COLLEGE OF PHARMACY (COP)

BACHELOR OF PHARMACY DEGREE (BPharm)

ACADEMIC CURRICULUM

BACHELOR OF PHARMACY DEGREE (BPharm) – 180 credits

AUIB offers a 5-year Bachelor of pharmacy program for a total of (180) credits.

Type of Credit	***Contact Hours/Week***	***Contact Hours/Semester***
Regular	1	15
Laboratory	2	30
Clinical / Practical	3	45

YEAR I – 32 credits

Course Requirement	# Credits
UNI 101 First Year University Experience	3
ENL 101: Expository Writing	3
BIO 101: Introductory Biology	3
CHE 105: General Chemistry for Healthcare Professions	3
CHE 105L: General Chemistry for Healthcare Professions lab	1
HCT 101: Fundamentals of Healthcare Professions	3
CSC 101: Computer Fundamentals	3
MAT 101: College Algebra	3
BIO 211: General Biology I	3
BIO 211L: General Biology I Laboratory	1
BIO 217: Human Anatomy & Physiology	3
CHE 211: Organic Chemistry I	3
Total:	**32**

YEAR II – 31 credits

Course Requirement	# credits
ENL 201: Academic Writing	3
CLA: Core Liberal Arts	3
CHE 212: Organic Chemistry II	3
CHE 211L: Organic Chemistry I Laboratory	1
BIO 219: Medical Microbiology & Immunology	3
PHA 101: Introduction to Pharmacy and Pharmaceutical Sciences	3
CLA: Core Liberal Arts	3
CLA: Core Liberal Arts	3
BIO 210: Biostatistics	3
BIO 218: Pathophysiology	3
BIO 225: Biochemistry	3
Total:	**31**

YEAR III – 43 credits

Course Requirement	# credits
CLA: Core Liberal Arts	3
PHA 300: Pharmacology I	3
PHA 300L: Pharmacology I Laboratory	1
PHA 310: Dosage Forms I	3
PHA 310L: Dosage Forms I Laboratory	1
PHA 320: Medicinal Chemistry I	3
PHA 330: Pharmaceutical Analysis	3
PHA 330L: Pharmaceutical Analysis Laboratory	1
CLA: Core Liberal Arts	3
PHA 350: Pharmacology II	3
PHA 360: Dosage Forms II	3
PHA 360L: Dosage Forms II laboratory	1
PHA 370: Medicinal Chemistry II	3
PHA 380: Pharmacotherapeutics I	3
PHA 380L: Pharmacotherapeutics I: Applied Skills Lab	1
PHA 390: Drug Information and Literature Evaluation	2
PHA 395: Introductory Pharmacy Practice Experience (PPE1)	3
CLA: Core Liberal Arts	3
Total:	**43**

YEAR IV – 38 credits

Course Requirement	# credits
PHA 480: Pharmacotherapeutics and Biopharmaceutics	3
PHA 410: Physical Assessment	3
PHA 420: Pharmacotherapeutics II	3
PHA 420: Pharmacotherapeutics II: Applied Skills Lab	0.5
PHA 430: Pharmacotherapeutics III	3
PHA 430: Pharmacotherapeutics III: Applied Skills Lab	0.5
PHA 440: Toxicology	3
PHA 450: Dispersing and Pharmaceutical Care	3
PHA 460: Pharmacognosy and Evidence-Based Herbal Medicine	3
PHA 470: Pharmacotherapeutics IV	3
PHA 470: Pharmacotherapeutics IV: Applied Skills Lab	0.5
PHA 480: Pharmacotherapeutics V	3
PHA 480: Pharmacotherapeutics V: Applied Skills Lab	0.5
HCT 48X: Major Electives (healthcare major)	3
PHA 495: Introductory Pharmacy Practice Experience II (PPE II)	3
CLA: Core Liberal Arts	3
Total:	**38**

YEAR V – 36 Credits

Course Requirement	# credits
CLA: Core Liberal Arts	3
PHA 500: Pharmacy Management and Drug Marketing	3
PHA 510: Pharmacoepidemiology	2
PHA 520: U.S. and Iraqi Pharmacy Law and Regulation	1
PHA 58X: Major Elective (Pharmacy)	3
PHA 545: Introductory Pharmacy Practice Experience III (PPE III)	6
PHA 550: Pharmaco-genomics	3
PHA 560: Pharmaco-economics	3
PHA 58X: Major Electives (Pharmacy)	3
PHA 595: Introductory Pharmacy Practice Experience IV (PPE IV)	9
Total:	**36**

Course Description

*Core liberal Arts (42 Credits):

Kindly refer to the Core Liberal Arts (CLA) courses managed by the College of Arts and Sciences.

