SOME OUTLINES OF LABORATORY CONDUCTED AT THE FACULTY

Biochemistry Lab

Course Objective and Description:

Designed to introduce the students to various experimental practices used in bio- chemistry, i.e., performing qualitative identification tests for natural products as carbohydrates, proteins, fats also in this lab soap making process will be applied and other skills will be taught like extraction of cholesterol, lecithin and casein.

Experiments:

- Determination of pKa from Dissociation of weak acid
- Qualitative Tests for simple sugars
- Qualitative Tests for complex polysaccharides
- Qualitative Tests for protein and amino acids
- Extraction and Identification of Lecithin and cholesterol from egg yolk
- Saponification number of oil and soap making
- Factors affecting enzyme activity(I)
- Factors affecting enzyme activity(II)
- Extraction of essential oil by steam distillation
- Determination of pka for Bromothymol blue
- Vitamin C analysis by redox titration
- Antioxidant evaluation for vegetable oil by H202 assay
- Colorimetric Methods for quantitative determination of protein

Zoology Lab

Course Objective and Description:

The Laboratory section allows students to become familiar with the form and function of major animal phyla through observation of living animals, prepared slides and models.

Experiments:

- The Microscope
- The Animal Cell
- Cell Division: Mitosis
- Cell Division: Meiosis
- Genetics
- The Reproductive System
- The Circulatory System
- The Respiratory System
- The Endocrine System
- The Excretory System
- The Digestive System
- Histology: Muscles and Nervous Tissues
- Histology: Digestive Tract
- Histology: Urinogenital Canals

Animal Physiology lab

Course Objective and Description:

This course covers practical sessions in homeostasis, neural conduction, blood analysis, circulatory, respiratory, execratory, digestive and endocrine systems. Live samples, torso models, microscopic slides and videos are used.

Experiments:

- Orientation & Introduction to Physiology lab.
- Introduction to Haematology. Introduction to Anticoagulants. Collection of Blood samples.
- Collection of Blood Samples from different farm animals.
- Determination of PCV.
- Preparation of Serum and Plasma
- Estimation of Hemoglobin.
- Blood Grouping & Coagulation of Blood.
- Preparation of Blood Smear for Different Leukocyte Count (DLC).
- Determination Total Leukocyte (TLC).
- Determination Total Erythrocyte Count (TEC).
- Urinalysis: 1) Specimen Collection.

  2)Preservation of Urine.

- Gross examination of urine & Specific gravity of urine.
- PH and Protein Detection.
- Qualitative test for glucose & ketones.
- Microscopic examination of urine.

General Botany lab

Course Objective and Description:

In the laboratory, students will study the anatomy of plant tissues both simple and complex in addition to the structure of stem, root, leaf, flower, fruit and seed of higher plants.

Experiments:

- Instructions.
- Microscope.
- Wet mount slide preparation.
- Simple tissue.
- Complex tissue.
- Secondary tissue and growth.
- Type of stem.
- Root anatomy.
- Leaf anatomy.
- Flower anatomy.
- Fruit classification and anatomy.
- Protista.
- Gymnosperms anatomy.
- Angiosperm.

Microbiology lab

Course Objective and Description:

The course is designed to be hands on through the term. It covers the basic tools needed to study microorganisms (microscope). Studying the different type of bacteria according to their morphology, capsule-forming, spore-forming etc. also it covers the basic requirements of bacterial growth and how to prepare media and isolate bacteria using different techniques. The last part covers biochemical test that are used to differentiate between bacteria.

Experiments:

- ✓ Health and safety and introduction to microscopic techniques.
- ✓ Light microscope.
- ✓ Bacterial morphology and staining (negative staining).
- ✓ Gram staining.
- ✓ Acid-fast staining.
- ✓ Endo-spore staining.
- ✓ Capsule staining.
- ✓ Culture media preparation and sterilization.
- ✓ Culture transfer
- ✓ Culture transfer and bacterial number
- ✓ Beta galacosidase activity
- ✓ Tri sugar iron agar
- ✓ Starch hydrolysis
- ✓ Urease activity, gelatine activity and catalase activity.

Dairy Industry Lab

Course Objective and Description:

Students develop an understanding of the science and technology that underpins modern dairy foods processing and gain hands-on experience in the manufacture of safe, high quality dairy products ranging from pasteurized milk to cheese.

Applying the general methods of processing fresh milk and dairy products (yoghurt, butter milk, sour cream, butter, cheeses…etc, and studying the quality parameters and analysis of the milk and its products.

