

**The School of Pharmacy & Biomedical science**  
**Bachelor of Clinical Pharmacy**  
**Course Description of Core and Major Requirements**

**Core Requirements**

<b>Code</b>	<b>Title</b>	<b>Course Description</b>
<b>BIOC310</b>	<b>Medical Biochemistry</b>	Medical Biochemistry is designed to present the basics of biochemistry, thus including a study of structure of amino acids, carbohydrates, lipids, proteins, vitamins, and nucleic acids, in addition to their metabolism, it also imparts knowledge about the catalytic role of enzymes, their structure, kinetic and mechanism of action, bioenergetics, membranes and signaling systems, integration and regulation of the major metabolic pathways, nitrogen metabolism, myoglobin, hemoglobin, and hemostasis, with emphasis on the biochemical basis of human disease
<b>BIOL200</b>	<b>General Biology I</b>	This course aims to provide students with basic information of living system organizations, energy transfer and continuity of life. The topics include: biological history; structure and functions of cells and cellular organelles; transport across cell membrane; cell division; general biochemistry; and DNA structure. This course has both a lecture and laboratory component.
<b>BIOL200L</b>	<b>General Biology I Lab</b>	This lab course introduces principles of microscopy with emphasis on viewing different animal tissues and cells, in addition to experimentation related to the concepts discussed in BIOL 200.
<b>BIOL360</b>	<b>Human Physiology &amp; Anatomy</b>	The course examines the basic concepts of structure and function of the human body. Processes of cardiovascular, respiratory, nervous, digestive and reproductive body systems will be surveyed. Organ systems will be discussed using models and other lab materials. Human Anatomy & Physiology, therefore, covers the structure and functioning of the human body. The course begins with an introduction to the human body and the key chemistry concepts needed to understand its processes. Each of the nine systems of the body is covered in detail. One major dissection is done at the beginning of the year to familiarize students with the internal structure of mammals. Other laboratory experiences are provided related to the body system being studied.
<b>BIOL360L</b>	<b>Human Physiology &amp; Anatomy Lab</b>	In this lab students learn how to use anatomical terminology and body position. Also they study the appendicular and axial skeleton, and joints. In addition, students perform dissection of the heart, brain, kidneys... and of whole animal. Also students study reflexes and muscle twitching in frog. The primary objective of this lab is to help Biology and Pharmacy students master the basic concepts of Human Anatomy. The different lab sessions avoid rote memorization and help maintain a high level of interest in understanding the fundamentals of human anatomy by using charts, models, dissection as well as laboratory reports.
<b>BIOL385</b>	<b>Microbiology</b>	In this course students will be introduced to the world of microbiology in terms of classification, identification, pathogenic effects, and beneficial effects as applications in food industry and to principles of culturing, isolation, enumeration and identification of different microbes. Also, you will have the chance to discover examples of different groups and species of microorganisms that have direct impact on human health.
<b>BIOL385L</b>	<b>Microbiology Lab</b>	In this lab students learn how you use microbial culture, staining techniques, disinfection, and sterilization. Isolation of a culture of some normal flora and a survey of parasites are included. Use various metabolic reactions in the identification and classification of organisms. This Microbiology laboratory is a two hour a week laboratory course with experiments.
<b>BMED445</b>	<b>Pathophysiology</b>	This course studies the mechanisms, etiologies, risk factors and complications of diseases processes. It emphasizes on the clinical signs and symptoms, history, prognosis and epidemiology of diseases. Study of pathological imbalances including cellular adaptation and injury, fluid compartment exchanges with edema and dehydration, electrolyte functions, control and imbalances, acidosis and alkalosis, nervous system injuries and responses, sensory imbalances, skeletal system injury and repair, soft tissue injury and repair, and muscle injury and dysfunction.

