

### **BSc in Pharmacy Program Manual**

#### **About the Faculty and Department of Pharmacy:**

The faculty of Pharmacy at Middle East University was established in 2013 and obtained the approval to establish a Bachelor of Pharmacy program in accordance with the licensing decision No. 293 issued on 7-8-2013 from the Jordanian Ministry of Higher Education and Scientific Research (MOHE). The school was established with a clear mission to “Supply the labor market with pharmaceutical cadres supported by knowledge, skills and professional ethics, and to promote scientific research and community service”. The faculty of Pharmacy at MEU was accredited and granted the approval to accept and enroll students on 3-3-2014 according to Resolution No. 6/80/2014 issued by the Jordanian Higher Education Commission for Accreditation and Quality Assurance (HEAC) thus the college received its first student cohort in the first semester of the 2014/2015 academic year, and that is in September of 2014.

The faculty of Pharmacy at MEU currently offers two degrees and these are the bachelor of pharmacy degree (BSc in Pharmacy) and a joint 3+2 MPharm program which was developed cooperatively with the university of Strathclyde in Glasgow, Scotland. The faculty of Pharmacy at MEU houses several facilities to meet the educational objectives of its curriculum and program. The facilities include 8 teaching laboratories including one research lab, 6 lecture halls, a pharmacy practice lab and a virtual pharmacy.

#### **Vision:**

Achieve academic and professional notability and competitiveness in the field of pharmaceutical sciences on local and international scales.

#### **Mission:**

Provide the labour market with pharmacy professionals equipped with knowledge, skills and ethics; and promote research and community service.

#### **Faculty Aims:**

1. Produce competent leaders capable of competing on local and international scales.
2. Offer distinct academic programmes within a modern educational environment.
3. Carry out effective community service and pharmaceutical care.
4. Conduct original research.

## BSc in Pharmacy Program Learning Outcomes

Program Intended Learning Outcomes of the BSc in Pharmacy Program	
1	<b>Foundational Knowledge</b>
1.1	Develop, integrate, and apply knowledge from the foundational sciences (i.e., <b>pharmaceutical, social/behavioral/administrative, and clinical sciences</b> ) to evaluate the scientific literature, explain drug action, solve therapeutic problems, and advance <b>population health and patient centered care</b> .
2	<b>Essentials for Practice and Care</b>
2.1	<b>Patient-centered care</b> - Provide <b>patient-centered care</b> as the medication expert (collect and interpret evidence, prioritize, formulate assessments and recommendations, implement, monitor and adjust plans, and document activities).
2.2	<b>Medication use systems management</b> - Manage patient healthcare needs using human, financial, technological, and physical resources to optimize the safety and efficacy of medication use systems.
2.3	<b>Health and wellness</b> - Design prevention, intervention, and educational strategies for <b>individuals and communities</b> to manage chronic disease and improve health and wellness.
2.4	<b>Population-based care (Provider)</b> - Describe how <b>population-based care</b> influences <b>patient centered care</b> and influences the development of practice guidelines and evidence-based best practices.
3	<b>Approach to Practice and Care</b>
3.1	<b>Problem Solving</b> – Identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution.
3.2	<b>Educator</b> – Educate all audiences by determining the most effective and enduring ways to impart information and assess understanding.
3.3	<b>Patient Advocacy</b> - Assure that patients’ best interests are represented
3.4	<b>Interprofessional collaboration</b> – Actively participate and engage as a healthcare team member by demonstrating mutual

	respect, understanding, and values to meet patient care needs.
3.5	<b>Cultural sensitivity</b> - Recognize <b>social determinants of health</b> to diminish disparities and inequities in access to quality care.
3.6	<b>Communication</b> – Effectively communicate verbally and nonverbally when interacting with an individual, group, or organization.
4	<b>Personal and Professional Development</b>
4.1	<b>Self-awareness</b> – Examine and reflect on <b>personal knowledge, skills, abilities, beliefs, biases, motivation, and emotions</b> that could enhance or limit personal and professional growth.
4.2	<b>Leadership</b> - Demonstrate responsibility for creating and achieving shared goals, regardless of position.
4.3	<b>Innovation and Entrepreneurship</b> - Engage in innovative activities by using creative thinking to envision better ways of <b>accomplishing professional goals</b> .
4.4	<b>Professionalism</b> - Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society.
5	<b>Pharmaceutical product expert</b>
5.1	<b>Manufacturing</b> - Carries out compounding procedures to produce an effective and safe medicine (Compounder) and implements quality control measures and tests (Quality Manager) in accordance with regulations.

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## Application and Admission requirements for the BSc in Pharmacy program:

### A. Students with General Secondary Education Certificate:

1. Holding the General Secondary Education Certificate or its Equivalent.
2. The student's high school average must not be less than 80%.
3. Non-Jordanian students may be accepted as an exception to the average requirement, with a maximum of 15 marks less than the permitted admission rates.

### B. Students who hold a Diploma certificate and wish to bridge their studies:

1. Students (inside Jordan) who want to bridge their studies and who have a community college diploma will be accepted at an average no less than 70%. 25% of the plan's credit hours are equalized.
2. Students (outside Jordan) who want to bridge their studies and who have a community college diploma will be accepted, provided they present an official letter from the Ministry of Higher Education of the student's country or the embassy of that student's country. The letter must state that the said diploma qualifies its holders to pursue his/her university studies for a Bachelor's Degree in his/her country. Alternatively, students may obtain an equivalency diploma from the Jordanian Ministry of Higher Education and 50% of the study plan's credit hours are equalized, except for the pharmacy major where the percentage is 25% of the study plan and provided that the courses whose grades are less than 60% are not equalized.

### Why study Pharmacy at MEU:

Pharmacy is the science of preparing and dispensing medical drugs. The study of pharmacy involves chemistry and pharmaceuticals, among other specialist topics. A pharmacist is a licensed healthcare professional who specializes in providing information about different medication and methods of treatment to patients. The pharmacist is an integral part of a healthcare team, providing services to people in a variety of settings to benefit local communities such as providing medication adherence support, vaccinations, weight loss programmes and much more. Our Bachelor in Pharmacy Program Combines hands-on learning with clinical experience to give you a comprehensive understanding of how drugs are developed and how medications affect the human body.

