EQUIPMENT

- Spectrophotometers
- Semi-Automated Chemistry Analyzer
- Centrifuges
- Automatic Pipettes
- Chemical Reagents and Kits

EXPERIMENTS

- Determination of Uric Acid and Creatinine in Serum and Urine
- Determination of Fasting Blood Sugar
- Kinetic Measurement of Lipase and or Alpha Amylase
- Kinetic Determination of Creatine Kinase
- Determination of Total Bilirubin, Conjugated and Unconjugated Bilirubin
- Determination of Albumin and Total Protein in Plasma
- Kinetic Determination of Alanine Aminotransferase
- Determination of Total Cholesterol
- Determination of HDL-Cholesterol and Calculation of HDL-Cholesterol
- Colorimetric Determination of Sodium and Potassium in Serum
- Determination of Iron and TIBC

TESTS AND SERVICES

- Liver Function Tests (AST, ALT, Bilirubin, etc...)
- Kidney Function Tests (Uric Acid, and Creatinine, Urea)
- Cardiac Enzymes (CPK, AST)
- Iron and TIBC
- Blood Sugar
- Albumin and Total Protein and More
DIAGNOSTIC MICROBIOLOGY LABORATORY

INTRODUCTION

This laboratory introduces students to the various techniques and procedures used in the isolation and identification of infectious agents of human diseases including pathogenic bacteria, fungi, parasites and viruses according to body systems. General investigations will be carried out for urine, stool and body fluids (i.e. spinal, synovial, pleural, pericardial, abdominal, and seminal fluids).

EQUIPMENT AND INSTRUMENTS

- Incubators
- Autoclaves
- Anaerobic Jars
- Spectrophotometers
- pH Meters
- Oven

EXPERIMENTS

- Collection and Proper Preparation of Routine Specimens Tested in the Microbiological Laboratory
- Preparation, Sterilization, Labeling and Storing Media and Reagents Used in the Clinical Microbiological Laboratory. Biochemical Tests to Identify Bacteria
- Examination of Sputum, Throat and Mouth
- Examination of Faecal and Urine Specimens

TESTS AND SERVICES

- Isolation and Identification of Infectious Agents of Human Diseases
- General Investigations for Urine, Stool & Body Fluids
HEMATOLOGY LABORATORY

INTRODUCTION

This laboratory introduces students to the basic techniques used in the evaluation and investigation of blood disorders. Manual and automated procedures are conducted in this laboratory. Students perform manual and automated CBC, which includes the red blood cell count, white blood cell count, and platelet count. Students are also exposed and trained to identify normal and abnormal disorders related to red cells and white blood cells. The homeostatic part of this course deals with the assessment of the clotting factors and the concept and measurement of PT, PTT, fibrinogen and D-Dimer. Experiments conducted in this lab cover the subjects Hematology 1 and Hematology 2.

EQUIPMENT

- Cell Analyzer CA5309
- Microscopes
- Hemocytometers
- Hematocrit Centrifuges
- Centrifuges
- Semi-Automated Coagulation Machine

EXPERIMENTS

- Determination of Manual White Blood Cell Count
- Determination of Manual Red Blood Cell Count
- Manual Determination of Hematocrit and ESR
- Measurement of CBC using a Fully Automated Cell Counter
- Making and Staining Peripheral Blood Smear
- RBC Morphology and WBC Morphology, Normal and Abnormal
- Osmotic Fragility Test and G6PD
- Sickle Cell Screening
- Determination of Prothrombin Time
- Determination of Partial Thromboplastin Time and D-Dimer

TESTS AND SERVICES

- CBC, Complete Blood Count and Differential (Manual and Automated)
• Manual Hematocrit
• Erythrocyte Sedimentation Rate
• Reticulocyte Count
• PT, PTT, D-Dimer
INTRODUCTION

This laboratory includes a thorough grounding in all aspects of histopathological techniques such as tissue fixation, grossing and preparation, processing, embedding, microtome section cutting, staining and microscopic examination of tissue samples. Other techniques including frozen sections and bone decalcifications are demonstrated.

EQUIPMENT AND INSTRUMENTS

- Automatic Tissue Processor
- Tissue Embedding Station (Histocenter)
- Rotary Microtome
- Section Floating-Out Bath
- Tissue Block Storage Cabinet
- Cryostat
- Binocular Microscope(s)
- Demonstration Microscope With Camera and Screen
- Base-Sledge Microtome
- Dissection, Fixation, and Staining Tools
- Automatic Knife Sharpener

EXPERIMENTS

- Sample Collection (Rabbit Dissection)
- Fixation, Grossing and Sample Accession
- Manual Tissue Processing
- Paraffin Embedding (and the Tissue Center/ Station)
- Automatic Tissue Processing
- "Microtomy - Introduction to the Instrument"
- "Microtomy - Practical Section Cutting"
- Cryostat, Frozen and Related Sections
- Hematoxylin and Eosin Staining, Mounting and Cover Slipping
- Bone Decalcification and Processing
TESTS AND SERVICES

- Histological Techniques of Fixation, Grossing, Processing (Dehydration, Clearing, Impregnation), Embedding, Section Cutting (Microtomy) and Staining Procedures
HUMAN ANATOMY AND PHYSIOLOGY LAB

INTRODUCTION

This laboratory provides essential knowledge of the terms, techniques and procedures commonly performed in human physiology and anatomy laboratories and examines the structural and functional properties of blood physiology, cardiovascular activity, neural system, Pulmonary and musculoskeletal systems and sensory physiology.

