## College of Pharmacy’s Laboratories

<table>
<thead>
<tr>
<th>Location / Lab #</th>
<th>Functions</th>
<th>Utilization / Remarks</th>
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</thead>
</table>
| M12-130          | Pharmaceutical Microbiology, Environmental Microbiology, Food Microbiology, Food Safety and Quality | College of Pharmacy [Pharmaceutical Microbiology Course]  
                      College of Health Sciences  
                      College of Sciences [Biotechnology Department] |
| M12-131          | Physical Pharmacy, Cosmetics, Pharmaceutical Compounding, Biochemistry | College of Pharmacy [Department of Pharmaceutics & Pharmaceutical Technology, Department of Medicinal Chemistry] |
| M12-024          | Pharmaceutical Technology Lab – Tablet and Capsule unit | College of Pharmacy [Department of Pharmaceutics & Pharmaceutical Technology] |
| M12-127          | Physical Pharmacy, Pharmaceutical Compounding, Rheology | College of Pharmacy [Department of Pharmaceutics & Pharmaceutical Technology] |
| M12-128          | Medicinal Chemistry IB  
                      Medicinal Chemistry IIB | College of Pharmacy [Department of Medicinal Chemistry] |
| M12-034          | Biochemistry, Analytical Chemistry, Analytical Chemistry for Bio | College of Pharmacy [Department of Medicinal Chemistry]  
                      College of Sciences |
| M28-103          | Invivo & Invitro Pharmacological Experiment | College of Pharmacy [Pharmacy Practice & Pharmacotherapeutics] |
| M-32             | Pharmacognocy, Health System Pharmacy | College of Pharmacy [Pharmacy Practice & Pharmacotherapeutics] |
**Medicinal Chemistry**

**Medicinal Chemistry’s Laboratories**

<table>
<thead>
<tr>
<th>Lab Name</th>
<th>Location</th>
<th>Person in Charge</th>
<th>Programs Served</th>
<th>Courses Served</th>
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<tbody>
<tr>
<td>Medicinal Chemistry</td>
<td>M12-128</td>
<td>Dr. Dana Hilal</td>
<td>College of Pharmacy</td>
<td>Medicinal Chemistry I, A, II A, IB, IIB</td>
</tr>
<tr>
<td>Pharmacognosy</td>
<td>M28-103</td>
<td>Dr. Chefa’a Al-Hourani</td>
<td>College of Pharmacy</td>
<td>Pharmacognosy</td>
</tr>
</tbody>
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Chemistry for Pharmacy lab

Introduction

This course covers experiments on qualitative and quantitative aspects of general chemistry and their applications in the pharmaceutical field, such as separation, identification, determination, purification, and extraction procedures.

Equipment and Instruments

• Analytical Balances
• Top Loading Balances
• Hot Plates and Stirrer
• Oven
• Ice Flaking Machine
• Water Bath
• Centrifuge
• Vacuum Pump
• Separatory Funnel
• Melting Point Apparatuses

Experiments

• Identification of Anions and Cations
• Density Determination
• The Empirical Formula of a Compound: The Law of Constant Composition
• Water Analysis
• Physical Properties of Chemicals: Melting Point, Sublimation, and Boiling Point
• Water of Hydration
• Factors Affecting Rate of Reactions
• pH, Buffer Solutions and Buffer Capacity
• Analysis of Vinegar by Titration
• Isolation of Caffeine from Tea Leaves
• Paper Chromatography; Separation of Plant Pigments
• Analysis of Ascorbic Acid by Oxidation Reduction Titration
Medicinal Chemistry IA

Introduction

This course introduces the basic concepts of medicinal chemistry, including study of the molecular and chemical structures of organic pharmaceuticals using molecular models, preparation of some active ingredients, functional groups reactions and identification of organic compounds such as amine, aldehyde, ketones, alcohols, esters and phenols.