<b>CHEM200</b>	<b>General Chemistry</b>	This course covers the basic principles of Chemistry. An in-depth study of electronic structure chemical of atom, periodicity, chemical bonding and molecular structure. Chemical equilibrium will focus mostly on acid base, redox reactions and other complex ionic equilibria followed by many solution reactions such as precipitation of buffers. The final part of this course describes the basic principles of thermodynamics of various states of matter, electrochemistry, and the kinetic aspects of chemical reactions.
<b>CHEM200L</b>	<b>General Chemistry Lab</b>	The laboratory work involves hands-on experience with chemical systems. Experiments include basic calorimetry, a limited qualitative and quantitative analysis scheme, properties of gases, acid-base and redox titrations.
<b>CHEM205</b>	<b>Quantitative Analysis</b>	This course covers methods associated with quantitative analytical techniques. It emphasizes the quantitative determination of substances using spectroscopic analysis, analytical separations, chromatography, and electrochemical methods: potentiometric, voltammetry, and coulometer. Laboratory stresses use of methods and instrumental techniques for quantitative chemical analysis
<b>CHEM205L</b>	<b>Quantitative Analysis Lab</b>	This Lab course covers methods associated with quantitative analytical techniques. It emphasizes the quantitative determination of substances using spectroscopic analysis, analytical separations, chromatography, and electrochemical methods: potentiometric, voltammetry, and coulometry. Laboratory stresses use of methods and instrumental techniques for quantitative chemical analysis.
<b>CHEM250</b>	<b>Organic Chemistry I</b>	This course will focus on laying the fundamental principles of Organic chemistry. We will analyze in depth the theory of chemical bonding, molecular structure and physicochemical properties in organic chemistry. We will cover also the acidity and basicity, inductive effect, stereochemistry and nucleophilic substitution (SN1,SN2, E1 and E2) concepts and applications. These principles will be applied to the chemistry of alkanes, alkyl halides, alcohols, ethers and alkenes in the first semester of organic chemistry.
<b>CHEM300</b>	<b>Organic Chemistry II</b>	This course will continue the study of the fundamental principles of Organic chemistry started in CHEM 250. We will analyze in depth the theory of chemical bonding, molecular structure and physicochemical properties of aromatics and their reactions such as aromaticity and electrophilic aromatic substitution. The chemistry and properties of other functional groups such aldehydes, ketones, carboxylic acids and amines and their derivatives. The final part of this course will focus on spectroscopy and structure of organic compounds
<b>CHEM300L</b>	<b>Organic Chemistry Lab</b>	Is a laboratory course to teach the students several common organic chemistry techniques. Emphasis is placed on experimental precision and accurate results as well as safe laboratory procedures. This laboratory course is for students with good aptitude for synthesis in organic chemistry and who want to learn the preparation, isolation, and identification of organic compounds. Students will have also the opportunity to explore interesting areas of organic chemistry and work more independently on the laboratory.

## Major Requirements

<b>Code</b>	<b>Title</b>	<b>Course Description</b>
PHAR200	Introduction to Drug Information	This course introduces students to basic principles of drug information including, medical terminologies, and drug monograph. In addition, students will learn how to identify the different parts for the (SOAP note). The course also provides students with the knowledge to write drug consults and drug utilization review. The course will help students to recognize the different literature resources available, different types of a study design and apply basic biostatistics calculations.
PHAR250	Pharmacy Practice, History & Ethics	This 3-credit course emphasizes upon the historical background and major milestones in the evolution of pharmacy from apothecaries to clinical pharmacy. The first part for this course deals with pharmacy history present and future. The second part deals with pharmacy practice including major medical terms and abbreviations, function for international pharmaceutical organizations and overview about drug classes and dosage forms. The last part deals with ethical principles governing patient–pharmacist relationship.
PHAR300	Pharmaceutical Calculations	This course provides the pharmacy student with the knowledge and skills needed to mix medications to obtain concentration/dose, to convert measurements from the metric system to the apothecary system and vice versa, to calculate doses needed for pediatrics or adults, to mathematically adjust medication doses in case of

