Curriculum For

Bachelor of Pharmacy (B. Pharm)

The Faculty of Pharmacy

Al-Quds University

2019-2020

About the program :

The Faculty of Pharmacy at Al-Quds University offers an undergraduate Bachelor of Pharmacy Program (B. Pharm). The five-years program integrates basic, clinical, and research sciences with industrial aspects.

The course of study encompasses basic sciences, biomedical sciences, pharmaceutical sciences and industrial pharmacy, pharmacology, clinical pharmacology and pharmacy practice, pharmaceutical technologies, and pharmaceutical chemistry as well as practical and laboratory applications for all these fields in the faculty laboratories. In addition, the student receives practical training through the virtual pharmacy in the faculty and 720 hours of training distributed in community pharmacies, pharmaceutical companies, and hospitals. Pharmacy students are expected to pass an evaluation exam during the last semester.

Duration of study:

Five years

Admission Requirements:

1- The student must have a degree of secondary school (Tawjihi) in the scientific branch with a minimum score of 80% or an equivalent score in the SAT II, IGCSE, GCSE, GCE IB, or Abitur (subject to the equivalence standards prescribed by the Ministry of Education)

2- Admission for students who have Bigrut certificate must finish at least 26 units, including 10 units of scientific courses, and the general average of the units not less than 80%.

Program goals:

- To Provide students with advanced pharmaceutical education including basic medical sciences, pharmaceutical and clinical sciences linking academic education with practical experience and labor market needs.
- To participate in scientific research in pharmacy related fields.
- To studying pharmaceutical properties of active molecules.
- To provide comprehensive pharmaceutical care for patients, improve patient outcomes, and to meet public expectations for safe and effective drug therapy through applied knowledge and discovery
- To enter into the field of practicing pharmacy as well informed and enlightened citizens and professionals.
- To concentrate on patient caring and ethical aspects of the pharmacy profession.
- To create applied knowledge on pharmaceutical products and medications.
- To participate with in a health care team to address local and society, communities and individual health needs .
- To promote, facilitate and conduct educational programs to promote quality use of medicines.

Career prospects:

Pharmacists can work in a variety of settings including:

- Community pharmacies and drug stores.
- Pharmaceutical and chemical analysis
- pharmaceutical and medical marketing
- pharmaceutical care in clinics and hospitals
- Academia and scientific research
- Governmental and non-governmental sectors

Program Intended Learning Outcomes - ILO's.

By the end of the program, our students will be able to:

Knowledge :

- Illustrate knowledge of the fundamental principles and essential concepts of the basic sciences in the pharmaceutical sciences
- Recognize basic knowledge related to the skills and techniques involved in drug development and total quality management
- Identify the principle rules of safety and health care assessment
- Define marketing mindset in approaching health promotion and maintenance

Intellectual skills

- Analyze pharmaceutical problems based on a scientific approach
- Employ the process of compounding and dispensing medications
- Apply the rules of safety and professional best practice.
- Investigate the differences between medications.
- Evaluate intervention effectiveness with respect to evidence-based medicine.
- Analyze, interpret and compare the information in a robust manner.
- Solve problems through the application of the evidence-based process.

Professional Skills

- Adjust prescription orders, applying calculations related to the compounding and dispensing of medicines
- Demonstrate and perform the ability to write clear and organized reports, and to master communication skills
- Use the necessary skills and management to educate health care professionals and the public in optimal drug therapy.
- Design tools to assess practice and facilitate changes.
- Adapt the ability to manage stress.
- Display the highest ethical and professional standards
- Display command of the relevant tools and sources of information related to the pharmaceutical problems

Attitudes and Values

- Function well in a team, using appropriate skills, including leadership skills, team-building, and project management.
- Communicate clearly and influentially, both orally and in writing.
- Use information and communication technologies appropriately.

  To adopt ethical values

Academic Plan :

The student has to fulfill the following requirements:

1- To pass 156 credit hours distributed as follow:

A: University Requirements (24 Credit hours) include:

University Required Courses (18 credit hours)

University Elective Courses (6 credit hours)

B: Faculty Required Courses (18 Credit Hours)

C: Main Specialty courses (114 Credit Hours) include:

1: Required Specialty courses (108 Credit Hours

2: Elective Specialty Courses (6 credits hours)

2- To finish 720 training hours in community pharmacies, hospitals, and pharmaceutical institutions

3- To pass the training exam at the last semester of study (second semester – Fifth year).