*Science Requirements (36 Credits):

HCT 101: Fundamentals of Healthcare Professions (3 Credits)

This course provides students with an overview of the various health professions by covering and discussing fundamental aspects of the healthcare system. It includes an overview of healthcare development, how health delivery systems are structured, legal and ethical considerations of healthcare delivery, and an overview of various healthcare professions. Students are encouraged to discover health professions through assignments, observations, and interviews.

CHE 105: General Chemistry for Healthcare Professions (3 Credits)

This course deals with the study of general chemical principles including stoichiometry, atomic structure, chemical bonds and molecular geometry, chemical reactions and equilibria, thermochemistry, gases, solutions, with emphasis on the practical aspects of chemistry in numerous healthcare-related situations.

CHE 105L: General Chemistry for Healthcare Professions Laboratory (1 Credit)

A laboratory course with hands-on practical applications for topics discussed in General Chemistry for Healthcare Professions course. *Pre-/co-requisite: CHE 105.*

CHE 211: Organic Chemistry I (3 Credits)

This course overs properties, reactions, and synthesis of organic molecules as per functional groups, including aromatic and aliphatic hydrocarbons, alkyl halides, alcohols, ethers, aldehydes and ketones, carboxylic acids and derivatives, enols, amines, and molecules of biological importance, and spectroscopy. *Pre-requisite: CHE 201.*

CHE 211L: Organic Chemistry I Laboratory (1 Credit)

A laboratory course with hands-on practical applications for topics discussed in Organic Chemistry I. *Pre-/Co-requisite: CHE 211.*

CHE 212: Organic Chemistry II (3 Credits)

Continuation of Organic Chemistry I. *Pre-requisite: CHE 211.*

BIO 211: General Biology I (3 Credits)

This course examines the cells and the macromolecules that define their structure and function, such as DNA, RNA, proteins, lipids, and carbohydrates, with a special focus on cell evolution and chemistry, membranes, organelles and cytoskeleton, cell signaling and control, and genetic information flow. It provides the basic components comprised within all living things before delving into how the internal systems of organisms work and how they coexist and contend with external elements. *Pre-requisite: BIO 101.*

BIO 211L: General Biology I Laboratory (1 Credit)

A laboratory course with hands-on practical applications for topics discussed in General Biology I. *Pre-/Co-requisite: BIO 211.*

BIO 217: Human Anatomy and Physiology (3 Credits)

This course introduces students to the anatomy and physiology of the human body with an emphasis on the skeletal, muscular, cardiovascular, renal, immune, nervous, endocrine, gastrointestinal, respiratory, and reproductive systems. A comprehensive knowledge of homeostatic regulation in the functions of the body and a discussion of imbalances to homeostasis will be covered. Congenital abnormalities, as well as their physiological effects and clinical implications, will be investigated. Clinical case studies will be illustrated for the respective systems. *Pre-requisite: BIO 211*

BIO 219: Medical Microbiology & Immunology (3 Credits)

This course introduces students to the basis of microbiology with an emphasis on infectious diseases. The student will learn about the numerous characteristics of microorganisms in general, as well as the specific properties of pathogenic bacteria, fungi, viruses, and parasites. Various elements of medical microbiology are discussed, as well as pathogen detection and control, disease transmission, host resistance, immunity, infection control, and latest advancements in microbiological techniques. *Pre-requisite: BIO 211*

BIO 218: Pathophysiology (3 Credits)

This course covers the mechanisms, etiologies, risk factors and consequences of diseases processes. It focuses on diseases' clinical signs and symptoms, as well as their history, prognosis, and epidemiology. Cellular adaptation and injury, electrolyte functions, fluid compartment exchanges with edema and dehydration, 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 are among the pathological imbalances studied. *Pre-requisite: BIO 217*

BIO 225: Biochemistry (3 Credits)

This course presents students with a survey of basic concepts in modern biochemistry and molecular biology. The course emphasizes the application of biochemical concepts to human metabolism incorporated in the study of amino acids, carbohydrates, lipids, proteins, enzymes, and nucleotides, in addition to their metabolism, bioenergetics, membranes and signaling systems, integration and regulation of the major metabolic pathways, nitrogen metabolism, myoglobin, hemoglobin, and hemostasis. *Pre-requisite: BIO 211, CHE 212*.