		renal or hepatic compromise, and to interpret correctly standard abbreviations and symbols used in prescriptions and medication orders
PHAR400	Medical Chemistry I	This course will introduce the principles of medicinal chemistry which deals with the physicochemical properties of drugs that affect their therapeutic applications. Discussion will include the chemical stability, dosage form, synthesis and biotransformation pathways, absorption and structure-activity relationship (SAR) of pharmaceutical agents. During this course, factors like the chemical, stereochemical and physical properties of certain classes of drugs will be emphasized. The drug classes will include the following: drugs affecting cholinergic, adrenergic, and serotonergic neurotransmissions, general and local anesthetics.
PHAR405	Pharmaceutical Analysis & Biotechnology	The course introduces the fundamental principles of modern instrumental methods used in pharmaceutical analysis, including the theoretical background and calculations needed, with their applications for identifying, separating and quantifying drugs. Instrumentation discussed within this course fall into: Spectroscopic methods (UV-Visible, IR and Atomic Absorption), chromatographic methods (TLC, HPLC and GC), and electroanalytical methods.
PHAR405L	Pharmaceutical Analysis & Biotechnology Lab	The course provides the students with practical experience of the instrumental methods used in pharmaceutical analysis; including UV-visible spectrophotometry, chromatographic methods (column, TLC and HPLC), polarimetric assays, conductometric titrations and enzymatic methods. The course also presents the underlying principles guiding the instrument operation, instrument components, and the nature of the data generated by the instrument for each method discussed. Moreover, the course covers the basic principles in data analysis, error analysis and calibration.
PHAR410	Drug Dosage Forms I	This course introduces the students to the different types and preparation of pharmaceutical dosage forms encountered in pharmacy practice. Solid dosage forms, semisolid dosage forms, and transdermal drug delivery systems will be covered in this course. This course relates the basic scientific background to pharmaceutical practice regarding the dosage forms preparation and quality control.
PHAR420	Physical Pharmacy	This course helps in understanding the fundamental physicochemical principles relating to the design of pharmaceutical dosage forms by focusing on solubility, dissolution, distribution, diffusion principles, liquids, colloids, and thermodynamics
PHAR425	Pharmacognosy & Herbal Medicine	The course introduces students to natural products and other bioactive molecules from nature, their origin, identification, development, and usage. Furthermore, it identifies the chemical structure, classes and structure---activity relationships of natural products. Moreover the course identifies the importance of natural products as major ingredients used within drug manufacturing.
PHAR450	Medicinal Chemistry II	This course helps the students to explore the principal classes of prescription drugs including neurologic, anesthetic, analgesic, anti-inflammatory, anti-bacterial, and cardiovascular agents. It will also familiarize the students with the indications of neurologic, anesthetic, analgesic, anti-inflammatory, anti-bacterial, and cardiovascular agents, along with their related pharmacokinetics, pharmacodynamics and pharmacological profile.
PHAR455	Physical Assessment in Pharmacy Practice	This course introduces the student to the physical examination process. The student will assist in assessing vital signs and other common physical exams done in inpatient and outpatient settings in order to maximize patients' medical therapies. The course will include laboratory session where students practice use of basic medical devices and vital signs measurement assessment.
PHAR460	Pharmacy Management & Drug Marketing	This course emphasizes on effective pharmacy management and marketing strategies. Management and marketing theories are explained thoroughly and their application in the market place. Social, governmental laws and economical differences between cultures have impact on marketing and management theories and their implementations.
PHAR465	Interpretations of Lab Data	The course stresses on common laboratory data used to diagnose diseases or to monitor drug therapy effectiveness and toxicity. Students will learn the biochemical significance of each clinical test in relation to diseases and drug treatment.
PHAR470	Drug Dosage Form II	This course is the second part of the dosage forms courses which serve to introduce the students to the different types and preparation of pharmaceutical dosage forms encountered in pharmacy practice. Suppositories, liquids, disperse systems, pulmonary delivery systems, and sterile dosage forms will be covered in this course. This course relates the basic scientific