Description of requirements :

I- University Requirements 24 Credit hours)

University Required Courses (18 credit hours)

Number Course	Course Title	Credit Hours
0400101	Arabic language skills	2
0400120	Jerusalem throughout history	2
0400121	Palestine: nature & environment	2
0400122	Islamic culture	2
0400128	World civilizations	3
0400124	Logical thinking	3
0400184	English language skills	2
0400185	English language skills 2	2

University Elective Courses (6 credit hours)

The student has to choose 6 credit hours from the following courses (A or B)

A. Either two courses (Introductory + Intermediate) from the following:

Number Course	Course Title	Credit Hours
0400111	Hebrew language 1 (Level 1)	3
0400112	Hebrew language 2 (Level 2)	3
0400113	French language 1 (Level 1)	3
0400114	French language 2 (Level 2)	3
0400115	German language 1 (Level 1)	3
0400116	German language 2 (Level 2)	3
0400117	Spanish language 1 (Level 1)	3
0400118	Spanish language 2 (Level 2)	3
0400119	Turkish language 1 (Level 1)	3
0400129	Turkish language 2 (Level 2)	3
0400146	Italian language 1 (Level 1)	3
0400147	Italian language 2 (Level 2)	3

B. OR two courses from the following:

Number Course	Course Title	Credit Hours
0300142	Science and life	3
0400130	Fine arts	3
0400132	Literary appreciation	3
0400133	Women and men in human societies	3
0400141	Issues in modern and contemporary arab thought	3
0303100	Internet for special purposes	3
0500140	Democracy, human rights and international humanitarian law	3
0500143	Conflict resolution by peaceful means	3
0305100	Introduction to public health and environment	3
0403131	Communication skills	3
0500145	Introduction to legal thought	3
0409135	History and philosophy of science	3
0400148	Special topic	3
0400149	Islam and contemporary issues	3

II- Requirements from the Faculty of Pharmacy (132 credit hours),

A: Faculty Required Courses (18 Credit Hours)

Required Courses	Course Title	Credit Hours	Prerequisite
1216110	General Chemistry كيمياء عامة	3	
1216111	General Chemistry Lab. مختبر الكيمياء العامة	1	
1214110	General Biology احياء عامة	3	
1214111	General Biology Lab مختبر الاحياء العامة	1	
1214121	Anatomy علم التشريح	3	1214110
1215120	Physical Pharmacy صيدلة فيزيائية	3	1216110
1216120	Introduction to Pharmaceutical Organic Chemistry مقدمة في الكيمياء العضوية الصيدلانية	2	1216110
1214120	Introduction to Physiology مقدمة في علم وظائف الأعضاء	2	1214110

B: Main Specialty courses (114 Credit Hours) include:

1: Required Specialty courses (108 Credit Hours)

Required Courses	Course Title	Credit Hours	Prerequisite
1215110	Introduction to Pharmacy and Pharmaceutical Calculations مقدمة في الصيدلة والحسابات الصيدلانية	3	
1216211	Pharmaceutical Organic Chemistry 1 كيمياء عضوية صيدلانية-1	3	1216120
1216212	Pharmaceutical Organic Chemistry Lab 1 مختبر كيمياء عضوية صيدلنية-1	1	1216111
1214211	Physiology I علم وظائف الأعضاء-1	3	1214120 1214121
1214213	Basic Biochemistry كيمياء حيوية اساسية	3	1216110 1214110
1216213	Pharmaceutical Analytical Chemistry كيمياء تحليلية صيدلانية	3	1216110
1216214	Pharmaceutical Analytical Chemistry Lab مختبر كيمياء تحليلية صيدلانية	1	1216111

1216221	Pharmaceutical Organic Chemistry 2 كيمياء عضوية صيدلانية-2	3	1216211
1216222	Pharmaceutical Organic Chemistry Lab 2 مختبر كيمياء عضوية صيدلانية-2	1	1216212
1214221	Physiology2 علم وظائف الاعضاء-2	2	1214211
1214222	Physiology Lab مختبر علم وظائف الأعضاء	1	1214211
1214225	Pharmacology 1 علم أدوية-1	3	1214213
1214223	Metabolic Biochemistry الكيمياء الحيوية الايضية	3	1214213
1214224	Metabolic Biochemistry Lab مختبر الكيمياء الحيوية الايضية	1	1214213
1214310	Pharmacology 2 علم الادوية-2	3	1214225
1215310	Pharmaceutics 1 مستحضرات صيدلانية-1	3	1215120
1216310	Medicinal Chemistry 1 كيمياء طبية 1	3	1216221
1217310	Applied Biostatistics إحصاء حيوي تطبيقي	2	
1214311	Immunology علم المناعة	2	1214110
1214320	Pharmacology 3 علم الادوية-3	3	1214310
1216320	Medicinal Chemistry 2 كيمياء طبية-2	3	1216310
1215320	Pharmaceutics 2 مستحضرات صيدلانية-2	3	1215310