Equipment and Instruments

• Analytical Balances
• Hot Plates and Stirrers
• Rotatory Evaporators and Vacuum Pumps
• Distillation Apparatuses
• Melting Point Apparatuses
• Water Baths
• Ultrasonic Bath
• Ovens

Experiments

• Molecular Models and Stereochemistry
• Qualitative Identification of Functional Groups (Part-I)
• Qualitative Identification of Functional Groups (Part-II)
• Factors Affecting SN1 and SN2 Reactions
• Resolution of Racemic Mixture [α-Methylbenzylamine]
Medicinal Chemistry IB

Introduction

This course is concerned with the theory and practice of the preparation of some active ingredients in pharmaceutical preparation as well as classical and instrumental methods for the separation, identification and quantitative analysis of chemical substances. Satisfactory completion of this course affords students a working knowledge of analytical instrumentation typically employed in pharmaceutical and biochemical research laboratories. It also provides students with an appreciation of the relative strengths and limitations of different instrumental-based analysis methods.

Equipment and Instruments

- UV-VIS Spectrophotometer
- GC-MSMS
- GC-FID and GC-ECD
- HPLC-UV
- Analytical Balances
- Hot Plates and Stirrers
- Rotatory Evaporators and Vacuum Pumps
- Water Baths
- Ultrasonic Bath
- Ovens

Experiments

- Aspirin Preparation and Crystallization
- Drugs Mixture Separation Using TLC
- Determination of Paracetamol Concentration Using Spectrophotometer
- Separation of Caffeine and Paracetamol Mixture Using HPLC
- Separation and Identification of Hydrocarbon Mixture Using GC-FID and GC-MSMS

Tests and Services

- Development and Validation of Analytical Methods for Analysis of Active Ingredients and related substances.
- Routine Quality Control of Pharmaceutical Products
- Accelerated and Real Time Stability Study of Pharmaceuticals
- Heavy Metal Content Determination in Pharmaceutical Sample
Medicinal Chemistry IIA

Introduction

The practical part of the course covers experiments on the synthesis of organic compounds and drugs using different analysis and purification techniques and includes synthesis of chiral drugs and the techniques used in the separation of enantiomers.

Equipment and Instruments

- Analytical Balances
- Top loading Balances
- Hot Plates and Stirrer
- Oven
- Water Bath
- Thermometer
- Vacuum Pump
- IR- Spectrophotometer
- Polarimeter
- Ice Flaking Machine
- Reflux Apparatus
- Melting Point Apparatus
- Separator Funnel
- Rotatory Evaporator
- UV Cabinet
- Thin Layer Chromatography Tanks

Experiments

- Friedel-Crafts Alkylation
- Nitrating Methyl Benzoate: Electrophilic Aromatic Substitution
- Synthesis of 3-Methylpyrazole-5-One
- Synthesis of Acetanilide
- Diel’s Alder Reaction

Tests and Services

- To Have Preliminary Idea About the Active Ingredients and their Concentration in the Drug Dosage Forms
- Toxic Elements Detection and Measurement in Food, Water, Soil and Other Specimens (With the Help of ICP)
Medicinal Chemistry IIB

Introduction

The practical part of this course deals with experiments on the synthesis of pharmaceutical organic compounds and detection of their purity, stability and biological activity. Experiments to study the chemical and pharmaceutical properties of pharmaceutical drugs are also included in this course in addition to the application of molecular modeling to study the three-dimensional structures of drugs and their structure activity relationship (SAR).

Equipment and Instruments

- Analytical Balances
- Top loading Balances
- Hot Plates and Stirrer
- Oven
- Water Bath
- Thermometer
- Centrifuge
- Vaccum Pump
- UV-Vis Spectrophotometer
- Polarimeter
- Ice Flaking Machine
- Reflux Apparature
- Melting Point Apparature
- Separator Funnel
- Rotatory Evaporator
- UV Cabinet
- Thin Layer Chromotography Tanks