		background to pharmaceutical practice regarding the dosage forms preparation and quality control.
PHAR470L	Drug Dosage Form II Lab	This one-credit course is the practical part of the two series of dosage form courses (PHAR410, PHAR470) that deal with different formulations and drug delivery systems focusing on the rational and the significance of each dosage form. The course will help the students to acquire the skills in preparing different dosage forms in the lab based on guidelines and pharmacopeias.
PHAR480	Pharmacy Practice Experience I (PPEI)	This course is part of a series of practice experience courses which introduces students to the philosophy and practice of pharmaceutical care, including patient counseling, monitoring plans, and patient outcomes, with emphasis on the role of the pharmacist as the primary manager of patient drug therapies. Students are also required to spend one month training in the Drug Information Center to practice their role as drug information provider for the public and other healthcare professionals
PHAR686	Community Pharmacy	This course aim provides skills in a community pharmacy setting and is designed for the pharmacy student to actively participate in a supervised program of pharmacy practice. Students gain experience by applying their didactic learning in the pharmaceutical sciences in resolving problems that arise during the delivering pharmaceutical services for outpatients. This practice experience emphasizes on the managerial tasks of the pharmacist ranging from medication selection and order, proper handling and dispensing of controlled substances, appropriate filling and maintaining patient profiles, and patient
PHAR505	Pharmacology I	This course introduces the underlying principles of pharmacology and provides an overview of the physiological, biochemical, and anatomical foundations for the interaction of drugs and chemicals with biological systems. The course includes a systematic study of the effects of drugs on different organ systems and disease processes, the mechanisms by which drugs produce their therapeutic and toxic effects, and the factors influencing their absorption, distribution and biological actions.
PHAR510	Biopharmaceutics & Pharmacokinetics	This course introduces the students to the concepts of biopharmaceutics, and pharmacokinetics. The processes of absorption, distribution, metabolism, and excretion of drugs are discussed with the purpose of improving the evaluation of drug delivery systems and the therapeutic management of patients. The relationship among physiology, pharmacokinetics and pharmacodynamics is explored to help understand clinical variability to drug response. The student will be able to understand the concepts, origins, calculations, applications and limitations of kinetic concepts.
PHAR515	Therapeutics I (Neurology/Psychiatry)	This course is the first of a series of 7 courses of therapeutics that focus of identifies the pathophysiology, etiology, risk factors and signs and symptoms of most common neurologic and psychiatric disorders. It provides the nonpharmacologic and pharmacologic treatment options according to evidence-based guidelines. It introduces the students to the application of pharmacologic and pharmacokinetic parameters, and description of factors that would guide the selection of the best treatment options. It also familiarizes the students with how to evaluate the treatment therapy for psychiatric and neurologic diseases through highlighting on the monitoring parameters and important medications' adverse effects. The student will apply problem-solving strategies to patient-oriented cases and will develop patient treatment plan.
PHAR520	Therapeutics II (Pulmonary/Rheumatology)	This course identifies the pathophysiology, etiology, risk factors and signs and symptoms of most common Pulmonary/Rheumatology Disease. It provides the non-pharmacologic and pharmacologic treatment options according to evidence-based guidelines. It introduces the students to the application of pharmacologic and pharmacokinetic parameters, and description of factors that would guide the selection of the best treatment options. It also familiarizes the students with how to evaluate the treatment therapy for Pulmonary/Rheumatology Diseases through highlighting on the monitoring parameters and important medications adverse effects. The student will apply problem-solving strategies to patient-oriented cases and will develop patient treatment plan.
PHAR695	Senior Project	The senior project is a core component of the curriculum, and must be performed to fulfil the graduation requirements. In this project, a group of 3-5 students, with the help of a supervisor, develop an idea of clinical research as well as a data collection form. Then,