1215321	Pharmaceutics Lab مختبر مستحضرات صيدلانية	1	1215310
1214321	General Microbiology علم الاحياء الدقيقة العامة	3	1214110
1214322	General Microbiology Lab مختبرعلم الاحياء الدقيقة العامة	1	1214111
1216410	Medicinal Chemistry 3 كيمياء طبية-3	3	1216320
1214410	Pathology علم الامراض	3	1214320
1215410	Industrial Pharmacy صيدلة صناعية	3	1215320
1215411	Industrial Pharmacy Lab مختبر صيدلة صناعية	1	1215321
1214411	Pharmacognosy علم العقاقير	2	1214225
1214412	Clinical Chemistry كيمياء سريرية	3	1214223 1214320
1216420	Pharmaceutical Instrumental Analysis التحليل الالي الصيدلاني	3	1216213 1215410
1216421	Pharmaceutical Instrumental Analysis Lab مختبر التحليل الالي الصيدلاني	1	1216214
1214422	Introduction to Clinical Pharmacy مقدمة في علم الصيدلة السريرية	2	1214412
1214423	Pharmacokinetics حركية الدواء	3	1214320
1214424	Over the Counter Drugs OTC أدوية بدون وصفة	3	1214320
1214425	Research methodologies	2	1217310

	طرق البحث العلمي		
1216510	Phytochemistry كيمياء العقاقير	2	1216410
1214511	Clinical Pharmacy 1 صيدلة سريرية 1	3	1214412
1215510	Biotechnology and Innovative Therapy تقانة حيوية و علاجات مبتكرة	3	1214320 1214311
1214512	Toxicology علم السموم	2	1214320
1214510	First Aid الاسعافات الاولية	1	
1214513	Clinical Nutrition تغذية سريرية	2	1214412
1214520	Clinical Pharmacy 2 صيدلة سريرية-2	3	1214511
1217521	Pharmacy Legislation and Ethics الاخلاقيات والتشريعات الصيدلانية	1	1214320
1217520	Pharmacy Management and Marketing الإدارة الصيدلانية والتسويق	2	1214424
1217522	Seminar (Graduation Project) مشروع التخرج/ ندوة	1	1214425
1215521	Pharmacy Training تدريب عملي	1	1214320 1215320

2: Elective Specialty Courses (6 credits hours):

The students are expected to take 6 credits hours of the following elective courses

Number Course	Course Title	Credit Hours	Pre-requisite
1214581	Clinical Pharmacokinetics حركية الدواء السريرية	2	1214441
1214582	Drug Metabolism and Disposition أيض الدواء وطرحه	2	1214306
1214583	Drug Discovery and Development إكتشاف الأدوية وتطويرها	2	1214302
1215584	Perfumes and Cosmetics العطور ومواد التجميل	2	1215431 1215432
1216585	Biological Chemistry الكيمياء البيولوجية	2	1214204
1214589	Chemotherapeutics of Cancer العلاج الكيماوي للسرطان	2	1214302
1217591	Selected Topics -1	2	
1217592	Selected Topics- 2 موضوعات مختارة -2	2	
1215593	Directed Study دراسة موجهة	2	
1214507	Pharmaceutical Microbiology	2	1214101

	علم الاحياء الدقيقة الصيدلاني		
1216595	Drug Design تصميم الدواء	2	1214302
1214590	InVivo and In Vitro Testing of Drugs الفحوصات المختبرية والحيوية للادوية	2	1214302
1215520	Good Manufacturing Practice ممارسات التصنيع الجيدة	2	1215410

Five Years Graduation Plan

First Year:

1st Semester:

Course Number	Title	Credit Hours	Prerequisite
1216110	General Chemistry كيمياء عامة	3	
1216111	General chemistry lab مختبر كيمياء عامة	1	
1214110	General Biology الاحياء العامة	3	
1214111	General Biology Lab مختبر الاحياء العامة	1	
1215110	Introduction to Pharmacy and Pharmaceutical calculations مقدمة في الصيدلة والحسابات الصيدلانية	3	
0400184	English Skills 1	2	
0400101	Arabic Language Skills	2	
	Total Credit Hours	15	

2nd Semester:

Course Number	Title	Credit Hours	Prerequisite
1214121	Anatomy علم التشريح	3	1214110
1215120	Physical Pharmacy صيدلة فيزيائية	3	1216110
1216120	Introduction to Pharmaceutical Organic Chemistry مقدمة في الكيمياء العضوية	2	1216110
1214120	Introduction to Physiology مقدمة في علم وظائف الأعضاء	2	1214110
0400185	English Skill 2	2	0400184
	University requirement	3	
	University requirement	3	
	Total Credit Hours	18	
1st Year Total		33 Credit Hours	