BIO 210: Biostatistics (3 Credits)

This course introduces the basics of biostatistics and epidemiology. It covers both theory and applications in the form of problem solving and laboratory sessions. Topics include research methods and design, descriptive statistics, performance characteristics of diagnostic tests, graphical methods, probability, estimation, hypothesis testing, p-values, regression and correlation, and clinical trials.

***Major Requirements:**

PHA 101: Introduction to Pharmacy and Pharmaceutical Sciences (3 Credits)

This course provides an overview of the profession of pharmacy and highlights the difference with pharmaceutical sciences and related specialties. It emphasizes upon the historical background and major milestones in the evolution of pharmacy from apothecaries to clinical pharmacy. It deals with pharmacy practice including major medical terms and abbreviations, functions of international pharmaceutical organizations, and drug classes and dosage forms. It also underscores the ethical principles, the nature and place of pharmaceutical services in the society, and the moral standards and professional conduct.

PHA 300: Pharmacology I (3 Credits)

This course covers the fundamental principles of pharmacology as well as the physiological, biochemical, and anatomical underpinnings of drug and chemical interactions with biological systems. It also covers the effects of medications and the mechanisms by which pharmaceuticals create therapeutic and harmful effects. Specific medications and pharmacological action sites are investigated further, starting with the peripheral nervous system, then the central nervous system, and finally drugs applied to treat inflammation. *Pre-requisite: PHA 101*

PHA 300L: Pharmacology I Laboratory (1 Credit)

A laboratory course that provides students with hands-on experience in the application of pharmacological principles. Students will learn to prepare and administer drugs, perform both in vitro and in vivo assays, and analyze data using statistical methods. Through a variety of experimental models and techniques, students will reinforce the concepts learned in the Pharmacology courses. This laboratory course is an essential component of the education of pharmacy students, providing them with the practical skills and knowledge necessary to succeed in the field of pharmacology. *Pre-/co-requisite: PHA 300.*

PHA 350: Pharmacology II (3 Credits)

This course is a continuation of Pharmacology I. It covers medication classifications such as cardiovascular, anti-diabetic, and chemotherapy medicines. Specific medications and pharmacological action sites are investigated, starting with cardiovascular drugs, and moving on to antidiabetic agents, antifungal agents, antibiotics, and cancer chemotherapeutic agents. *Pre-requisite: PHA 300.*

PHA 310: Dosage Forms I (3 Credits)

This course discusses the design, formulation, manufacture, and evaluation of liquid pharmaceutical dosage forms, based on physical and chemical principles. It also covers current good manufacturing practices (GMP). Compounding aqueous and non-aqueous solutions, suspensions, emulsions, colloids, and diverse formulations specially designed for a variety of administration routes are also covered.

PHA 310L: Dosage Forms I Laboratory (1 Credit)

A laboratory course with hands-on practical applications for the procedures and principles utilized to generate and deliver individual extemporaneous liquid prescriptions (solutions,

colloidal dispersions, suspensions, and emulsions), including calculations and labeling of compounded dose forms. *Pre-/co-requisite: PHA 310.*

PHA 360: Dosage Forms II (3 Credits)

This course is a continuation of PHA 310. It focuses on the design, formulation, manufacturing, and evaluation of semi-solid, solid, and novel pharmaceutical dosage forms. *Pre-requisite: PHA 310 and PHA 310L.*

PHA 360L: Dosage Forms II Laboratory (1 Credit)

A laboratory course with hands-on practical applications for the formulation, preparation, handling and evaluation of solid and semisolid dosage forms such as gels, ointments, creams, suppositories, granules, tablets, and other topical products. *Pre-/Co-requisite: PHA 360.*

PHA 320: Medicinal Chemistry I (3 Credits)

This course discusses the mechanism of action of drugs within organisms to design new and advanced pharmaceutical and medicinal agents. This interdisciplinary course also sheds the lights on the importance of knowledge obtained from toxicology, pharmacology, computer simulations, and clinical practice to offer valuable insights used in developing drugs with enhanced targeted actions and lower side effects.

PHA 370: Medicinal Chemistry II (3 Credits)

This course explores the main classes of prescription drugs including neurologic, anesthetic, analgesic, anti-inflammatory, antibacterial, and cardiovascular compounds. It also introduces the students to the indications of neurologic, anesthetic, analgesic, anti-inflammatory, anti-bacterial, and cardiovascular drugs, as well as their pharmacokinetics, pharmacodynamics, and pharmacological profiles. *Pre-requisite PHA 330*.