		students collect, analyze, and summarize the project data. After supervisor approval, the students write a draft of their work and submit it for discussion in the school. The final copy of the research is produced after applying the recommended corrections.
PHAR555	Pharmacology II	This course introduces the underlying principles of pharmacology and provides an overview of the physiological, biochemical, and anatomical foundations for the interaction of drugs and chemicals with biological systems. The course includes a systematic study of the effects of drugs on different organ systems and disease processes, the mechanisms by which drugs produce their therapeutic and toxic effects, and the factors influencing their absorption, distribution and biological actions.
PHAR560	Pharmacogenomics	This course is intended to provide 4th year pharmacy students , after a general background in Genetics, Cell and Molecular Biology, the general principles of pharmacogenomics of drug metabolism and its potential applications to tailor drug therapy, as well as the applications to patients care in few therapeutic areas.
PHAR565	Therapeutics III	This course is the third of a series of 7 courses of therapeutics that focus on diseases of various organ systems divided into modules. Within each module drug treatment of selected diseases is reviewed. An emphasis is placed on assessment, indications for drug therapy, selection of rational and safe drug therapy, identification of alternatives to drug therapy and patient monitoring. The student will apply problem-solving strategies to patient cases and develop patient care plans.
PHAR570	Therapeutics IV	This course identifies the pathophysiology, etiology, risk factors and signs and symptoms of most common endocrinologic and women's health related disorders. It provides STUDENT the non-pharmacologic and pharmacologic treatment options according to evidence-based guidelines. It introduces the students to the application of pharmacologic and pharmacokinetic parameters, and description of factors that would guide the selection of the best treatment options. It also familiarizes the students with how to evaluate the treatment therapy for endocrinologic and women's health related disorders through highlighting on the monitoring parameters and important medications adverse effects. The student will apply problem-solving strategies to patient-oriented cases and will develop patient treatment plan.
PHAR575	Pharmacology III	This course introduces the underlying principles of pharmacology and provides an overview of the physiological, biochemical, and anatomical foundations for the interaction of drugs and chemicals with biological systems. The course includes a systematic study of the effects of drugs on different organ systems and disease processes, the mechanisms by which drugs produce their therapeutic and toxic effects, and the factors influencing their absorption, distribution and biological actions
PHAR580	Pharmacy Practice Experience II (PPE II)	This course is part of a series of practice experience courses which introduces students to the philosophy and practice of pharmaceutical care, including patient counseling, monitoring plans, and patient outcomes, with emphasis on the role of the pharmacist as the primary manager of patient drug therapies. Students are also required to spend one month training in the Drug Information Center to practice their role as drug information provider for the public and other healthcare professionals
PHAR585	Pharmacy Seminar	This course involves meticulous selection of up-dated research and review articles that are pertinent to pharmacotherapeutics course topics that students are concurrently taking. Students are responsible for evaluating and critiquing original publications and review articles focusing on the weaknesses and strengths of the article and appropriately extrapolating the results to the proper patient population by evaluating the internal and the external validity of the article reviewed.
PHAR590	Clinical Immunology	The course aims to make students familiar with immune system structure, functions and immune system related diseases. The course contents include: types of immunity, immune cells and organs, humoral and cell-mediated immunity, hypersensitivity, autoimmune diseases, tumor immunology, transplantation immunology, and immunodeficiency disorders. The course will focus on the development of immune system and how it attacks pathogens but does not attack human cells as well as on human diseases which resulted either from abnormal immune responses such as hypersensitivity and autoimmunity or deficient immune responses as in immunodeficiency diseases.