2nd Year:

1st Semester :

Course Number	Title	Credit hours	Prerequisite
1216211	Pharmaceutical Organic Chemistry 1 كيمياء عضوية صيدلانية-1	3	1216120
1216212	Pharmaceutical Organic Chemistry Lab 1 مختبر كيمياء عضوية صيدلانية-1	1	1216111
1214211	Physiology I علم وظائف أعضاء-1	3	1214120 1214121
1214213	Basic Biochemistry كيمياء حيوية اساسية	3	1216110 1214110
1216213	Pharmaceutical Analytical Chemistry كيمياء تحليلية صيدلانية	3	1216110
1216214	Pharmaceutical Analytical Chemistry Lab مخبر كيمياء تحليلية صيدلانية	1	1216111
	University Elective	3	
	Total Credit Hours	17	

2nd Semester:

Course Number	Title	Credit hours	Prerequisite
1216221	Pharmaceutical Organic Chemistry 2 كيمياء عضوية صيدلانية-2	3	1216211
1216222	Pharmaceutical Organic Chemistry Lab 2 مختبر كيمياء عضوية صيدلانية-2	1	1216212
1214221	Physiology 2 علم وظائف الاعضاء-2	2	1214211
1214222	Physiology Lab مختبر علم وظائف الأعضاء	1	1214211
1214225	Pharmacology 1 علم أدوية-1	3	1214213
1214223	Metabolic Biochemistry الكيمياء الحيوية الايضية	3	1214213
1214224	Metabolic Biochemistry Lab مختبر الكيمياء الحيوية الايضية	1	1214213
	Total Credit Hours	14	
2nd Year Total		31 Credit Hours	

3rd Year:

1st Semester:

Course Number	Course Title	Credit Hours	Prerequisite
1214310	Pharmacology 2 علم الادوية-2	3	1214225
1215310	Pharmaceutics 1 مستحضرات صيدلانية-1	3	1215120
1216310	Medicinal Chemistry 1 كيمياء طبية ا	3	1216221
1217310	Applied Biostatistics إحصاء حيوي تطبيقي	2	
1214311	Immunology علم المناعة	2	1214110
	University requirement	2	
	Total Credit Hours	15	

2nd Semester:

Course Number	Course Title	Credit Hours	Prerequisite
1214320	Pharmacology 3 علم الادوية-3	3	1214310
1216320	Medicinal Chemistry 2 كيمياء طبية-2	3	1216310
1215320	Pharmaceutics 2 مستحضرات صيدلانية-2	3	1215310
1215321	Pharmaceutics Lab مستحضرات صيدلانية مختبر	1	1215310
1214321	General Microbiology علم الاحياء الدقيقة العامة	3	1214110
1214322	General Microbiology Lab مختبرعلم الاحياء الدقيقة العامة	1	1214111
	University requirement	2	
	Total Credit Hours	16	
3rd Year Total		31 Credit Hour	

Summer Semester:

Training at a Community or Hospital Pharmacy.

Total Training is for 720 hrs after 3rd & 4th year (360 hrs each year). The training of the student will be evaluated by the training committee assigned by the faculty. Tthe evaluation of the students will be done in 3 exams; the first exam will be after the 3rd year, the second exam after the 4th year, and a comprehensive exam in the 5th year as: (pass or fail).

4th year

1st Semester:

Course Number	Course Title	Credit hours	Prerequisite
1216410	Medicinal Chemistry 3 كيمياء طبية-3	3	1216320
1214410	Pathology علم الامراض	3	1214320
1215410	Industrial Pharmacy صيدلة صناعية	3	1215320
1215411	Industrial Pharmacy Lab مختبر صيدلة صناعية	1	1215321
1214411	Pharmacognosy علم العقاقير	2	
1214412	Clinical Chemistry كيمياء سريرية	3	1214223 1214320
	University elective	3	
	Total Credit Hours	18	

2nd Semester:

Course Number	Course Title	Credit hours	Prerequisite
1216420	Pharmaceutical Instrumental Analysis التحليل الالي الصيدلاني	3	1216213 1215410
1216421	Pharmaceutical Instrumental Analysis Lab مختبر التحليل الالي الصيدلاني	1	1216214
1214422	Introduction to Clinical Pharmacy مقدمة في علم الصيدلة السريرية	2	1214412
1214423	Pharmacokinetics حركية الدواء	3	1214320
1214424	Over the Counter Drugs (OTC) أدوية بدون وصفة طبية	3	1214320
1214425	Research Methodologies طرق البحث العلمي	2	1217310
	University requirement	2	
	Total Credit Hours	16	
4th Year Total		34 Credit Hours	

Summer Semester:

Training at a Community or Hospital Pharmacy.