### Career Prospects:

- Pharmacist
- Clinical Pharmacist
- Pharmaceutical companies
- Regulatory Affairs
- Pharmaceutical Marketing
- Research & Development
- Royal Medical Services
- Academia
- Drug distribution & Logistics

## BSc in Pharmacy Curriculum

Deans' Council Decision: 21/34-2019/2020.  
Date Adopted: 08/07/2020.  
Faculty' Council Decision: 04/16-2019-2020  
Date Adopted: 07/07/2020

### الصيدلة بكالوريوس/الخطة الدراسية BSc in Pharmacy Study Plan

قرار مجلس العمداء: 2020/2019-34/21  
تاريخ الاعتماد: 2020/07/08  
قرار مجلس الكلية: 2020-2019-16/4  
تاريخ الاعتماد: 2020/07/07

المتطلب السابق	عملي	نظري	عدد الساعات المعتمدة	Course Title	اسم المادة	رقم المادة
Prerequisite(s)	Practical	Theoretical	Credit Hours			Course Number
University Requirements (12 Cr. Hrs.)				متطلبات جامعة اجبارية 12 ساعة معتمدة		
0161100	0	3	3	Arabic Communication Skills	مهارات الاتصال باللغة العربية	0161101
0161200	0	3	3	English Communication Skills	مهارات الاتصال باللغة الإنجليزية	0161201
-	0	3	3	National Education	التربية الوطنية	0161301
-	0	3	3	Military Science	العلوم العسكرية	0161302
University Electives (6 credit hours from each of the following two groups)				متطلبات جامعة اختيارية 12 ساعة يختارها الطالب من المجموعتين التاليتين بحد أقصاه (6 ساعات معتمدة من كل مجموعة		
المجموعة الأولى:						
-	0	3	3	Functional Writing	الكتابة الوظيفية	0161102
-	0	3	3	Life Skills	مهارات حياتية	0161401
-	0	3	3	Islamic Education	الثقافة الإسلامية	0161501
-	0	3	3	Contemporary Issues	قضايا معاصرة	0161502
-	0	3	3	Jerusalem (The Question of Palestine)	القدس (القضية الفلسطينية)	0161503
-	0	3	3	Law and Everyday Life	القانون في حياتنا	0161504
المجموعة الثانية:						
-	0	3	3	Community Responsibility	المسؤولية المجتمعية	0161303
-	0	3	3	Scientific Thinking Skills	مهارات التفكير العلمي	0161402
-	0	3	3	Introduction to Leadership and Entrepreneurship	مقدمة في القيادة والريادة	0161403
0161400	0	3	3	Computer Skills	مهارات الحاسوب	0161404
-	0	3	3	Man and the Environment	الانسان والبيئة	0161601
-	0	3	3	Safety and Security	الامن والسلامة	0161602

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Faculty Requirements: 25 Cr. Hrs.				ساعة معتمدة 25 متطلبات الكلية الإلزامية		
-	0	3	3	Mathematics (1)	رياضيات (1)	0161701
0161701	0	2	2	Biostatistics	إحصاء حيوي	0162704
--	0	3	3	General Chemistry	كيمياء عامة	0161901
0161901	1	0	1	General Chemistry (Lab)	كيمياء عامة (عملي)	0161902
(متزامن)						
0161901	0	2	2	Organic Chemistry I	كيمياء عضوية (1)	1211101
-	0	0	3	General Biology	بيولوجيا عامة	1211601
1211601	1	0	1	General Biology (Lab)	بيولوجيا عامة (عملي)	1211602
(متزامن)						
1211101	0	2	2	Analytical Chemistry	كيمياء تحليلية	1212107
1212107	1	0	1	Analytical Chemistry (Lab)	كيمياء تحليلية (عملي)	1212108
(متزامن)						
1212104	0	3	3	Microbiology	علم الاحياء الدقيقة	1213102
1213102	1	0	1	Microbiology (Lab)	علم الاحياء الدقيقة (عملي)	1213103
(متزامن)						
1212107	0	2	2	Instrumental Analysis	تحليل الي	1213108
1213108	1	0	1	Instrumental Analysis (Lab)	تحليل الي (عملي)	1213109
(متزامن)						

Area of Study Requirements: (107) Cr. Hrs.				متطلبات التخصص الإلزامية: (107) ساعة معتمدة		
0161901	0	2	2	Fundamentals of Pharmacy	اساسيات الصيدلة	1211501
1211601	0	2	2	Anatomy and Histology	علم التشريح والانسجة	1211603
1211603	1	0	1	Anatomy and Histology (Lab)	تشريح وانسجة (عملي)	1211604
(متزامن)						
1211603	0	2	2	Human Physiology	فسيولوجيا الانسان	1212601
1211101	0	3	3	Organic Chemistry II	كيمياء عضوية (2)	1212101
1212101	1	0	1	Organic Chemistry (Lab)	كيمياء عضوية (عملي)	1212102
(متزامن)						
1211603	0	2	2	Biochemistry I	كيمياء حيوية (1)	1212103
1212103	0	2	2	Biochemistry II	كيمياء حيوية (2)	1212104
1212104	1	0	1	Biochemistry (Lab)	كيمياء حيوية (عملي)	1212105
(متزامن)						
1211501	0	3	3	Pharmaceutics I	صيدلانيات (1)	1212106
1211501	0	3	3	Physical Pharmacy	صيدلة فيزيائية	1212501
1212106	1	0	1	Pharmaceutics and Dispensing Lab	مختبر الصيدلانيات وصرف الادوية	1212502
(متزامن)						
1212101	0	2	2	Medicinal Chemistry	كيمياء طبية (1)	1213101
1212106	0	3	3	Pharmaceutics II	صيدلانيات (2)	1213104
1213104	1	0	1	Pharmaceutics II (Lab)	صيدلانيات (2) (عملي)	1213105
(متزامن)						
1213101	0	3	3	Medicinal Chemistry II	كيمياء طبية (2)	1213106
1213106	1	0	1	Medicinal Chemistry (Lab)	كيمياء طبية (عملي)	1213107
(متزامن)						
1213102	0	2	2	Immunology and Immunotherapy	علم المناعة والعلاج المناعي	1213110
1212101	0	3	3	Chemistry of Natural Products	كيمياء النواتج الطبيعية	1213111