Experiments:

- Safety and Precaution .
- Milk Quality Assessment .
- Heat Stability Test.
- Dye Reduction Test.
- Fat Determination.
- Yoghurt Manufacturing.
- Jellified Milk .
- Concentrated Milk.
- Cheese Manufacturing.
- Cream and Butter Manufacturing .
- Ice Cream Manufacturing .
- Chemical and Sensory Evaluation of Our Products.
- Microbial Examination of Our Products.

Diet Therapy lab

Course Objective and Description:

This lab is formulated to allow students to have practical skills in analyzing nutritional cases and designing appropriate nutritional intervention in a collective approach that starts from reading medical files to providing a well-rounded nutritional therapy plan.

Experiments:

- Overview of Nutritional Interventions.
- Format of Medical Files.
- Modification to Regular Diet.
- Cases for Upper GI.
- Cases for Lower GI.
- Complex Cases {Oncology, CF and Celiac}.

Food Chemistry and Analysis Lab

Course Objective and Description:

Students develop an understanding of the science and technology that underpins modern dairy foods processing and gain hands-on experience in the manufacture of safe, high quality dairy products ranging from pasteurized milk to cheese.

The principles of food chemistry are presented in a laboratory setting to include fundamental and industry-applicable food chemistry principles of major and minor food constituents including carbohydrates, proteins, lipids, minerals, preservatives, and water. You will be given formal instruction on writing techniques, tips and suggestions, and formal critique of your technical writing from your peers, the TA, and the course instructor.

Experiments:

- ✓ Acid – Base Titration.
- ✓ Safety and Precaution.
- ✓ Moisture Content Determination.
- ✓ Ash Determination.
- ✓ Flame Photometer.
- ✓ Lipid Determination.
- ✓ Protein Determination.
- ✓ Fiber Determination.
- ✓ Vitamin C Determination.
- ✓ Salt Determination.
- ✓ Titrable Acidity Determination.
- ✓ Quality of Honey .
- ✓ Water Hardness.

Food Processing and Preservation Lab

Course Objective and Description:

This course deals with all the unit operation used in food industry (as evaporation, Freezing, and frying).

This courses will includes the application of Food processing methods and their role in the preservation of foods including thermal, chemical and physical processes used in the food industry. In addition to the effects of processing methods and storage on the food quality, safety and nutrient content.

Experiments:

- Safety and Precaution.
- Water activity Determination.
- Reducing sugar Determination.
- Oxidation of Lipids.
- Blanching Efficiency.
- Drying of Fruits and Vegetables.
- Freezing of Fruits and Vegetables .
- Frying Technology .
- Fermentation .
- Sugar Preserved Fruits .
- Enzymatic Browning.
- Canning and Sterilization .
- Tomato Products.
- Vinegar Making.

Food Microbiology Lab

Course Objective and Description:

To prepare the learner to be able to work in food facilities applying knowledge and skills of interaction between microorganisms and food.

The course will focus on relationships of microbes with our food and how microorganisms can cause lots of harm to our bodies when we ingest contaminated food. The course will cover different types of bacteria and mouldsand their growth requirements and how spoilage of food and drink can cost lives and money to any society. Microbial control and how to control food poisoning and design a plan to eradicate contamination will be discussed. On other side, beneficial microorganisms in the food industry and to our health will be discussed as well.

Experiments:

- Health and Safety and Media Preparation.
- Food Sampling and Isolating Bacteria From Fish.
- Yeast and Moulds.
- Isolation of E Coli From Minced Beef.
- Isolation of E Coli From Tap Water.
- Isolation of Salmonella From Egg.
- Thermal Destruction of Bacteria.
- Isolation of Spores.
- Canned Food.
- Intrinsic Factors and Extrinsic Factors.
- Isolation of Staph.
- Cleaning and Sanitation .

Meal planning lab

Course Objective and Description:

This lab is designed to provide the students with a solid background about the different methods used in meal planning for healthy people throughout life cycle, which include both the assessments, and dietary planning.

Experiments:

- Dietary Assessment.
- Diet Planning Principles.
- DASH Diet.
- Exchange List.
- Diabetes and Carbohydrates.
- Cases of Life Cycle.

Laboratory equipment and tools

Growth chamber

It is able to provide plants with the required temperature, light and in some incubators even relative humidity that is necessary for their growth and development.

Incubator

It is able to provide microorganisms with the required temperature, light and in some incubators even relative humidity that is necessary for their growth and development.

Deep freezer

Eliminates the need to make numerous trips to the lab ideal for intermediate term storage of restriction enzymes we have tow deep freezer (-30,-80)>.

Oven and Muffle Furnace

They depend on hot air for sterilization and drying of different materials. Those with internal fan can be more consistent and efficient.