Total Training is for 720 hrs after 3rd & 4th year (360 hrs each year). The training of the student will be evaluated by the training committee assigned by the faculty. (the evaluation of the students will be done in 3 exams; the first exam will be after the 3rd year, second exam after the 4th year, and a comprehensive exam in the 5th year as: (pass or fail).

5th Year:

1st Semester

Course Number	Course Title	Credit hours	Prerequisite
1216510	Phytochemistry كيمياء العقاقير	2	1216410
1214511	Clinical Pharmacy 1 صيدلة سريرية 1	3	1214412
1215510	Biotechnology and Innovative Therapy تقانة حيوية و علاجات مبتكرة	3	1214320 1214311
1214512	Toxicology علم السموم	2	1214320
1214510	First Aid الاسعافات الاولية	1	
1214513	Clinical Nutrition تغذية سريرية	2	1214412
	Faculty Elective Course	2	
	Faculty Elective Course	2	
	Total Credit Hours	17	

2nd Semester:

Course Number	Course Title	Credit hours	Prerequisite
1214520	Clinical Pharmacy 2 صيدلة سريرية	3	1214511
1217521	Pharmacy Legislation and Ethics الاخلاقيات والتشريعات الصيدلانية	1	1214320
	Faculty Elective Course مساق اختياري	2	
1217520	Pharmacy Management and Marketing الإدارة الصيدلانية والتسويق	2	1214424
1217522	Seminar (Graduation Project) مشروع التخرج/ ندوة	1	
1215521	Pharmacy Training تدريب عملي	1	1214320 1215320
	Total Credit Hours	10	
5th Year Total		27 Credit Hours	

Course Descriptions

General Chemistry (3 credit hours) (1216110)

This course carries 3 credit hours. It is a comprehensive survey of chemistry offered for pharmacy students that emphasize the principles underlying the formation and interaction of chemical substances: stoichiometry, types of chemical reactions, thermochemistry, atomic and molecular structure, solutions, thermodynamics, oxidation-reduction reactions and chemical

Bonding.

General Chemistry lab (3 credit hours) (1216111)

The general chemistry lab focus on many key concepts: The course allows students to gain familiarity with laboratory techniques and apparatus, the experiments should challenge the student to think independently about chemistry both in the lab setting and in the world environment, the experiments should support and expand upon the material that is being covered in the classroom and to apply their knowledge of concepts from CHEM 1216100 course in an actual laboratory situation, the experiments should build the student's skills in basic chemistry techniques. All students must complete mandatory safety training to participate in the course, this training is provided at the first-class meeting.

General Biology (3 credit hours) (1214110)

This is an elementary course in general biology and biology of the cell. The course designed for

first year pharmacy students in order to provide an understanding of basic biological principles,

cell biology and molecular biology. The aim of this course is to provide the student with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology and to understand the applications of science biology. As an introductory course, it is expected to develop the problem solving and critical thinking skills needed by the student to assess and solve biologically based questions.

General Biology Lab (1 credit hours) (1214111)

The general biology Lab includes Introduction to Laboratory apparatus/reagents and laboratory safely measures; Usage/care of microscope; preparation of microscopic slides, demonstration of diffusion and osmosis/gaseous exchange experiments. Observation of cells and tissues of selected animal species. Investigations on physiological processes affecting biological reactions. Observation of mitosis in onion bulb. Observation of bacterial cells.

Introduction to Pharmaceutical Organic Chemistry (2 credit hours) (1216120)

The course provides students with basic knowledge in organic chemistry. The course includes terminology methods, the properties and important reactions of families with the following functional groups: alkanes, alkenes and Alkynes, Halo-alkanes and radicals. In addition, the course covers conformers, stereoisomers and focuses on the stereochemistry of the reactions.

Introduction to Physiology (2 credit hours) (1214120)

An introductory overview of some basic principles and mechanisms applicable to the function

of all individual body systems. Cellular physiology and the mechanism of action of excitable tissues. Action potential in nerve and muscles and the coupling between electrical and mechanical activities. In addition to functional organization of human body. And main principles in physiology of autonomic system.

Anatomy (3 Credit Hours) (1214121) , Prerequisite is (1214110)

The course will introduce pharmacy students to basics in anatomy. This course covers a study of the gross anatomical structure of the human body, by means of complete dissection supplemented by lectures and the study of cross sections. Covers the main structures of the thoracic, abdominal and pelvic cavities and correlation to their function.