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1212601	0	3	3	Pharmacology I	علم الأدوية (1)	1213201
1213201	0	3	3	Pharmacology II	علم الأدوية (2)	1213202
1213201	0	2	2	Pharmacy Ethics and Legislations	اخلاقيات وتشريعات صيدلانية	1213301
1213107	3	0	3	Pharmacy Training I	تدريبات عملية صيدلانية (1)	1213401
1212601	0	2	2	Pathophysiology	فسيولوجيا الامراض	1213601
1213202	0	3	3	Pharmaceutics III	علم الأدوية (3)	1214201
1213102	0	3	3	Clinical Biochemistry and Nutrition	كيمياء حيوية وتغذية سريرية	1214202
1213202	0	3	3	Biopharmaceutics and Pharmacokinetics	صيدلة حيوية وحركية الدواء	1214203
1214203 (متزامن)	1	0	1	Biopharmaceutics and Pharmacokinetics (Lab)	صيدلة حيوية وحركية الدواء (عملي)	1214204
1214201	0	3	3	Clinical Pharmacy and Therapeutics I	صيدلة سريرية وعلاج دوائي (1)	1214205
1213111	0	3	3	Phytotherapy	العلاج بالأدوية الطبيعية	1214206
1214205 (متزامن)	0	1	1	Clinical Cases I	حالات سريرية (1)	1214301
1213202	0	3	3	Pharmacy Practice	ممارسة صيدلانية	1214302
1214302 (متزامن)	1	0	1	Pharmacy Practice (Practical)	ممارسة صيدلانية (عملي)	1214303
1214205	3	0	3	Pharmacy Training II	تدريبات عملية صيدلانية (2)	1214401
1213110	0	2	2	Drug Delivery Systems	أنظمة إيصال الدواء	1214501
1212104	0	3	3	Pharmaceutical Biotechnology	تكنولوجيا حيوية صيدلانية	1214502
1213104	0	3	3	Pharmaceutical Technology	تكنولوجيا صيدلانية	1214503
1214502	0	1	1	Pharmaceutical Regulatory Affairs	الشؤون التنظيمية الدوائية	1214504
1214205	0	3	3	Clinical Pharmacy and Therapeutics II	صيدلة سريرية وعلاج دوائي (2)	1215201
1215201	0	2	2	Clinical Pharmacy and Therapeutics III	صيدلة سريرية وعلاج دوائي (3)	1215202
1214204	0	1	1	Drug and Health Informatics	المعلوماتية الدوائية والصحية	1215203
1214205	0	2	2	Over the Counter Medicines	ادوية بدون وصفة طبية	1215204
1214205	0	2	2	Public Health and Epidemiology	الصحة العامة وعلم الوبائيات	1215205
1215201 (متزامن)	0	1	1	Clinical Cases II	حالات سريرية (2)	1215301
1214201	0	2	2	Pharmaceutics	اقتصاد صيدلاني	1215302
1214201	0	2	2	Pharma Marketing	التسويق الصيدلاني	1215303
1214205	0	2	2	Evidence Based Medicine	الطب المسند بالبراهين	1215304
1213104	0	3	3	Industrial Pharmacy	صيدلة صناعية	1215501
1215501 (متزامن)	1	0	1	Industrial Pharmacy (Lab)	صيدلة صناعية (عملي)	1215502
1214503	0	2	2	Cosmetics	مستحضرات التجميل	1215503

Area of Study Electives: 9 Cr. Hrs.				ساعات معتمدة: 9 متطلبات التخصص الاختيارية		
1214501	0	3	3	Drug Design	تصميم الدواء	1215101
1213111	0	3	3	Advanced Chemistry of Natural Products	كيمياء النواتج الطبيعية المتقدمة	1215102
1213106	0	3	3	Advanced Medicinal Chemistry	كيمياء طبية متقدمة	1215103

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1213102	0	3	3	Advanced Microbiology	احياء دقيقة متقدمة	1215104
1214206	0	3	3	Advanced Phytotherapy	العلاج بالأدوية الطبيعية المتقدم	1215206
1214502	0	3	3	Gene and Protein Therapy	العلاج الجيني والبروتيني	1215207
1214201	0	3	3	Advanced Pharmacology	علم الادوية المتقدم	1215208
1214201	0	3	3	Molecular Pharmacology	علم الادوية الجزيئي	1215209
1215201	0	3	3	Advanced Therapeutics	علاج دوائي متقدم	1215210
1214206	0	3	3	Toxic Plants	النباتات السامة	1215211
1214302	0	3	3	Advanced Pharmacy Practice	ممارسة صيدلانية متقدمة	1215305
1214302	0	3	3	Pharmacovigilance	الرقابة واليقظة الدوائية	1215306
1214201	0	3	3	Select Topics in Pharmacy	مواضيع مختارة في الصيدلة	1215504
1214502	0	3	3	Advanced Pharmaceutical Biotechnology	تكنولوجيا حيوية صيدلانية متقدمة	1215505
1214503	0	3	3	Advanced Pharmaceutical Technology	تكنولوجيا صيدلانية متقدمة	1215506
1214504	0	3	3	Drug Approval	تسجيل الدواء	1215507
<b>Remedial Courses</b>				<b>المساقات الاستدراكية</b>		
-	0	3	3	Remedial Arabic Language Skills	اللغة العربية الاستدراكية	0161100
-	0	3	3	Remedial English Language Skills	اللغة الإنجليزية الاستدراكية	0161200
-	0	3	3	Remedial Computer Skills	مهارات الحاسوب الاستدراكي	0161400
<b>Total number of credit hours (165 Cr. Hrs.)</b>					<b>ساعة معتمدة (165 مجموع الساعات)</b>	

## BSc in Pharmacy Advisory Study Plan for the Academic Year 2020/2021

### First Year

First Semester			
Course No.	Course Title	Credit Hours	Prerequisite
0161901	General Chemistry	3	-
0161902	General Chemistry Lab	1	-
1211601	General Biology	3	-
1211602	General Biology Lab	1	-
0161701	Calculus	3	-
	Univ requirement	2	-
	Univ requirement	3	-
<b>Total</b>		<b>16</b>	

Second Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1211603	Human Anatomy & Histology	2	1211601
1211604	Human Anatomy Lab	1	1211603*
1211101	Organic Chemistry I	2	0161901
1211501	Foundations of Pharmacy	2	0161901
0162704	Biostatistics	2	0161701
	Univ requirement	3	-
	Univ requirement	3	-
<b>Total</b>		<b>15</b>	

### Second Year

First Semester			
Course No.	Course Title	Credit Hours	Prereq/ Coreq*
1212101	Organic Chemistry II	3	1211101
1212102	Organic Chemistry lab	1	1212101*
1212501	Physical Pharmacy	3	1211501
1212601	Human Physiology	2	1211603
1212103	Biochemistry I	2	1211603
	Univ requirement	3	-
	Univ requirement	3	-
<b>Total</b>		<b>17</b>	