Experiments

- Synthesis of Sulfasalazine
- Synthesis of 5,5-Diphenylhydantoin from Benzyl
- Muticomponent Reactions: Ugi, Passerini, Benelli (Part-I)
- Muticomponent Reactions: Ugi, Passerini, Benelli (Part-II)
- Synthesis and Chemical Analysis of Penicillins
- Structural Data: The Bases for Molecular Modeling (Molecular Docking)

Tests and Services

- To Have Preliminary Idea About the Active Ingredients and their Concentration in the Drug Dosage Forms
- Toxic Elements Detection and Measurement in Food, Water, Soil and Other Specimens (With the Help of ICP)
Pharmacognosy Lab

Introduction

Plant materials are used throughout developed and developing countries as home remedies, over the counter drug products and raw materials for the pharmaceutical industry. It is therefore essential to ensure the quality of medicinal plant products by using several techniques and applying suitable standards. One of the most important techniques to authenticate a crude plant drug is the microscopical examination of the crude plant or the plant powder. The plant material is prepared for microscopical examination and the anatomical features of the powdered drugs are recorded in order to compare the structures present with those drawn and described in the relevant monographs. At the end of the lab course, students are able to interpret the morphological and anatomical descriptions of the crude plant in order to clearly identify it.

Experiments

• The Morphological and Microscopical Identification of the Herbal Leaves such as Senna Leaves; Peppermint Leaves; Thyme Leaves and Flowering Tops
• The Morphological and Microscopical Identification of the Herbal Seeds such as Black Mustard Seeds and Fenugreek Seeds
• The Morphological and Microscopical Identification of Herbal Fruits such as Anise Fruits, Caraway Fruits, Coriander Fruits, Cardamom Fruits, Fennel Fruits, Black Pepper Fruits and Capsicum Fruits
• The Morphological and Anatomical Identification of Herbal Underground Parts: Rhubarb Rhizome, Ginger Rhizome, Liquorice Root
• The Morphological and Anatomical Identification of Herbal Flowers Like Clove Flower
• The Morphological and Anatomical Identification of Herbal Stem and Root Barks such as Cinnamon Bark

Tests and Services

• This course gives the pharmacists the skills to identify herbal medicines and detect any adulteration in the herbal products in the market through microscopic examinations.
## Pharmaceutics and Pharmaceutical Technology’s Laboratories

<table>
<thead>
<tr>
<th>Lab Name</th>
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<th>Person in Charge</th>
<th>Programs Served</th>
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<tbody>
<tr>
<td>Pharmaceutics A</td>
<td>M12-127</td>
<td>Dr. Shireen Audeh, Dr. Amira Mahrous</td>
<td>College of Pharmacy</td>
<td>Pharmaceutics A</td>
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<tr>
<td>Pharmaceutics B</td>
<td>M12-127</td>
<td>Dr. Shireen Audeh, Dr. Amira Mahrous</td>
<td>College of Pharmacy</td>
<td>Pharmaceutics B</td>
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<tr>
<td>Pharmaceutics 1A</td>
<td>M12-024, M12-131</td>
<td>Dr. Shireen Audeh, Dr. Amira Mahrous</td>
<td>College of Pharmacy</td>
<td>Pharmaceutics 1A</td>
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<td>Pharmaceutics 2A</td>
<td>M12-024</td>
<td>Dr. Shireen Audeh, Dr. Amira Mahrous</td>
<td>College of Pharmacy</td>
<td>Pharmaceutics 2A</td>
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<tr>
<td>Pharmaceutics 1B</td>
<td>M12-024</td>
<td>Dr. Shireen Audeh, Dr. Amira Mahrous</td>
<td>College of Pharmacy</td>
<td>Pharmaceutics 1B</td>
</tr>
</tbody>
</table>
Pharmaceutics A

Introduction

The goal of the laboratory is to provide students with the necessary skills in performing pharmaceutical calculations and to promote student’s learning by performing full experimental work on physical pharmacy topics covered in this course such as partition phenomena, phase equilibria and solubility. This lab will provide the students with practical training in formulation of oral liquid dosage forms such as syrups, effervescent solutions, infusions, decoctions, washes, elixirs, and aromatic waters.