Pharmaceutical Organic Chemistry 1 (3 Credit Hours) (1216211)

The course aims to give the pharmacy student the essential knowledge in the chemistry of organic compound and functional groups to help him understand the structure and reactivity

of chemical entities mainly those used as pharmaceuticals and drugs and the importance of organic compounds in pharmacy- in relation to drug action and toxicity. The course will concentrate on atomic and molecular structure and bonding and the fundamentals of stereochemistry and their significance to pharmacy- in relation to drug action and toxicity. The chemistry of aliphatic compounds cyclic and alicyclic, saturated and unsaturated alkyl halides, nucleophilic substitution mechanisms, hydroxyl functional group and its reactivity, delocalization and conjugation, elimination and addition reactions, formation and reactions of enols and enolates are to be covered. The course will concentrate at organic reactions and their applications to drug discovery and development.

كيمياء عضوية صيدلانية-1 (1216211)

يهدف المساق إلى إعطاء طالب الصيدلة المعرفة الأساسية في كيمياء المركبات العضوية والمجموعات الوظيفية لمساعدته على فهم بنية و تفاعل الكيانات الكيميائية بشكل رئيسي تلك المستخدمة كمستحضرات صيدلانية وأدائية وأهمية المركبات العضوية في الصيدلة - فيما يتعلق بعمل الدواء والسمية. وسوف تركز الدورة على التركيب الذري والجزيئي والترابط وأساسيات الكيمياء المجسمة وأهميتها للصيدلة - فيما يتعلق بعمل الأدوية والسمية. الكيمياء من المركبات الأليفية دوري و alicyclic, المشبعة وغير المشبعة الهيليات الألكيل, آليات استبدال النيوكليوسفيلي, مجموعة الهيدروكسيل الوظيفية وتفاعلاتها, delocalization والمصاحبة, القضاء وإضافة ردود الفعل, تشكيل وردود الفعل من enols وenolates هي التي يجب تغطيتها. سوف تركز الدورة على التفاعلات العضوية وتطبيقاتها لاكتشاف المخدرات وتطويرها.

Pharmaceutical Organic Chemistry 2 (3 Credit Hours) (1216221)

The major topics will include the concept of aromaticity and anti-aromatic structures, reactivity of benzene nucleus-mechanism of aromatic electrophilic substitution, and the effect on reactivity and orientation of ring substituents and their pharmaceutical importance. Acidity of organic molecules, the chemistry of carbonyl group (ketones, aldehydes, carboxylic acid), and its role in biologically active molecules. The chemistry of the amino group and the basicity of organic compounds, followed by the amino acids and peptides chemistry will be addressed. Since heterocyclic systems are key components in drugs and pharmaceuticals, heterocyclic compounds (saturated and unsaturated) carbohydrates,

nucleosides, nucleotides and nucleic acids will be dealt with extensively. Spectral methods (IR, UV-VIS, NMR, and MS) used for analyzing and structural identification of pharmaceuticals and drugs.

كيمياء عضوية صيدلانية-2 (4 ساعات معتمدة) رقم(1216221)

سوف تشمل المواضيع الرئيسية مفهوم العطرية والهياكل المضادة للاعات العطرية، والتفاعل من نواة البنزين آلية استبدال الكهروفيلي العطرية، وتأثير على التفاعل والتوجه من دون الباطنة حلقة وأهميتها الصيدلانية. حموضة الجزيئات العضوية، وكيمياء مجموعة الكربونيل (الكيتونات، الألدهيد، حمض الكربوكسيليك)، ودورها في الجزيئات النشطة بيولوجيا. سيتم تناول كيمياء المجموعة الأمينية وأساسيات المركبات العضوية، تليها الأحماض الأمينية وكيمياء الببتيدات. منذ النظم غير الهوائية هي المكونات الرئيسية في الأدوية والمستحضرات الصيدلانية، سيتم التعامل مع المركبات غير المعالجة (المشبعة وغير المشبعة) الكربوهيدرات، النيوكليوسيدات، النيوكليوتيدات والأحماض النووية على نطاق واسع. التفاعلات العضوية وتطبيقاتها لاكتشاف المخدرات والتنمية. طرق) spectralالأشعة تحت الحمراء، الأشعة فوق البنفسجيةVIS- ، NMR، و (MSالمستخدمة لتحليل و liden الهيكلية...

Pharmaceutical Organic Chemistry Lab 1 (1 Credit Hour) (1216212)

This laboratory will give the pharmacy students the principles of organic chemistry techniques which include physical tests: melting point, boiling point, solubility, recrystallization, refractive index, surface tension and specific angle of rotation for optically active drugs. Also, this course includes the Isolation of drugs from their natural sources, by means of extraction, steam distillation, chromatography…est. In addition to all the above techniques identification of alcohols, synthesis of some alkyl halides and alkenes will be carried out.