Second Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1212104	Biochemistry II	2	121203
1212105	Biochemistry lab	1	1212104*
1212106	Pharmaceutics I	3	1212501
1212502	Pharmaceutics and Dispensing Lab	1	1212106*
1212107	Analytical Chemistry	2	1211101
1212108	Analytical Chemistry lab	1	1212107*
1212602	Pathophysiology	2	1212601
	Univ requirement	3	-
<b>Total</b>		<b>15</b>	

### Third Year

First Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1213101	Medicinal Chemistry I	3	1212101
1213201	Pharmacology I	3	1212602
1213102	Microbiology	3	1212104
1213103	Microbiology lab	1	1213102*
1213104	Pharmaceutics II	3	1212106
1213105	Pharmaceutics II Lab	1	1213104*
	Univ requirement	3	-

Second Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1213106	Medicinal Chemistry II	3	1213101
1213107	Medicinal Chemistry Lab	1	1213106*
1213202	Pharmacology II	3	1213201
1213108	Instrumental Analysis	2	1212107
12113109	Instrumental Analysis lab	1	1213108*
1213110	Immunology	2	1213102
1213111	Chemistry of Natural Products	3	121201

<b>Total</b>	<b>17</b>		

1213301	Pharmacy Ethics, Professionalism and law	2	1213201
<b>Total</b>	<b>17</b>		

Summer semester			
Course number	credits	Course title	prerequisite
1213401	3	Pharmacy Training I	1213202

### Fourth Year

First Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1214201	Pharmacology III	3	1213202
1214202	Clinical Biochemistry & Nutrition	3	1213102
1214501	Drug Delivery Systems	2	1213110
1214203	Biopharmaceutics & Kinetics	3	1213202
1214204	Biopharmaceutics & Kinetics lab	1	1214203*
1214502	Pharmaceutical Biotechnology	3	1213104
<b>Total</b>	<b>15</b>		

Second Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1214503	Pharmaceutical Technology	3	1213104
1214205	Clinical Pharmacy & Therapeutics I	3	1214201
1214301	Clinical Cases 1	1	1214205*
1214206	Phytotherapy	3	1213111
1214302	Pharmacy Practice	3	1213202
1214303	Pharmacy Practice Lab	1	1214302*
1214504	Pharmaceutical Regulatory Affairs	1	1214502
<b>Total</b>	<b>15</b>		

Summer semester			
Course number	credits	Course title	prerequisite
1214201	3	Pharmacy Training II	1214205

### Fifth Year

First Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1215501	Industrial pharmacy	3	1213104
1215502	Industrial pharmacy lab	1	1215501
1215201	Clinical Pharmacy & Therapeutics II	3	1214205
1215301	Clinical Cases II	1	1215201*
1215302	Pharmacoeconomics	2	1214201
1215303	Pharmaceutical Marketing	2	1214201
	Pharmacy Elective	3	
<b>Total</b>	<b>15</b>		

Second Semester			
Course No.	Course Title	Credit Hours	Prerequisite
1215202	Clinical Pharmacy & Therapeutics III	2	1215201
1215203	Drug & Health Informatics	1	1214205
1215204	Over the Counter Medicines (OTC)	2	1214205
1215205	Public Health & Epidemiology	2	1214205
1215304	Evidence Based Medicine	2	1214205
1215503	Cosmetics	2	1214503
	Pharmacy Elective	3	
	Pharmacy Elective	3	
<b>Total</b>	<b>17</b>		

## Course Descriptions

### **General Biology (1211601):**

This course is an intensive course designed to develop appreciation of characteristics of life through studying cell structures & function and how information is passed from generation to generation. Some attention will be devoted to plants as important tools in Pharmacognosy. The course will end with focus on animal study including Vertebrates, Invertebrates, and Human

### **General Biology Lab (1211602):**

This is an introductory Biology Lab; introducing skills in different laboratorial experiments. Students should learn how to: prepare slides, use microscopes, dissect some organisms, test the presence of organic molecules in some food items using agents, and recognizing groups of organisms as invertebrates and vertebrates, recognizing types of plants.

### **Anatomy and Histology (1211603):**

This course will provide the student with a basic knowledge of human anatomy using a systemic approach. The students will acquire an understanding of structure as it relates to function, and a working vocabulary of human anatomy, facilitating their introduction into clinical pharmacy and therapeutics.

### **Anatomy and Histology Lab (1211604)**

Practical Anatomy and Histology is a practical course, in which the students are expected to spend three practical hours per week in the lab of Anatomy and Histology. They are going to learn the anatomical terminology and the anatomical planes of the body. They will be also introduced to the anatomy of the human body systems; Skeletal, Muscular, Nervous, Cardiovascular, Digestive, Respiratory and Urogenital systems. Moreover, they will learn the histology of the epithelial and connective tissues

### **Organic Chemistry I (1211101):**

This course aims to give the student the initial knowledge of the principles of organic chemistry. The course covers the following topics: bonding, molecular properties and structure of organic compounds, nomenclature, preparations, physical properties, stereochemistry, reactions and reaction mechanisms of alkanes, alkenes, alkynes and aromatic compounds.

### **Fundamentals of Pharmacy (1211501):**

This course will provide an introduction to students about the profession of Pharmacy its history and gain an understanding of the impact of the pharmacist in the patient care process. This course explains the role a pharmacist can have in patient care, research, and academia; explores the various settings in which pharmacists work; and examines what training is necessary for success in the pharmacy field. Additionally, the second part of the course provides the students with the basic understanding of pharmaceutical calculations I examines how to apply basic mathematical skills in solving calculation problems encountered in pharmacy practice.

**Organic Chemistry II (1212101):**

Organic chemistry II is primarily a lecture and problem-solving course, which builds upon the first course of organic chemistry to prepare the student for other courses in pharmacy, biochemistry medicinal chemistry and phytochemistry. The curriculum is divided between advance topics in three areas of organic chemistry: (1) structures, properties, and nomenclatures of organic compounds, (2) mechanistic theory, and (3) synthesis and reactions. The course is composed of series of lectures, guided problem sets, and exams.

**Organic Chemistry Lab (1212102):**

This course is a complementary part to the theoretical lectures. It provides the student the important knowledge to acquire good practical skills in the study of the structure, properties, and reactions of organic compounds. Moreover, to acquire the necessary skills to separate and purify organic compounds based on their different physical properties. Furthermore, the student will be able to differentiate between different classes of organic compounds according to the type of functional group exist in the compound. The final phase of the course, the student will be asked to synthesize some pharmaceutical compounds based on simple organic reactions.