PHA 330: Pharmaceutical Analysis (3 Credits)

This course will provide students with sufficient knowledge regarding the principles of chemical equilibria and their relations to pharmaceutical analysis, the importance of analysis in the pharmaceutical industry, and the concepts of different titrimetric analytical methods. The course also focuses on understanding the merits of different instrumental analytical techniques and the basics of chromatography and how they might be employed to analyze drugs in bulk raw materials and dosage forms.

PHA 330L: Pharmaceutical Analysis Laboratory (1 Credit)

A laboratory course with hands-on practical applications that allow students to apply what they've learned in class to real-world situations. *Pre-/co-requisite: PHA 330.*

PHA 380: Pharmacotherapeutics I (3 Credits)

This course covers the pathophysiology, etiology, risk factors and signs and symptoms of most common non-prescription and over the counter treatments, self-care, immunizations, gastrointestinal, hepatic, and pulmonary with emphasis on monitoring parameters and the side effects of crucial medications. . The student will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient.

PHA 380L: Applied Skills Lab I

Students enrolled in this applied pharmacotherapy lab will gain the skills necessary to provide care for patients with illnesses commonly encountered in community practice. Students will be afforded opportunities to provide patient-centered care utilizing the QuEST/SCHOLAR MACS process. Student achievement of core abilities will be assessed through an Objective Structured Clinical Examination. Co-Requisite: PHA 380

PHA 420: Pharmacotherapeutics II (3 Credits)

This course covers the pathophysiology, etiology, risk factors and signs and symptoms of most common psychological, neurological, and cardiovascular disorders with emphasis on monitoring parameters and the side effects of crucial medications. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient. *Pre-requisite: PHA 380*

PHA 420L: Applied Skills Lab II

This applied skills lab is associated with the pharmacotherapeutics course series and covers basic patient assessment and professional communication. Learning activities are designed to complement didactic instruction while allowing students to apply knowledge in a simulated environment. Student achievement of core abilities will be assessed through an Objective Structured Clinical Examination. One lab session is held weekly in correspondence with pharmacotherapeutics.

PHA 430: Pharmacotherapeutics III (3 Credits)

This course covers pathophysiology, etiology, risk factors and signs and symptoms of infectious diseases with an emphasis on monitoring measures and significant pharmaceutical side effects. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient. *Pre-requisite: PHA 380*

PHA 430L: Applied Skills Lab III

Students enrolled in this applied pharmacotherapy lab will gain the skills necessary to provide care for patients with illnesses commonly encountered in pharmacy practice. Learning activities are designed to complement didactic instruction while allowing students to apply knowledge in a simulated environment. Students will be afforded opportunities to apply the Pharmacist's Patient Care Process thereby assessing and therapeutically managing patients. Student achievement of core abilities will be assessed through an Objective Structured Clinical Examination (OSCE).

PHA 470: Pharmacotherapeutics IV (3 Credits)

This course covers the pathophysiology, etiology, risk factors and signs and symptoms of most common renal, endocrine, rheumatological disorders, with emphasis on monitoring measures and significant pharmaceutical side effects.. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient. *Pre-requisite: PHA 380*

PHA 470L: Applied Skills Lab IV

Students enrolled in this applied pharmacotherapy lab will gain the skills necessary to provide care for patients with illnesses commonly encountered in pharmacy practice. Students will be afforded opportunities to apply the Pharmacist's Patient Care Process thereby assessing and therapeutically managing patients. Student achievement of core abilities will be assessed through an Objective Structured Clinical Examination (OSCE).

PHA 480: Pharmacotherapeutics V (3 Credits)

This course covers pathophysiology, etiology, risk factors, and signs and symptoms of oncological, women's and men's health, and hematology. with an emphasis on monitoring measures and significant pharmaceutical side effects. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient.
This course covers the recent need for selecting the most appropriate medication, regimen, and dose while minimizing drug interactions, adverse drug reactions, and IV incompatibilities. In addition, infectious diseases, both endemic and epidemic, are a difficult field for pharmacists and other healthcare professionals to work with. This course helps students to rationalize therapy, prevent antibiotic resistance, and save costs. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient. *Pre-requisite: PHA 380*

PHA 480 L: Applied Skills Lab V

Students enrolled in this applied pharmacotherapy lab will gain the skills necessary to provide care for patients with illnesses commonly encountered in pharmacy practice. Students will be afforded opportunities to provide pharmacy services apply the Pharmacists' Patient Care Process thereby assessing and therapeutically managing patients. Student achievement of core abilities will be assessed through an Objective Structured Clinical Examination (OSCE).