Equipment and Instruments

- Picnometer
- UV Spectrophotometer
- Separating Funnel
- pH Meter
- Thermometers

Experiments

- Pharmaceutical Calculations — Density, Specific Gravity and Specific Volume of Liquids
- Preparation of Pharmaceutical Buffered Solutions and Determination of Buffer Capacity
- Preparation of Simple Syrup, Effervescent Solutions and Drought
- Preparation of Cough Syrup, Infusion of Senna
- Preparation of Strong Iodine Solution (Lugol’s Solution), Washes and Aromatic Waters
- Determination of Critical Solution Temperature of Phenol/Water System
- Phase Diagram of Three Component Mixture System
- Determination of Partition Coefficient of Iodine Between Two Immiscible Phases
- Determination of the Effect of Temperature and Electrolytes on the Solubility of Benzoic Acid
Pharmaceutics B

Introduction

The goal of the laboratory is to promote student’s learning by performing full experimental work on physical pharmacy topics covered in this course such as determination of colligative properties of pharmaceutical solutions, measurement of surface and interfacial tension of disperse systems, use of surfactants in micellar solubilization, determination of rheological properties of pharmaceutical preparations, and determination of optical and electric properties of colloids.

Equipment and Instruments

• Fiske Osmometer
• Stalagmometers
• Ostwald Viscometers
• Falling Sphere Viscometer
• Brookfield Viscometer
• Microscope

Experiments

• Determination of Colligative Properties of Solutions – Osmotic Pressure
• Effect of Adding Hypotonic or Hypertonic Solutions on Red Blood Cells
• Determination of Colligative Properties of Solutions – Freezing Point and Boiling Point
• Determination of Surface Tension and Interfacial Tension Between Two Immiscible Phases
• Determination of Critical Micelles Concentration of Surfactants
• Micellar Solubilization of Water-Insoluble Drugs
• Adsorption of Oxalic Acid on Charcoal
• Preparation and Characterization of Colloids
• Determination of Rheological Properties and Behavior of Different Pharmaceutical Dosage Forms
Pharmaceutics 1A

Introduction

The goal of the laboratory is to provide students with practical training in formulation and preparation of dosage forms such as suspensions, emulsions, microemulsions, gels, ointments and suppositories. Students will be able to interpret, calculate, extemporaneously prepare these dosage forms and apply basic scientific principles to the art and technology of formulation.

Equipment and Instruments

- Brookfield Viscometer
- Dissolution Tester
- UV Spectrophotometer
- UV Lamp
- Centrifuge
- Conductmeter
- Microscope
- Suppositories Molds

Experiments

- Formulation and Characterization of Suspensions
- Physical Stability Testing of Suspensions
- Formulation and Characterization of Emulsions
- Formulation and Characterization of Gels and Creams
- Cosmetics and Medicated Creams
- Formulation of Ointments
- Formulation of Suppositories
- Characterization of Suppositories
- Formulation of Pessaries
**Pharmaceutics 2A**

**Introduction**

The goal of the laboratory is to provide students with practical training in performing bioequivalence studies. The lab offers hands on training on how to design, perform, analyze and interpret results and write reports of bioequivalence studies. The lab/tutorial also aims to complement the core course in providing essential knowledge regarding fundamental factors affecting pharmacokinetics parameters of drug by using means of practice problem, computer simulation program and group project work.

**Equipment and Instruments**

- HPLC
- Centrifuges
- Vortex
- Centrifuge Tubes
- UV Spectrophotometer
- USP Dissolution Tester
- Freezer
- WinNonlin Software
- SPSS Software

**Experiments**

- Identify and Differentiate the Characteristics of Zero and First Order Kinetics
- Determine the Rate Constant of Reaction and Initial Concentration of Reactants
- Application of WinNonlin as a Tool to Determine Pharmacokinetics Parameters of a Given Set of Drug plasma Concentration Over Time Data
- Comparison of Pharmacokinetic Parameters of Two Marketed Product of Paracetamol (Panadol and Adol) Following a 500 mg Single Dose in Healthy Adult Volunteers Under Fasted and Fed Conditions. The Bioequivalence Study was Approved by the Ethical Committee in the University
Pharmaceutics 1B

Introduction

The goal of the laboratory is to provide students with practical training on how to formulate and characterize different solid dosage forms such as powders, tablets and capsules. The lab is designed to teach the students formulation principles where the physicochemical properties of the drug and excipients may influence the formulation, component compatibility, manufacturing, bioavailability and stability of the final dosage form.