Autoclave

It is a device to sterilize equipment and supplies by subjecting them to high pressure steam at 121° C or more, typically for 15 to 20 minutes depending on the size of the load and the contents. Autoclaves are widely used in microbiology, veterinary science, mycology,. Typical loads include glassware, medical waste, utensils, animal cage bedding.

Microtome

It, (from Greek *mikros*, "small" and *temnein* "to cut") is a sectioning device that allows for the cutting of extremely thin slices of material, known as sections. Microtomes are an important device in microscopy preparation, allowing for the preparation of samples for observation under transmitted light or electron radiation. Microtomes use steel, glass, or diamond blades depending upon the specimen being sliced and the desired thickness of the sections being cut. Steel blades are used to prepare sections of animal or plant tissues for light microscopy histology. Glass knives are used to slice sections for light microscopy and to slice very thin sections for electron microscopy. Industrial grade diamond knives are used to slice hard materials such as bone, teeth and plant matter for both light microscopy and for electron microscopy. Gem quality diamond knives are used for slicing thin sections for electron microscopy.

Centrifuge

It is a piece of equipment, generally driven by an electric motor (some older models are still spun by hand), that puts an object in rotation around a fixed axis, applying a force perpendicular to the axis. The centrifuge works using the sedimentation principle, where the centripetal acceleration causes more dense substances to separate out along the radial direction (the bottom of the tube). By the same token, lighter objects will tend to move to the top (of the tube; in the rotating picture, move to the centre). Simple centrifuges are used in chemistry, biology,

and biochemistry for isolating and separating suspensions. They vary widely in speed and capacity. They usually comprise a rotor containing two, four, six, or many more numbered wells within which the samples containing centrifuge tips may be placed.

Water bath

It is used in the laboratory to allow a chemical reaction to occur at an elevated temperature.

Microscope

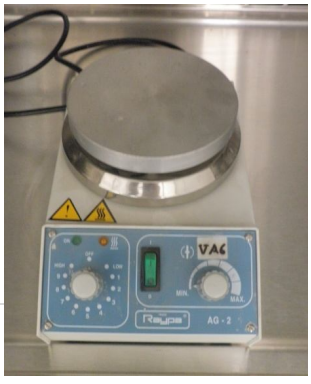
It is an instrument to see objects too small for the naked eye. The science of investigating small objects using such an instrument is called microscopy. Microscopic means invisible to the eye unless aided by a microscope.

Fluorescence microscope

A fluorescence microscope is an optical microscope used to study properties of organic or inorganic substances using the phenomena of fluorescence and phosphorescence instead of, or in addition to, reflection and absorption.

Magnetic stirrer

It is a laboratory device consisting of either a rotating magnet or stationary electromagnets creating a rotating magnetic field. This device is used to cause a stir bar immersed in a liquid to spin very



quickly, agitating or mixing the liquid. A magnetic stirrer often includes a provision for heating the liquid.

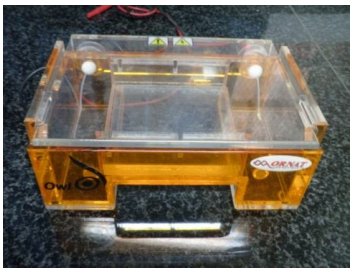
pH meter

It is an electronic instrument used to measure the pH (acidity or alkalinity) of a liquid (though special probes are sometimes used to measure the pH of semi-solid substances). A typical pH meter consists of a special measuring probe (a glass electrode) connected to an electronic meter that measures and displays the pH reading

Thermal cycler

It (also known as a Thermocycler, PCR Machine or DNA Amplifier) is a laboratory apparatus used to amplify segments of DNA via the polymerase chain reaction (PCR) process. The device has a *thermal block* with holes where tubes holding the PCR reaction mixtures can be inserted. The cycler then raises and lowers the temperature of the block in discrete, pre-programmed steps.

Gel electrophoresis apparatus



It is used with gel electrophoresis which is a technique used for the separation of deoxyribonucleic acid (DNA), ribonucleic acid (RNA), or protein molecules using an electric field applied to a gel matrix.

Vortex

It is a simple device used commonly in laboratories to mix small vials of liquid. In cell culture and microbiology laboratories they may be used to suspend cells. In a biochemical or analytical laboratory they may be used to mix the reagents of an assay or to mix an experimental sample and a dilutant.

Mortar and pestle

A mortar and pestle is a tool used to crush, grind, and mix substances. The pestle is used for pounding and grinding, and the mortar is a bowl, typically made of hard wood, marble, clay, or stone. The substance is ground between the pestle and the mortar.

UV illuminator

It is most commonly used in modern laboratories to visualize nucleic acids stained with ethidium bromide or other dyes.