PHA 390: Drug Information and Literature Evaluation (2 Credits)

This course covers the fundamentals of drug information such as medical terminologies and drug monographs. Students will learn how to recognize the various sections of a SOAP note. They will also learn how to prepare medication consultations and drug use reviews. The course will also help students to recognize the different types of literature materials, as well as how to apply basic biostatistics calculations.

PHA 400: Pharmacokinetics and Biopharmaceutics (3 Credits)

This course introduces the concepts of biopharmaceutics and pharmacokinetics. It emphasizes the absorption, distribution, metabolism, and excretion of pharmaceuticals to improve drug delivery system evaluation and patient management. Students will learn about the links between physiological parameters, compartmental models, pharmacokinetics, and pharmacodynamics to better comprehend the clinical variability of medication response.

PHA 410: Physical Assessment (3 Credits)

This course is designed for pharmacy students who are learning how to communicate with patients and conduct physical examinations. The goal of this course is to equip students to

provide a variety of pharmacy services in their real-world practice. It teaches students how to conduct skilled and effective interviews, as well as conduct a general survey of the patient and do a physical examination for vital signs. It also covers the strategies for examining the various body parts and systems.

PHA 440: Toxicology (3 Credits)

This course presents the fundamentals of toxicology covering areas of toxicology, human toxicity factors, and toxin disposal in the body. The course also teaches students how to diagnose poisonings and how to treat them clinically (i.e., stabilization of vital functions and specialized antidotal methods). The mechanism of toxicity, sources of exposure, primary clinical manifestations, and therapeutic options for poisoning with common chemical groups (pesticides, metals, solvents, and common medications) will be discussed.

PHA 450: Dispensing and Pharmaceutical Care (3 Credits)

This highly interactive practice course is designed to teach students the proper techniques and skills required to dispense drug products safely and accurately to patients in community and hospital settings. Students will also learn to effectively counsel patients, manage any conflict that may arise between the pharmacists, other healthcare professionals, and patients, and develop leadership skills. This course also teaches students to assist patients in the safe, appropriate, effective, and cost-efficient use of nonprescription medications.

PHA 460: Pharmacognosy and Evidence-Based Herbal Medicine (3 Credits)

This course introduces students to natural products and other bioactive agents from nature as well as their origins, identification, development, and application. It also identifies the chemical structure, classifications, and structure-activity connections of natural products. Furthermore, the course emphasizes the importance of natural products as major ingredients in medicine development.

PHA 500: Pharmacy Management and Drug Marketing (3 Credits)

This course aims to teach students that excellent patient care and successful pharmacy business are not mutually exclusive as pharmacists face unique challenges in fulfilling their professional obligations and providing superior patient care and clinical services. It also familiarizes the students with the management functions and resources that are common to all pharmacy practice settings, such as managing people, money, operations, traditional goods and services, and risk management and value-added services.

PHA 510: Pharmacoepidemiology (2 Credits)

This course explores the most frequent data analysis methodologies used according to study design, and presents the principles, concepts, and application of epidemiology in the field of pharmacy. The concepts of causality, bias, and confounding are discussed, as well as various metrics of connection. It also offers students basic pharmacoepidemiology information and tools, in addition to pharmacoepidemiologic designs, pharmacovigilance, and post-marketing surveillance.

PHA 520: U.S. and Iraqi Pharmacy Law and Regulation (1 Credit)

This course discusses the regulations of pharmacy practice in Iraq including the requirements to become a licensed pharmacist, establish a community pharmacy, operate a hospital pharmacy, and receive a license for manufacturing a drug or importing any substance that falls under its category. It also discusses the difference with the U.S. laws and regulations.

PHA 550: Pharmaco-genomics (3 Credits)

This course introduces a new genetic-based therapeutics profession that aims to influence and revolutionize pharmacy practice. It also introduces the fundamentals of molecular genetics and how genetics may be utilized to explain medication response variability, in addition to the pharmacogenetics of drug transport and metabolism, as well as their significance to clinical practice and drug therapy individualization. It also looks at existing and potential pharmacogenomics applications in oncology, hematology, cardiovascular and neurological illnesses, organ transplantation, and other fields.