Equipment and Instruments

- Korsch Tablet Press Machine
- Kaleva Spray Coating Machine
- Sieve Shakers / Retsch Sieves
- Disintegration Testing Apparatus
- Dissolution Apparatus
- Friability Testing Apparatus
- Thickness and Hardness Apparatus
- Flow Meter
- Capsule Filling Machine
- UV-Spectrophotometer
- Magnetic Hot Plate
- Desiccator
- Weighing Scale
- Thermometer

Experiments

- Angle of Repose and Bulk Density Measurement
- Capsule Filling
- The Effect of Diluents on Drug Solubility
- The Effect of Lubricant on Drug Solubility
- The Effect of pH on Drug Solubility
- The Effect of Humidity on Capsule
- Tablet Manufacture
- Quality Control Tests for Tablet (Friability, Hardness, Weight Variation, Thickness)
- Tablet Dissolution and Disintegration
# Pharmacy Practice and Pharmacotherapeutics Laboratories

<table>
<thead>
<tr>
<th>Lab Name</th>
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<th>Person in Charge</th>
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<tr>
<td>Pharmacology Lab</td>
<td>M28-I04A</td>
<td>Farman Khan</td>
<td>College of Pharmacy</td>
<td>Pharmacology – IA</td>
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<td>Pharmacology – IB</td>
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<td>Pharmacology - IIA</td>
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<tr>
<td>Pharmacy Practice Lab</td>
<td>M28-I03</td>
<td>Mena Al-Mallah</td>
<td>College of Pharmacy</td>
<td>Health System Pharmacy</td>
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<td>Pharmacognosy</td>
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Pharmacology Labs [Pharmacology - IA]

Introduction

Pharmacology of drugs, their mechanisms of action; therapeutic uses, adverse effects and drug interaction are covered in theoretical classes. However, to appreciate such principles and the importance of testing drugs for their effects, practical classes aim to illustrate such effects on isolated and whole animal preparations. In this laboratory classes, students learn how to handle animals and learn the pharmacokinetic principles. In addition, students investigate some of the responses of guinea pig ileum preparation to several drugs, ranging from dose—response studies to demonstration of selective antagonism. Also they learn about effects of drugs on Rabbits eye to understand autonomic pharmacology. The sympathetic and parasympathetic control of pupil diameter and how pupil diameter changes in response to a change in ambient light intensity is extensively covered. Neuro-muscular Blockers and drugs effects on skeletal muscle preparations are also covered. The effect of drugs on the slow muscle fibers of Toads abdominis muscle is also examined and to differentiate between the spastic and flaccid paralysis by studying the Neuro-muscular Blockers effect on chick. Simulated lab program used to demonstrate these principals in addition to the wet lab according to availability of animals and suitable species to be used.

General Equipment

- Water Still W4000
- Electronic Balances
- Thermostatic Bath
- Microscope
- Oven UNB
- UV Lamp Bench Type
- pH Meter
- Precision Triple Beam Balance
- Centrifuges
- Refrigerator
- Chest Freeze
- Hot Plates
- Vortex Mixer
- Melting Point Apparatus
- Mettle Toddler Microbalance
- Thermo Circulator
- Rat, Mice & Rabbits Cages
Equipment and Instruments