PHAR606	Non Prescription Drugs	The purpose of this course is to teach the students a consistent and systematic approach used to meet the drug-related needs for patients with self-care concern and to promote the value of their guidance in selecting and monitoring treatment with nonprescription drug. This course focuses on increasing a patient awareness of the importance of consulting a pharmacist, not only when considering a drug for the first time but also when making subsequent purchases. Emphasis is placed on product selection, herbal medicines, vitamins, dietary supplements and appropriate patient consultation for each. Medical supplies and equipment's pertaining to pharmacy practice are also discussed.
PHAR610	Toxicology	This course presents the basic principles of toxicology including areas of toxicology, factors affecting toxicity in humans and disposition of toxins in human body. The course also provides students with knowledge about diagnostic measures and clinical management (i.e. stabilization of vital function and specific antidotal measures) of poisonings. Poisoning with common groups of chemicals (pesticides, metals, solvents and common drugs) will be presented including, mechanism of toxicity, sources of exposure, major clinical manifestation and methods of treatment.
PHAR615	Therapeutics V	This course identifies the pathophysiology, etiology, risk factors and signs and symptoms of Infectious Diseases. It provides the non-pharmacologic and pharmacologic treatment options according to evidence-based guidelines. It introduces the students to the application of pharmacologic and pharmacokinetic parameters, and description of factors that would guide the selection of the best antimicrobial treatment options. It also familiarizes the students with how to evaluate the treatment therapy for Infectious Diseases. through highlighting on the monitoring parameters and important medications adverse effects. The student will apply problem-solving strategies to patient-oriented cases and will develop patient treatment plan.
PHAR620	Therapeutics VI	This course is the sixth of a series of 7 courses of therapeutics that focus in pathophysiology of the most common cancer diseases, risk factors, prevention, and treatment approaches based on updated guidelines. An emphasis is placed on assessment, indications for drug therapy, selection of rational and safe Chemotherapy, identification of alternatives to drug therapy and patient monitoring. The student will apply problem-solving strategies to patient cases and develop patient care plans.
PHAR625	Pharmacoeconomics	This course introduces basic concepts in accounting useful to pharmacy practice as well as basic micro and macro-economic theories. Topics will focus on supply and demand analysis, inflation, balance sheets, income statement and other concepts necessary to achieve optimal financial management and meet national drug policies. This course teaches the students to evaluate health economic and clinical outcome researches and to apply pharmacoeconomic analysis in clinical practice.
PHAR630	Therapeutics VII	This course identifies the pathophysiology, etiology, risk factors and signs and symptoms of selected diseases. It provides the non-pharmacologic and pharmacologic treatment options according to evidence-based guidelines. It introduces the students to the application of pharmacologic and pharmacokinetic parameters, and description of factors that would guide the selection of the best treatment options. It also familiarizes the students with how to evaluate the treatment therapy for selected diseases through highlighting on the monitoring parameters and important medications adverse effects. The student will apply problem-solving strategies to patient-oriented cases and will develop patient treatment plan.
PHAR640	Clinical Pharmacy	The aims of this course are to demonstrate, through learning environment, how to assess individual patient and population drug-related needs and develop a plan to meet those needs. The student will successfully perform a comprehensive patient assessment while being patient-centered and empathetic by identifying drug therapy problems and evaluating drugs for indication, effectiveness, safety, and convenience. The student will be able to develop individualized and clinically appropriate care plans for a patient and appropriately educate patients on their drug therapy and assess for patient understanding through effective communication
PHAR650	Pharmacy Dispensing Lab	This course focuses on the clinical aspect of pharmacy as well as its practices. Each student will be working individually from his pharmacy station in the dispensing lab. Some students will be placed in pharmacy settings created at the University while others will play the role of patients. Dispensing practices, counseling and checking for drug interactions and other

		pharmacy practices will be applied in this course so that the student will be evaluated for clinical and practical skills upon graduation. A counseling session will take place at the end of each laboratory session.
PHAR656	Pharmacy Law	This class provides an introduction to the scope and authority of programs, which relate to the legal and ethical practice of pharmacy. The focus is on a conceptual understanding of regulatory agencies and how pharmacy practically and ethically interacts with them.