PHA 560: Pharmaco-economics (3 Credits)

This course covers the fundamentals of pharmacoeconomics and associated models such as cost minimization, cost effectiveness, cost utility analysis, cost benefit analysis, and cost of sickness evaluation. Students will learn about various sorts of prices and advantages, as well as formulary decisions that are deemed important to control the pharmaceutical market. It teaches students how to use Markov Modeling and discount rates, as well as how to evaluate pharmacoeconomic research and develop a decision-making strategy.

PHA 395: Introductory Pharmacy Practice Experience I (PPE I) (3 Credits)

This course provides students with aspects of practical experiences in selected community or hospital pharmacy management settings under the supervision of pharmacists and clinical faculty preceptors. In compliance with Iraqi and US legislations, it focuses on community pharmacy management approaches and styles, organizational principles, personnel, purchasing and inventory control, pricing, para-pharmaceutical items, and community pharmacy services.

PHA 495: Introductory Pharmacy Practice Experience II (PPE II) (3 Credits)

This course provides students with practical experiences in hospital settings through the provision of drug information services to other healthcare providers. Students will learn how to screen and intervene on hospital medication orders, as well as hospital pharmacy accreditation criteria, hospital pharmacy administration, policies, and procedures, and drug distribution systems and patient-centered pharmacy services. As per site requirements, they will also assist in the preparation of a medication monograph, addressing drug information queries, assessing adverse drug responses, analyzing clinical studies, and participating in drug utilization reviews. *Pre-requisite: PHA 395*

PHA 545: Introductory Pharmacy Practice Experience III (PPE III) (6 Credits)

This practical course will allow future pharmacists to evaluate, analyze, and devise a treatment plan after acquiring all required information from patients and healthcare professionals and conducting a literature review with a focus on main literature and treatment guidelines. Students

will also gain expertise in the following pharmacy functions: reviewing patient profiles for drug interactions, medication noncompliance, and inappropriate drug therapy; counseling; knowledge of drug generic, brand names and dosage forms available on the market; reviewing patient profiles for drug interactions, medication noncompliance, and inappropriate drug therapy; basic administrative skills. *Pre-requisite: PHA 495*

PHA 595: Introductory Pharmacy Practice Experience IV (PPE IV) (9 Credits)

This final practical course in BPharm program enables students to learn and use therapeutic problem-solving skills as well as knowledge of medication use in a patient-care setting. Students will actively monitor patients for adequate care delivery, give therapeutic consultation, in-service presentation, and communicate with health care professionals and patients in an inter-professional setting. Internal Medicine, Pediatrics, and Critical Care are examples of acute patient care rotations. *Pre-requisite: PHA 545*

PHA 58X: Major Electives (Pharmacy) (3 Credits)

PHA 580: Pharmacotherapeutics VI (3 Credits)

This course enables students to develop knowledge regarding the pathophysiology of the most common cancer diseases, risk factors, prevention, and treatment approaches based on updated guidelines. Students will use problem-solving techniques to patient-centered cases and design a treatment plan for the patient.

PHA 581: Clinical Nutrition and Diet Therapy (3 Credits)

This course provides students with a fundamental understanding of nutrients and the role of nutrition in disease prevention and treatment. It also instructs students on the pathological states of patients with nutrition-related chronic diseases, as well as their unique nutritional needs. Students will also gain advanced evidence-based and practice-based knowledge on formulating, developing, monitoring, and administering disease- and patient-specific parenteral and enteral nutrition, as well as enhancing the pharmacist's role in nutrition support therapy.

PHA 582: Dermatology and Cosmetology (3 Credits)

This course introduces students to fundamental features of dermatologic illnesses, with a focus on common symptoms and effective treatment. It covers the evaluation, treatment, and referral of skin, nail, hair, and mucous membrane problems. Since pharmacists encounter several questions regarding general hygiene and cosmetic elegance, this courses also focuses on pharmaceutical cosmetology, which gives basic and modern understanding of optimal skin management and hair care.

PHA 583: Clinical and Pharmacy Management (3 Credits)

This course provides diverse introduction to major non-traditional pharmacy subjects. Clinical and pharmacy management topics such as utilization and care management, formulary, clinical planning, healthcare policy and strategy, clinical account management, specialty pharmacy, benefits consulting, pharmaceutical industry, business issues in managed care, and clinical pharmacy leadership are all covered in this course. Complementary issues include relevant regulatory topics like drug development.