مختبر الكيمياء العضوية الصيدلانية. 1: (1 ساعة معتمدة) (1216219) سيعطي هذا المختبر طلاب الصيدلة مبادئ تقنيات الكيمياء العضوية التي تشمل الاختبارات الفيزيائية: نقطة الذوبان، نقطة الغليان، القابلية للذوبان، التبلور، مؤشر الانكسار، التوتر السطحي وزاوية دوران محددة للعقاقير النشطة بصرياً. كما أن هذه الدورة تتضمن عزل الأدوية عن مصادرها الطبيعية، عن طريق الاستخراج، والتقطير بالبخار، والكروماتوغرافيا... مؤسسه. بالإضافة إلى كل التقنيات المذكورة أعلاه تحديد halides الكحول ق, سيتم تنفيذ تخليق بعض.
.الألكيل والأليكينات

Pharmaceutical Organic Chemistry Lab 2 (1 Credit Hour) (1216222)

Upon completing this laboratory, pharmacy students will be able to identify drugs by systematic identification through: a. Chemical tests that identify the different functional groups of organic compounds. b. Spectroscopy (FT-IR, UV-VIS, NMR)

Also in this laboratory the students will prepare some popular drugs such as: Aspirin, Wintergreen, Urotropine, Paracetamol, Phenacetin, p-methyl acetophenone (sun protector) and Sulfanilamide antibiotics.

مختبر الكيمياء العضوية الصيدلانية. 2: (1 ساعة معتمدة) (1216220)

عند الانتهاء من هذا المختبر، يكون طالب الصيدلة قادر على تحديد الأدوية عن طريق تحديد منهجي من خلال:

أ. الاختبارات الكيميائية التي تحدد المجموعات الوظيفية المختلفة من المركبات العضوية.

ب. التحليل الطيفي (FT-IR, UV-VIS, NMR) أيضا في هذا المختبر, الطلاب سوف تعد بعض الأدوية الشعبية مثل: الأسبرين, Wintergreen, Urotropine, باراسيتامول, فيناسيتين-p, ميثيلاتتيبولينون (حامية الشمس) والمضادات الحيوية السلفايلاميد.

Physical Pharmacy (3 Credit Hours) (1215120)

The course will introduce pharmacy students to principals of physical chemistry and its application in pharmaceutical sciences. The course will help the student in acquiring essential knowledge in order to predict the stability, solubility, compatibility and the biological action of drug products. Topics that will be covered include: An introduction to dimensions and units, some basic elements of mathematics, statistical methods and the analysis of error, precision and accuracy. States of matter, binding forces between molecules, gaseous, liquid and solid crystalline states, phase equilibrium and the phase rule determination of physical properties of molecules. Thermodynamics. Equilibrium phenomena, nonelectrolytes, solutions of electrolytes, buffered and isotonic solutions, ionic equilibrium, electromotive force and oxidation-reduction, solubility and distribution phenomena.

الصيدلة الفيزيائية (3 ساعات معتمدة) (1215120) هذا المساق سوف يعرض لطلاب الصيدلة اساسيات

الكيمياء الفيزيائية وتطبيقها في العلوم الصيدلانية. والتي بطبيعة الحال سوف تساعد الطالب في اكتساب المعرفة الأساسية من أجل التنبؤ بالثباتية والقابلية للذوبان والتوافق وكيفية عمل المنتجات البيولوجية والأدوية. وتشمل المواضيع التي سيتم تغطيتها: مقدمة للأبعاد والوحدات، وبعض العناصر الأساسية للرياضيات، والأساليب الإحصائية وتحليل الخطأ والدقة والدقة. الدول من المادة، والقوى ملزمة بين الجزيئات، الغازية، والدول البلورية السائلة والصلبة، ومرحلة التوازن وتحديد قاعدة المرحلة من الخصائص الفيزيائية للجزيئات. الديناميكا الحراريه. ظواهر التوازن، و nonelectrolytes، والسوائل المخزنة والسوائل متساوي التوتر، الأيونية قوة توازن الكهربائية، والأكسدة والاختزال والذوبان في ظاهر الامتصاص والتوزيع.