EQUIPMENT AND INSTRUMENTS

- Spirometers
- Kymographs
- ECG Machines
- Hemocytometers and Hemoglobinometers
- Stethoscopes and Sphygmomanometers
- Various Models and Charts (Heart, Human Body Systems, Torso, etc)
- Exercise Bicycle
- Tuning Fork Set
- Various Charts
- Ophthalmoscopes
- Flash lights and Hearing/ Vision Check Up Set

EXPERIMENTS

- Microscopic Examination of Cells, Tissues and Organs
- Determination of RBC count, Hematocrit and Hemoglobin Concentration
- Determination and Identification of WBCs
- Identifying Rh Factor and ABO Antigen System
- Electrocardiogram (ECG) and Effects of Exercises on ECG
- Auscultation of Heart Sounds and Measurement of Blood Pressure
- Measurement of Pulmonary Functions
- Examining the Central Nervous System Reflex arc
- Eyes and Vision Routine Checkup
- Hearing Routine Checkup and Vestibular Apparatus
- Taste Perception
- Studying the Structure of the Musculoskeletal and Cardiovascular Systems
INTRODUCTION

This lab studies the immune response of an individual to an infection or a foreign substance (antigen). This lab serves two diagnostic purposes: First, it helps in the diagnosis of several bacteria, fungal, viral and parasitic infections; and second, it assesses the immune status of the patient. A serum sample, the blood fluid that remains when the blood clots, is usually used in such testing, hence labeling the lab the Serology Lab. Further, serologic testing can be performed on other specimens such as a bacterial culture. Due to major developments in the field, a significant number of kits have become available in the market making this testing process an easy and accurate one.

EQUIPMENT AND INSTRUMENTS

- Incubators and Water Baths
- Microscopes
- Enzyme Immunoassay Washer and Reader Station (for ELISA Testing)
- Fluorescent Microscope
- Chemical Reagents and Buffers
- Serologic Kits

EXPERIMENTS

- Anti-Microbial Immunity. Investigation Into the Effects of Lysozyme
- Acute Phase Reactants. Latex Agglutination Test for C - Reactive Protein
- Precipitation and Agglutination Based Tests
- Labeled Immunoassays Such as Enzyme Linked Immunosorbent Assays (ELISA)

TESTS AND SERVICES

- Microbial Testing Such As Anti-Streptolysin O (ASO), E.coli 0157, Widal etc.
- RPR, a Syphilis Test
- Infectious Mononucleosis Testing
- Antibody Profile
- Hepatitis B Testing
- Immunodiffusion Fungal Testing
• Anti-Nuclear Factor for SLE Testing
• Pregnancy Testing

In addition to many other serological tests.
INTRODUCTION

Practical sessions cover methods of isolation and identification of pathogenic bacteria that cause human disease by using rich, selective and differential culture media. Other biochemical and serological methods for diagnosis are also used.

EQUIPMENT AND INSTRUMENTS

- Autoclaves, Anaerobic Jar
- Spectrophotometers
- pH meters, Centrifuges Oven, Water Bath and Balance
- Refrigerators and Freezers
- Media, Chemicals, Diagnostic Kits, APE-20 and Reagents
- Egg candle, Dissecting Instruments
- Microscopes, Inverted Microscope
- Colony Counters
- Microwave

EXPERIMENTS

- Cultivate Bacterial Cultures on Appropriate Media and Discuss the Significance of Quality Control in a Microbiology Laboratory
- Microscopic Morphology of Microorganisms: Wet Mount Preparation; Smear Preparation; Simple Staining, Protozoa, Fungi
- Differential Staining: Gram Stain, Acid-Fast Stain and Capsular stain
- Staphylococcus, Streptococcus, Enterococcus and Pneumococcus Identification
- Enterobacteriaceae Identification
- Pseudomonas and Other Aerobic Gram Bacilli Identification
- Antimicrobial Sensitivity Testing

TESTS AND SERVICES

- Isolation and Lab Diagnosis of Pathogenic Bacteria
- Antibiotic Sensitivity and MIC for Bacteria
• Laboratory diagnosis of different types of bacteria, by culturing on different media, using various bacteriological serological and biochemical methods to diagnose pathogenic bacteria.
MOLECULAR GENETICS LABORATORY

INTRODUCTION

Experiments are designed for students to become familiar with micro pipettes and reagent preparation for use in the preparation of agarose gels to identify human DNA and RNA, plasmids after bacterial cell transformation, PCR products and DNA that has been manipulated by restriction enzymes and ligase for use in southern blots.