**Physical Pharmacy (1212501):**

This course provides the students with the knowledge of physical pharmacy principles. It provides the student with the basic knowledge of partitioning and distribution phenomena, complexation phenomena, principles of reaction kinetics and pharmaceutical stability, diffusion phenomena, dissolution phenomena, and finally the interfacial phenomena. Gaining the concepts of these phenomenon will help the student in the development of new drugs and dosage forms, as well as, the improvement of various modes of administration.

**Human Physiology (1212601):**

The fundamental concepts, theories, and principles of Physiology as a link between the basic sciences and medicine. The major systems in the body and the specific physiological mechanisms will be discussed in relation to the individual functions of all the body's different cells, tissues, and organs.

**Biochemistry I (1212103):**

This course is designed to provide the students with principle knowledge regarding the chemical and physical properties of biomolecules (carbohydrates, lipids and proteins) and their function in a biological system. General properties of enzymes and their kinetics, hemoglobin structure and function, energy generation and signal transduction in cells will be covered.

**Biochemistry II (1212104):**

The course covers the main biochemical metabolic pathways of different biomolecules; carbohydrates, lipids, proteins and nucleotides and the interrelationship between them. Storage and expression of genetic information; nucleic acids structure, replication, transcription and translation will also be covered.

**Biochemistry Lab (1212105):**

This lab will provide hands on testing of several biological molecules such as enzymes, vitamins, nucleic acids, carbohydrates, fats, and proteins.

**Pharmaceutics I (1212106):**

An introduction to the prescription, dosage forms & the basic techniques of compounding simple solutions, weighing, measuring, labeling, packaging and pharmaceutical calculations.

**Pharmaceutics and Dispensing Lab (1212502):**

This course is concerned with solid and semisolid dosage form compounding and the principles of packaging labeling and storage of finalized pharmaceutical products in order to ensure the stability and efficacy of the product.

**Analytical Chemistry (1212502):**

This course covers quantitative and qualitative chemical analysis methods, stoichiometric calculations, concepts of chemical equilibrium, titrimetric methods including: acid-base titration, compleximetric titration, precipitation reactions and titrations, focusing on the methods used in pharmaceutical sciences.

**Analytical Chemistry Lab (1212108):**

This course is complementary part to the theoretical lectures. It provides the students important knowledge to acquire good practical skills in analysis and determination the amount of species using simple techniques in analytical chemistry which includes acid –base titration, re-dox titration, complexometric titration, precipitation reactions and their titration.

**Medicinal Chemistry I (1213101):**

Within this course, a detailed description of the pharmacokinetics and pharmacodynamics operations and they are affecting to process of drug design and drug action. In addition, a detailed application of analytical capabilities of the students to extract the SAR of certain drug groups act on the CNS and PNS. These include drugs used as adrenergic and cholinergic systems, sedative hypnotics, antidepressants, antiseizures, antiparkinson and antipsychotics. The course explores the direct relationship between the pharmacologic activity and the chemical structure of the compound.

**Pharmacology I (1213201):**

Pharmacology is the study of drugs. The course will cover the important concepts students need to know about the basis of drug action and the pharmacological basis of therapeutic. The first part of the course will deal with general principles of pharmacology, including pharmacodynamics, and pharmacokinetics. The second part will focus on systemic pharmacology and will involve discussions of major drug classes as they relate to organ systems or major pathophysiological diseases. Topics include: detailed information about drugs acting on autonomic nervous system and drugs acting on CNS.

**Microbiology (1213102):**

The course includes the basic structure and function of microorganisms, including bacteria, viruses, fungi, protozoa, and immunology. The course tackles principles of bacterial growth requirements, cultivation, counting, growth curve, bacterial counting, sterilization and disinfections, normal bacterial flora of human body, and importance in diseases, antimicrobial

agents and chemotherapy, fungi and yeasts role in health and disease, protozoa, viruses, and defense mechanisms of immune system.

**Microbiology Lab (1213103):**

In this course the students will apply knowledge gained in the microbiology course. The students will perform microbial identification through gram staining. The students will perform various in vitro tests for evaluating antimicrobial agents & will perform some microbial quality tests for non-sterile products. The students will perform tests used to monitor the environment (air, personnel, water) & test sterile products.

**Pharmaceutics II (1213104):**

This course covers types of Polymers and their Use in the Formulation of Medicines. The Formulation and Evaluation of Suspensions, Emulsions, Creams, Ointments, Pastes, Gels, Suppositories and Pessaries. The Formulation and Evaluation of Powders, Granules, Tablets and Capsules. The course will conclude with a preview of Novel Dosage Forms.

**Pharmaceutics II Lab (1213105):**

This course is concerned with solid and semisolid dosage form The Formulation and Evaluation of Suspensions, Emulsions, Creams, Ointments, Pastes, Gels, Suppositories. shampoo, cosmetic preparations and Capsules.

**Pathophysiology (1213601):**

Pathophysiology involves the study of functional or physiologic changes in the body that result from disease processes (or the reverse definition, how individual disease processes cause alterations in cellular function). The Course is divided into basic concepts and processes in pathophysiology followed by the application of these basic concepts in studying specific disorders (or disease states) traditionally organized by body system.

**Medicinal Chemistry II (1213106):**

This course discusses the medicinal chemistry of antibiotics, antifungal, antiviral and anticancer agents, covering structure activity relationship, mechanism of action and other issues related to physicochemical properties of each class members.

**Medicinal Chemistry Lab (1213107):**

This course provides the students with important knowledge to acquire good practical skills to synthesis of selected medication and pharmaceutical products. Furthermore, the students will be taught how to generate reports that include actual yield of the final synthetic compounds.

**Pharmacology II (12132020):**

This course will be a continuation of the pharmacology 1. This course will start with introduction to the pharmacology of cardiovascular system, including the drugs that used for treatment of hypertension, angina pectoris and acute coronary syndrome, hyperlipidemia, congestive heart failure and dysarrhythmia. Then the course will cover the drugs that affect the endocrine system, including the drugs used for diabetes mellitus, thyroid and pituitary gland disorders, adrenal hormones, androgens and estrogen. In addition, drugs for respiratory diseases such as asthma and COPD, gastrointestinal disorders, and skin conditions will be covered. Also

this course will cover anticoagulant, NSAIDs, general and local anesthetic agents. For each medication, the mechanism of action, the adverse drug reactions and the therapeutic uses will be discussed.