- Animal Temperature Recorder
- Rat Restrainer Adjustable Length
- Rabbit Restrainer Adjustable Length
- Dissecting Set
- Harvard Apparatus Oscillographs
- Small Animal Ventilator
- Single Heated Tissue Bath
- Operator Table for Animal
- Homoeothermic Control Units for Medium & Small Animals
- Rat, Mice & Rabbits Cages
- Desiccator
- AD - Instrument

Experiments

- Experimental Animals and their Methods of Handling
- Routes of Drug Administration & Dose Calculation
- Drug – Drug Interactions and Drug Excretion
- Identification of Unknown Drug
- The Effect of Autonomic Drugs on Rabbit’s Eye
- Guinea Pig Ileum Preparation
- Neuromuscular Junction Blockers & Frogs Rectus Abdominis Muscles
- Anterior Tibalis – Sciatic Nerve Preparation
Pharmacology Labs [Pharmacology - IB]

Introduction

This course will introduce the basic concepts of Cardiovascular Pharmacology to students & will investigate aspects of muscle function and drug effects in diverse isolated tissues and whole animal preparations including:

Cardiac Muscle Function

Vascular Tissue (Rat Coronary Artery & Rabbit Blood Pressure) All experiments expose students to techniques including equipment set-up, force transducer calibration, tissue dissection and mounting, and dose-response assays and analysis

The following experiment uses a small mammal, rabbit & albino rats to investigate the actions of various pharmacological agents on the arterial blood pressure and also the effects of drugs on the isolated rabbit heart, using a Langendorff apparatus in which the heart is perfused via its coronary arteries with oxygenated physiological solution, which keeps the cardiac muscle viable in vitro for a few hours. The student will explore the effects of various neurotransmitters and drugs on the heart. Simulated lab program & short video animation used to demonstrate these principals in addition to the wet lab according to availability of animals and suitable species to be used.

Equipment and Instruments

- Blood Pressure Transducer
- Heart Mammalian Perfusion System
- Blood Pressure Monitor Mercury
- AD - Instrument

Experiments

- Cardiovascular Physiology
- Electrophysiology of the Heart and ECG
- Effects of Drugs on the Perfused Isolated Rabbits Heart – Langer- dorff’s Preparation
- Rat Blood Pressure Preparation
- Renal Physiology
- Blood Coagulation
Pharmacology Labs [Pharmacology - IIA]

Introduction
This course will introduce the basic concepts of CNS Pharmacology, including experimental Parkinsonism, Analgesic effect of some drugs, local anesthetic agents and induction of physical dependence using morphine.

Equipment and Instruments
- Rat Restrainer Adjustable Length
- Rabbit Restrainer Adjustable Length
- VERSAMAX Analyzer
- Hot Plate Analgesia Meter Harvard
- Animal Activity Monitor + Acer Monitor + Computer Set

Experiments
- Experimental Parkinsonism
- Opioid Analgesia in Animals, Thermal & Mechanical Methods
- Non-steroidal Anti Inflammatory Analgesics, Chemical & Electrical Methods
- Induction of Physical Dependence with Morphine
- Local Anesthetic Agents
Pharmacy Practice-IB

Introduction

The Pharmacy Practice (IB) course helps the student acquire the necessary background behind extemporaneous compounding theories and procedures. Specifically, it helps students in the areas of making different dosage forms such as solutions, suspensions, and mixing of powders and topical products. The practicum also introduces students to medication dispensing and labeling and how to work collaboratively with other health team members. Also, dose calculation is an integral part of the practical component.

Equipment and Instruments

- Electronic Top Loading Balance
- Two-Pan Balance (Torsion Balance)
- Hotplate with Magnetic Mixer
- Ointment Jars
- Ointment Slabs with Spatulas
- Prescription Bottles (Clear and Amber)
- Mortar and Pestle
- Capsule Shells
- Print References and Electronic Programs and Databases

Experiments

- Preparation of Orange Syrup
- Preparation of Trimethoprim Mixture
- Preparation of Spironolactone Mixture
- Preparation of Propranolol Mixture
- Preparation of Aqueous Cream
THE CENTRAL LABORATORIES - WOMEN