EQUIPMENT

- Autoclave
- Balance
- Water Bath
- Centrifuge
- Micropipettes
- Thermal Cycler
- Microwave Heater
- UV Transilluminator
- Electrophoresis Apparatus

EXPERIMENTS

- Calibration
- Making Laboratory Solutions
- DNA Extraction From Whole Blood
- DNA Purification + Gel preparation and Electrophoresis
- Preparation and Transformation of Competent Cell
- Plasmid Isolation
- Use of Restriction Enzymes
- Action of Ligase
- RNA Extraction From Whole Blood
- Polymerase Chain Reaction
- Southern Blot

TESTS AND SERVICES
• Isolation of DNA and RNA From Various Tissues
• Production of cDNA Mutagenesis of Mloned Genes
• Specific Gene Detection Using PCR Technique and Cloning
PARASITOLOGY LABORATORY

INTRODUCTION

Laboratory sessions are designed to expose students to the morphology of different diagnostic stages of medically important parasites and introduce the skills for proper lab procedures for collection, handling and identification of most common protozoal and worm infections.

EQUIPMENT AND INSTRUMENTS

- Microscopes
- Prepared Parasitology Slides
- Centrifuge
- Test Tubes
- Glassware
- Slides and Cover Slips
- Charts and Models

EXPERIMENTS

- Microscopic Identification of Flagellated Protozoa: Trypanosoma Brucei Rhodesiense, Trypanosoma Brucei Gambiense, Trypanosoma Cruzi, Leishmania Species, Giardia lamblia, Trichomonas Vaginalis and Non-Pathogenic Trichomonads
- Concentration Techniques for Recovery of Intestinal Parasites. Sarcomina: Entamoeba Histolytica, E. coli, E. Hartmanni, Iodamoeba Butschlii, Endolimax Nana
- Prepare Thin and Thick Blood Films. Perform Giemsa Staining Technique for Blood Smears
- Identification of Malaria Parasites in Stained Blood Smears
- Identification of the Different Eggs and Larval Stages of Medically Important Worms

TESTS AND SERVICES

- Macroscopic & Microscopic Fecal Examination for Detection of Eggs and Cysts of Parasites of the Digestive Tract
- Concentration Techniques for Parasites
• Blood Smear to Detect Blood Parasites
PHLEBOTOMY LABORATORY

INTRODUCTION

This laboratory offers students the necessary theoretical and practical training to perform proper venous and microcapillary blood collection, solve common phlebotomy complications and understand the phlebotomist's role as an effective member of the healthcare team. In addition, safety and infection control measures, quality assurance and total quality improvement, and ethical standards and professional conduct are introduced.

EQUIPMENT AND TOOLS

- Hematochrit Centrifuge
- Vacutainer System
- Syringe System
- Butterfly System
- Slides
- Tourniquet
- Puncture Proof Containers
- Biohazard Bags
- Gloves
- Auto-Lancet

EXPERIMENTS

- Specimen Handling & Labeling
- Performing Blood Drawing using the Venipuncture Method
- Performing Blood Drawing using the Syringe Method
- Performing Capillary Puncture Techniques
- Bleeding Time

TESTS AND SERVICES

- Phlebotomy Services
- Phlebotomy Training
URINALYSIS LABORATORY

INTRODUCTION

This laboratory exposes and train students on the most commonly performed body fluids tests including urine, CSF, synovial fluid and others. Routine and special tests are emphasized in this laboratory. Students perform complete urinalysis and examine urine sediment and identify all abnormal findings such as crystals, WBC, RBC, bacteria, parasites, and urinary casts.

EQUIPMENT

- Spectrophotometers
- Centrifuges
- Reagent Test Strips
- Glassware and Test Tubes

EXPERIMENTS

- Physical Examination of Urine: Color, Appearance, and Specific Gravity
- Chemical Examination of Urine: pH, Protein, Sugar, Ketone, Bilirubin, Bacteria
- Microscopic Examination of Urine Sediment and Identification of Blood cells, Crystals, Parasites, Yeast, Bacteria, and Casts
- Screening for Ascorbic Acid
- Screening for Phenylketonuria
- Screening for Aminoaciduria
- Screening for Porphyrin
- Quantitative Measurement of Urine Analytes
- Investigation of Other Body Fluids: CSF, Synovial Fluid, Peritoneal Fluid

TESTS AND SERVICES

- Urinalysis, Microscopic and Macroscopic
- Urine Screening for Ascorbic Acid, Melanin, Phenylketonuria, Porphyrins and Prophobilinogen
COLLEGE OF HEALTH SCIENCES - MEDICAL RESEARCH LABORATORY

INTRODUCTION

The objectives of this lab are to achieve scientific outcomes, improve the quality of research, acquire a variety of advanced equipment related to research, attract significant funding for research projects and encourage collaborative scientific research among experts and researchers.

MISSION

- To expand the horizon of scientific knowledge through extensive and profound research.
- To advance University research, education, and training in the field of Molecular Genetics as well as other different scientific disciplines.
- To promote and enhance the quality and innovative nature of scientific research, where outcomes reflect well on the academic community and lead to more accomplishments.

EQUIPMENT AND INSTRUMENTS

- Thermo Cyclers for PCR
- UV Light Documentation System
- Centrifuges
- Gel Electrophoresis
- Trans-Illuminator
- Thermo Shaker