**Instrumental Analysis (1213108):**

Instrumental analysis course provides the students with a solid background in instrumental analysis. The followings topics are covered: The interaction of electromagnetic radiation with matter, Quality control and figure of merit, ultraviolet-visible spectroscopy, Atomic absorption spectroscopy, Structural elucidation using NMR, IR and mass spectrometry, Chromatographic separation methods which includes, Thin layer chromatography, High performance liquid chromatography and gas chromatography

**Instrumental Analysis Lab (1213107):**

Practical instrumental analysis course provides the students with a practical background in instrumental analysis. The lab includes spectral methods of analysis including UV-Visible, Infra-Red (IR) and Nuclear Magnetic Resonance (NMR). The lab also introduces the students to chromatographic techniques such as thin layer chromatography (TLC), High Pressure Liquid Chromatography (HPLC) and Gas Chromatography (GC). These methods are used in lab along with other analytical procedures in applications for analysis of pharmaceutical preparations.

**Immunology & Immunotherapy (1213109):**

Basic principles of immunology and their relation to diseases and therapy. Different types of vaccines, and their mechanisms of action. The goal of this course is to provide a broad overview of gene and immunotherapy with a particular emphasis on translational applications. Furthermore, the course is designed to enable students to gain a fundamental understanding of the principles and mechanisms of gene and immunotherapy.

**Chemistry of Natural Products (1213111)**

This course is to show students how nature contributes to contemporary medicine. By providing students with a basic understanding and knowledge of the chemistry of natural products of medicinal importance, semi-synthetic derivatives, and synthetic analogues based on natural product templates. Biosynthetic approach will be used to classify natural products into distinct groups and to display the relationships between diverse structures encountered in nature with the creation of substances through the different metabolic path ways for various classes of compounds. Detailed information is given for biologically important natural products and drugs of natural origin, including sources, principal components, structural component analysis, drug use, mechanism of action, and current status use.

**Pharmacy Ethics & Regulations (1213301):**

The course deals with the professional role of pharmacists in various pharmaceutical institutions, the process of prescribing drugs, methods of dispensing them, the laws governing them, and their ethics.

**Pharmacy Training, I (1213401):**

This course consists of a simulation training that is conducted in the virtual pharmacy setting, in the form of mini workshops to build students' knowledge in a specific sector. In this course,

students are expected to learn how to use and incorporate technology in pharmacy practice, learn how to use different monitoring devices sold in pharmacies properly, perform patient education, learn how to read and handle a prescription, and learn how to interact and communicate with other health care providers.

**Pharmacology III (1214201):**

This course is a continuation of the Pharmacology 1 & 2 courses. In this course, the student will be familiar with different types of chemotherapeutic classes, mechanisms, indications and potential side effects. The concept of drug selectivity will be highlighted. This course includes the pharmacology of chemotherapeutic agents including antibacterial, antifungal, antiviral, antiparasitics and anticancer agents.

**Clinical Biochemistry & Nutrition (1214202):**

This course will give students a thorough grounding in a discipline that deals with the clinical analysis of body fluids and other biological material to aid the diagnosis, prognosis, prognosis, therapy and monitoring of diseases. In addition, the students will have a better understanding dietary constituents with scientific approach by describing their functions at cellular and molecular levels. and understanding the function of nutrients as they relate to human health and disease.

**Drug Delivery Systems (1214501):**

This course covers the development of dosage forms, targeted drug delivery, various drug delivery systems, drug release patterns from immediate and modified drug delivery systems and novel dosage forms used to control drug delivery and release to improve the delivery of the drug to the body. As well as looking at modern methods in the development of pharmaceutical forms supported by examples from the market.

**Biopharmaceutics & Pharmacokinetics (1214501):**

This course provides you with a basic intuitive understanding of the pharmacokinetic principles, terminology, models, equations and factors affecting drug absorption, distribution, metabolism and excretion and its importance in drug therapeutic or toxic effects. Emphasis will be placed upon the prediction of plasma levels of drugs under varying conditions applying different pharmacokinetic parameters. Solved examples obtained from literature and problem sets with answers are used to illustrate the application of pharmacokinetic principles and equations, making them realistic for clinical practice.

**Biopharmaceutics & Pharmacokinetics Lab (1214202):**

This practical course in addition to the co-requisite course (1201424) provides students with a basic intuitive understanding of the pharmacokinetic principles, terminology, models, equations and factors affecting drug absorption, distribution, metabolism and excretion and its importance in drug therapeutic or toxic effects. Emphasis will be placed upon the prediction of plasma levels of drugs under varying conditions applying different pharmacokinetic parameters. Handling pharmacokinetic parameters of drugs in the body and solving problems.

**Pharmaceutical Biotechnology (1214502)**

This course is designed to provide students with some basic information about recombinant DNA technologies, why they were developed, and how they are used today in many different scientific arenas. The course will introduce the different types of restriction enzymes, their advantages and disadvantages, and how they are used to create a recombinant DNA molecule. The course will review how to make a recombinant genomic DNA library and how to use this library to find a specific gene. The course will outline the differences between a genomic and a cDNA library and discuss how to use a cDNA library to clone a gene of interest. Finally, we will discuss methods to analyze genes identified through recombinant DNA technologies.

**Pharmaceutical Technology (1214503):**

This material is designed to help students to fully understand the design, development, manufacture and evaluation of various coated and non-coated discs, solid and soft capsules using the latest technologies and labels. The course will also cover granulation process, quality control tests of the corresponding products. The course will give an overview on the concepts of pharmaceutical preformulation. The material will offer a comprehensive understanding of pharmaceutical technology with strong emphases on its theory and practice.

**Clinical Pharmacy & Therapeutics I (1214205):**

This course provides students with sufficient introduction of therapeutic knowledge to be able to solve different cardiovascular, respiratory, and GI disorders and general approach treatment of the following diseases: hypertension, Chronic Heart Failure, Ischemic Heart Disease, Venous Thromboembolism (VT), Hyperlipidemia, Respiratory Disorders, COPD, Peptic ulcers Disease (PUD). Student will be able to solve Special Populations problems: elderly, Pregnancy, Children/adolescents, and African Americans, Combination Therapy, Hypertensive urgencies and Emergencies and other special cases for each disease.

**Clinical Cases I (1214301):**

Discussion of clinical cases of patients suffering from various diseases to develop clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. The course will include experiential training through students' visits to different hospital departments with engagement in clinical cases and pharmaceutical care.