Pipette

It (also called a pipet, pipettor or chemical dropper) is a laboratory instrument used to transport a measured volume of liquid. Pipettes are commonly used in molecular biology as well as medical tests. They come in several designs for various purposes with differing levels of accuracy and precision, from single piece glass pipettes to more complex adjustable or electronic pipettes. Many pipettes types work by creating a partial vacuum above the liquid-holding chamber and selectively releasing this vacuum to draw up and dispense. Pipettes that dispense between 1 and 1000 µl are termed micropipettes, while *macropipettes* dispense a greater volume of liquid.

Liquid N_2 jar

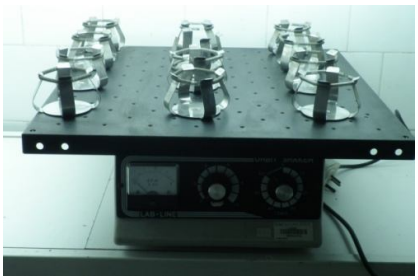
It is used to store liquid N_2 which is a cryogenic liquid. At atmospheric pressure, it boils at −195.8 °C. Like dry ice, the main use of liquid nitrogen is as a refrigerant. Among other things, it is used in

the cryopreservation of blood, reproductive cells (sperm and egg), and other biological samples (plant samples) and materials

Eppendrofs, PCR tubes, and tips

Microcentrifuge tubes (eppendorfs) or microfuge tubes are small, cylindrical plastic containers with coical bottoms, typically with an integral snap cap. They are used in molecular biology and biochemistry to store and centrifuge small amounts of liquid. Tips are used with pipettes to transport small quantities…

Shaker



It is used in laboratory for mixing samples

Laminar flow cabinet

A laminar flow cabinet or laminar flow closet or tissue culture hood is a carefully enclosed bench designed to prevent contamination of semiconductor wafers, biological samples, or any particle sensitive device. Air is drawn through a HEPA filter and blown in a very smooth, laminar flow towards the user. The cabinet is usually made of stainless steel with no gaps or joints where spores might collect. Such hoods exist in both horizontal and vertical configurations, and there are many different types of cabinets with a variety of airflow patterns and acceptable uses. NSF49 is the commonly accepted regulatory standard for these cabinets. Laminar flow cabinets may have a UV-C germicidal lamp to sterilize the shell and contents when not in use.

Flame photometer

A photoelectric flame photometer is a device used in inorganic chemical analysis to deter mine the concentration of certain metal ions, among them sodium, potassium, lithium, and calcium. In principle, it is a controlled flame test with the intensity of the flame colour quantified by photoelectric circuitry. The sample is introduced to the flame at a constant rate. Filters select which colours the photometer detects and exclude the influence of other ions. Before use, the device requires calibration with a series of standard solutions of the ion to be tested. Flame photometry is crude but cheap compared to flame emission spectroscopy, where the emitted light is analysed with a monochromator. Its status is similar to that of the colorimeter (which uses filters) compared to the spectrophotometer (which uses a monochromator). It also has the range of metals that could be analysed and the limit of detection is also considered.

Spectrophotometer

It provides outstanding photometric accuracy and reproducibility used in research with twelve test tube cuvettes.

Kjeldahl

The Kjeldahl method in analytical chemistry is a method for the quantitative determination of nitrogen in chemical substances. The method consists of heating a substance with sulfuric acid, which decomposes the organic substance by oxidation to liberate the reduced nitrogen as ammonium sulfate. In this

step potassium sulfate is added in order to increase the boiling point of the medium (from 337°F to 373°F / 169°C to 189°C). Chemical decomposition of the sample is complete when the medium has become clear and colorless (initially very dark). The solution is then distilled with sodium hydroxide (added in small quantities) which converts the ammonium salt to ammonia. The amount of ammonia present (hence the amount of nitrogen present in the sample) is determined by back titration. The end of the condenser is dipped into a solution of boric acid. The ammonia reacts with the acid and the remainder of the acid is then titrated with a sodium carbonate solution with a methyl orange pH indicator.

Bomb calorimeter:

This instrument is used for the measurements of gross energy of various substances: feeds, liquids and semi solids. The tested sample is totally burnt and the total heat of combustion is determined. This is what is called gross energy. It is expressed as calorie/ g sample.

Fiber extraction unit:

This instrument is used to measure the sample crude fiber. Six different samples can be tested simultaneously. Samples is treated first with alkaline solution then washed followed by an acidic treatment. The residue is deducted from the original sample weight to estimate crude fiber fraction.

Lipid extraction unit:

It is used for the estimation of samples crude fat. Solvent ether is used in this procedure. Samples (6 per run) are boiled with the solvent then extraction is applied. Sample weight after extraction is deducted from the sample initial weight to calculate the value of ether extract (lipid)