**Phytotherapy (1214206)**

This course is designed to provide students with a well-balanced framework for education in various aspects and recent advances and up-dated information in the field of phytotherapy and CAM. This course will provide in detail the dosage range of the medicinal plants studied, contraindications and incompatibilities of potential medicinal plants. In addition, It will supply advanced information on the CAM practice among the world and the role of rationality, intuition and experience in prescribing treatment. Currently approved by the herbal remedies in the US and Europe and can be found on the market.

**Pharmacy Practice (1214302):**

This course introduces students to pharmacy practice, different types of pharmacy practice and professional behaviors and ethics expected in pharmacy practice with a focus on pharmaceutical care practice. The course aims to introduce students to their future professional responsibilities

as pharmacists. They will be provided with a systematic approach to patient-centered pharmaceutical care that will be applied and practiced throughout the curriculum. Essential communication skills required in pharmacy practice will also be covered.

**Pharmacy Practice Lab (12143030):**

This course introduces students to the practical aspects of pharmacy practice, different types of pharmacy practice and professional behaviors and ethics expected in pharmacy practice with a focus on pharmaceutical care practice. The course aims to introduce students to their future professional responsibilities as pharmacists. They will be provided with a systematic approach to patient-centered pharmaceutical care that will be applied and practiced throughout the curriculum. Essential communication skills required in pharmacy practice will also be covered.

**Pharmaceutical Regulatory Affairs (1214505):**

This course introduces pharmaceutical industrial regulations, good pharmaceutical industry practices principles, ethical considerations, regulatory dossier sections preparation and licensure. Students will be introduced to the vital role performed by regulatory professionals, and become familiar with domestic regulatory requirements in Jordan and various regulatory agencies in other countries and their jurisdiction.

**Pharmacy Training II (1214401):**

This course will introduce students to the fundamentals of pharmacy practice in the community setting and prepare them for entering the pharmacy career field and gain the national certification. Students will have the opportunity to integrate and apply their knowledge and clinical skills under the supervision of a practicing registered pharmacist (external preceptor) and an academic faculty member (Instructor). Students will focus on the development and implementation of patient care services related to common chronic disease states, health & wellness, screening and over the counter medications. In addition, students' communication skills will be enhanced through direct patient care. Students will also be exposed and involved in processes related to product delivery and basic pharmacy operations management.

**Industrial Pharmacy (1215501):**

This material is designed to help students to fully understand the fundamentals of particle size mapping. Most importantly, its value in pharmaceutical technology, methodologies and analysis. The material also covers major pharmaceutical processes used in the pharmaceutical industry, such as: mixing, drying, milling and powder fluidity.

**Industrial Pharmacy Lab (1215502):**

It is an industrial pharmaceutical supplement to the pharmaceuticals studied by the student in previous years and a co-requisite to the industrial pharmacy course. It makes the student fully aware of the methods of manufacturing of tablets and capsules from the raw material until the final dosage form. It also concerns with conducting quality control tests to conform that the final product is in accordance with the requirements of pharmacopoeial standards. This course also deals with pharmaceutical processes and knowledge related to powders such as powder mixing, grinding and physico-chemical characterisation including; particle size mapping, flowability and compressibility.

**Clinical Pharmacy & Therapeutics II (1215201):**

This course is designed to familiarize the student with some selected common disease conditions that he/she is expected to meet and deal with whether he/she works in a community pharmacy, a hospital, or other health facilities. Pharmacotherapy of different infectious diseases, female disorders (drug use during pregnancy and lactation, contraception methods, and menopause), and neurological and psychiatric disorders, in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

**Clinical Cases II (1215301):**

Discussion of clinical cases of patients suffering from various diseases to develop clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. The course will include experiential training through students' visits to different hospital departments with engagement in clinical cases and pharmaceutical care

**Pharmacoeconomics (1215302):**

This course discusses the basic and applied concepts of pharmacoeconomics as well as the design models of the common types of pharmacoeconomics evaluations, with a focus on the practical aspects of these principles.

**Pharmaceutical Marketing (1215303):**

In this course, emphasis is placed on making marketing ideas and concepts come alive by encouraging students to apply established marketing principles to real companies in real situations.

**Clinical Pharmacy & Therapeutics III (1215202):**

This course is designed to familiarize the student with some selected common disease conditions that he/she is expected to meet and deal with whether he/she works in a community pharmacy, a hospital, or other health facilities. Pharmacotherapy of endocrinology disorders (Diabetes Mellitus, and thyroid disorder), student will be introduced to different types of tumor (colorectal and breast cancer), hematological diseases, kidney diseases, geriatric diseases and their complications. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans and offering alternative therapeutic options/plans when needed.

**Drug & Health Informatics (1215203):**

This course aims to provide students with an introduction to the field of health informatics and its implementation within the pharmacy profession. Health informatics focuses on the optimal use of data, information technology, and knowledge to improve health outcomes on the individual and population levels, and to advance health education and research. The course will cover key issues in the field of health informatics including problems and challenges that

this field can address, research and practice of health informatics, basic skills and knowledge in health informatics to apply in the pharmacy profession, and ethical and diversity issues in health informatics.

**Over the Counter Medicines OTC (1215204):**

Medications that can be bought without prescriptions are known as Over the Counter (OTC) drugs. This course introduces students to the concept of dispensing medications in the pharmacy without medical prescription and self-care. In addition, the course differentiates between cases that requires the referral to the doctor and those that be treated in the pharmacy using OTC drugs and the proper counseling that should be offered to patients.

**Public Health & Epidemiology (1215202):**

This course is designed to provide the students with an overview of the concept of epidemiology as a method of public health which is the scientific approach to studying disease and health problems. Upon completion of the course, students should be able to define and quantify public health issues using current epidemiological data at national and international levels, apply basic concepts of epidemiology and biostatistics in public health research, use existing data for the compilations and presentations of public health problems, evaluate and address the possibilities and limitations of existing data.

**Evidence Based Medicine (1215205):**

This course is intended for students to acquire and develop both the knowledge and the skills for evidence-based medicine (EBM). During this course student will use concepts they will obtain over the course of the previous clinical pharmacy and therapeutics courses as they are applied to help solving clinical problems.

**Cosmetics (1215503):**

This material is designed to provide the students with an introduction to cosmeticology. This course will focus on care products and their biological activities that are targeted to different parts of the body such as skin and hair. The students will have the ability to understand the design of cosmetic dosage forms and learn about the good manufacturing practice of cosmetic preparations.

**Drug Design (1215101):**

This course covers the scientific approach for developing new drug molecules based on studying basic methodology in the pharmaceutical medicinal chemistry and drug design especially by exploring structure activity/toxicity relationships of drugs. A study of the lead molecule and its optimization techniques will be broadly discussed for the design of new chemical entities (NCEs) or to improve the potency of a lead. In particular, the study of receptor-drug and enzyme-drug interactions is extensively covered at the molecular levels emphasizing all the physico-chemical factors affecting the binding of drugs. The course will focus also on the design of DNA intercalating agents and prodrug approaches in drug design. This course also introduces students to use the computational modeling software in studying the crucial interactions observed between the ligand and biological target (receptor/enzyme/nucleic acids) for the prediction of the binding affinity/orientation of the ligand. Finally, various ligand-

based and structure-based drug design strategies for virtual screening of novel drugs are also discussed with suitable case studies.

**Advanced Chemistry of Natural Products (1215102):**

This course covers the basic and the advanced principles of biosynthesis and mechanisms of reaction for the natural products. It emphasizes general techniques used in biosynthesis, main chemical reactions and natural drugs examples.

**Advanced Medicinal Chemistry (1215103):**

This course covers the scientific approach for developing new drug molecules based on studying basic methodology in the pharmaceutical medicinal chemistry and drug design especially by exploring structure activity/toxicity relationships of drugs. A study of the lead molecule and its optimization techniques will be broadly discussed for the design of new chemical entities (NCEs) or to improve the potency of a lead. In particular, the study of receptor drug and enzyme drug interactions is extensively covered at the molecular levels emphasizing all the physicochemical factors affecting the binding of drugs. The course will focus also on the design of DNA intercalating agents and prodrug approaches in drug design. This course also introduces students to use chemistry aspects (stereochemistry, chiral technology and combinatorial chemistry) in studying the crucial interactions observed between the ligand and biological target (receptor/enzyme/nucleic acids) for the prediction of the binding affinity/orientation of the ligand.

**Advanced Microbiology (1215104):**

The course includes the basic structure and function of microorganisms, including bacteria, viruses, fungi, protozoa, and immunology. The course tackles principles of bacterial growth requirements, cultivation, counting, growth curve, bacterial counting, sterilization and disinfections, normal bacterial flora of human body, and importance in diseases, antimicrobial agents and chemotherapy, fungi and yeasts role in health and disease, protozoa, viruses, and defense mechanisms of immune system.

**Advanced Phytotherapy: (1215206):**

This course is designed to provide students with a various aspects of the details of herbs, their habitat, uses and actions, and any contraindications. This Phytotherapy course draws from international knowledge and includes lessons on the three main traditions of healing (Chinese, Western, and Ayurvedic), as well as a full database of herbal medicine uses, properties and actions. With this herbalism course, you will also gain a thorough the legal aspects of a herbal medicine consultancy.

**Gene & Protein Therapy (1215207):**

Chemical, pharmaceutical and the therapeutic aspects of proteins and genes medications.

**Advanced Pharmacology (1215208):**

Chemical, pharmaceutical and the therapeutic aspects of proteins and genes medications.

**Molecular Pharmacology (1215208):**

Essential principles of molecular pharmacology. It also covers types of receptors, second messengers and cellular mechanisms of drug action. Genes, nucleic acids structure, replication and the control on these processes as sites of drug action are also discussed.

**Advanced Therapeutics (1215210):**

This course discusses the therapeutics for some clinical cases and selected drugs in a comprehensive and detailed manner.

**Toxic Plants (1214206):**

This course aims at acquainting students with basic knowledge of toxic, hallucinogenic and narcotic plants. The course involves two parts; the first part deals with toxic plants mainly those who are endemic to Jordan. Focus mainly on the toxic part(s), toxic constituents, symptoms of poisoning, treatment and precautions. The second part deals with hallucinogenic and narcotic plants. Concentration on the narcotic and hallucinogenic materials, their effect on the brain, their side effects on the health in general.

**Advanced Pharmacy Practice (1215305):**

This course is designed to introduce pharmacy students to the concepts, and principles of pharmaceutical care practice. It aims to prepare them to claim responsibility for providing all patients' drug related needs and accept accountability for this commitment. It introduces students to a thinking framework, which aids them to organize their knowledge of drugs and diseases, integrate it with patient specific data and make informed evidence based clinical decisions. Case studies are given throughout the course to allow students develop their analytical skills of identifying and prioritizing treatment therapy problems (TRP), specifying goals of therapy and designing effective care plans to achieve definite outcomes and improve patient's quality of life. The course also discusses topics such as improving patient's quality of life, professional ethics and standards, evidence based clinical practice and drug information sources for pharmacists. It highlights skills such as interview skills, communication skills, documentation skills and case presentation skills, and gives students the chance to train throughout the course.

**Pharmacovigilance (1215306):**

This course will introduce students to the basic concepts, principles and process of Pharmacovigilance with a focus on its importance as an effective mean for minimizing harm to the population. It will also provide students with a broad introduction to terminology used in pharmacovigilance and safety disclosures. Other topics that will be covered during the course include, clinical aspects of serious ADRs, regulatory aspects related to pharmacovigilance and ethical and societal considerations.

**Selected Topics in Pharmacy (1215504):**

Selected topic in pharmaceutical sciences will be assigned to students to fulfill certain academic requirements.

**Advanced Pharmaceutical Biotechnology (1215505):**

This course is designed to provide students with a well-balanced framework for education in various aspects of pharmaceutical biotechnology, including production, dosage forms and regulatory aspects regarding biopharmaceuticals. The course will cover the key concepts at the foundation of the technology relevant for protein therapeutics including molecular Biology, production and analytical procedures, formulation development, pharmacokinetics, pharmacodynamics, and immunogenicity. Additionally, the course will put significant emphasis on various therapeutic classes of protein biologics and nucleotide-based therapeutics currently approved by the regulatory bodies in the US and Europe and can be found on the market.

**Advanced Pharmaceutical Technology (1215506):**

The topics in advanced pharmaceutical technology focuses on the design of dosage forms and the changes in the way that dosage forms are designed and drugs are delivered. The structure and the content of this course reflect modern knowledge and thinking in pharmaceuticals. The course outlines and includes comprehensive consideration of the pharmaceutical nanotechnology, delivery of biopharmaceuticals and the formulation and manufacture of plant medicine. In addition to the design and administration of medicines for children and elderly.

**Drug Registration & Approval (1215507):**

This course discusses methods of drugs approval and registration. The course covers the phases of drug studies on animals and other clinical studies required for drug registration and approval within the pharmaceutical regulatory context.