Introduction to Pharmacy and Pharmaceutical Calculations: (3 Credit Hours) (1215110)

An introduction and overview of the profession of pharmacy., discussion of career opportunities and the skills involved in providing efficient pharmaceutical care. The course introduces the student to some basic medical terminology, abbreviations, history of pharmacy, reading and interpreting prescriptions, use of standard references as well as performing calculations based on individual patient needs, dosage forms, communication skills and sources of information

الصيدلة الفيزيائية-2 (2 ساعة معتمدة) (1215110)

يهدف هذا المساق الى تطبيق المبادئ الكيميائية والفيزيائية في تصميم نظم توصيل الدواء لتقديم الأدوية وفهم حركية الدواء وسوف تشمل المواضيع الظاهر الحركية، ونشرها، نشر الدواء وتخللها من خلال الأغشية وتقييم انتشار الأدوية وامتصاصها وتخللها البيولوجية، وانظلاق الأدوية وقانون Fick's وأساليب وأجهزة اختبار الذوبان بينية الظاهر واجهات السوائل وتطبيق على المواد السطحية النشطة تبددات الخشنة والغرويات اليرولوجيا ونظم Newtonian thixotropy وتحديد خصائص rheologic.

Pharmaceutical Analytical Chemistry (3 Credit Hours) (1216213)

This course deals with the classic analytical methods of analysis that are applied to pharmaceutical compounds covering theory, chemical principals and calculations. In

addition, this course familiarizes students with qualitative and quantitative methods of analysis, including different types of titrimetric analysis and their application for analysis of pharmaceutical preparations.

الكيمياء التحليلية الصيدلانية (3 ساعات الائتمان) (1216213)

يتناول هذا المساق الأساليب التحليلية الكلاسيكية للتحليل التي يتم تطبيقها على المركبات الدوائية التي تغطي المبادىء النظرية الكيميائية. بالإضافة إلى ذلك، يتعرف هذا المساق الطلاب على طرق التحليل النوعية والكمية، بما في ذلك الأنواع المختلفة من التحليلات التيتريمترية وتطبيقها لتحليل المستحضرات الصيدلانية.

Pharmaceutical Analytical Chemistry Lab (1 Credit Hour) (1216214)

This course train students on qualitative and quantitative methods of analysis, including different types of titrimetric analysis and their application for analysis f pharmaceuticals. Experiments include neutralization titration of strong and weak acidic and basic drugs, non-aqueous titration, argentometric titration, complexiметric titration, redox titration, iodometric titration and Karl Fisher titration.

Physiology 1 (3 Credit Hours) (1214211)

This course provides students with basic physiological mechanisms. In addition to basic aspects of medical physiology related to the pulmonary cardiovascular and gastrointestinal systems. Special emphasis will be on the neuronal and hormonal control of the related organs, and on body responses and adaptation to various stress conditions and physiological disorders.

Physiology 2 (3 Credit Hours) (1214221)

This course provides students with basic physiological mechanisms. In addition to basic aspects

of medical physiology related to the Respiratory and Central nervous Systems. Special emphasis will be on the Renal (excretory) system. The reproductive system will also be

included with special consideration body responses and adaptation to various stress conditions and physiological disorders. In addition a Physiology Lab which will include 6 experiments related to general physiology with emphasis on pulmonary, cardiovascular and gastrointestinal systems.

Physiology Lab (1 Credit Hours) (1214222)

The Lab will focus on experiments in basic physiological parameters, stages of anesthesia & dissection of living rat, respiratory volumes and gases, effect of hypoxia, hypercapnia, and asthma on maximum breathing capacity and respiratory volumes, effect of changes in position, cold and hot pressor on blood pressure, heart rate
and heart sounds, and ECG measurements, and hematological tests

Basic Biochemistry (3 Credit Hours) (1214213)

This course is designed to provide an understanding of the structure of the chemical components of living matter. The course will cover the four major classes of biological molecules: proteins, carbohydrates, lipids, and nucleic acids.
Emphasis will be on the chemical properties and three-dimensional structure of these molecules in relationship to their biological function. Principles of bioenergetics, the mechanisms of enzyme action, enzyme kinetics, and the control mechanisms which regulate enzymatic reactions will be discussed.

Metabolic Biochemistry (3 Credit Hours) (1214223)

This course will examine the metabolic pathways and regulatory processes occurring in biological systems and to develop an understanding of some of the sophisticated levels of control within and between metabolic pathways.

Metabolic Biochemistry lab (1 Credit hour) (1214224)

This course Includes 11 laboratory experiments in both basic and metabolic biochemistry. It includes basic skills in the practical work in biochemistry such as basic measurements, weighing, volumetric measurements, pH measurement, Pipetting and dilutions, buffers and buffer preparation and molar solutions preparations. The student will learn the basics of

spectrophotometery, measurements in enzyme kinetics, electrophoresis, blood chemistry, carbohydrates, proteins and DNA chemistry.

Basic Immunology (2 Credit Hours) (1214311)

This course deals with basic principles of immunology and their use to understand the cause of immunological and inflammatory diseases and the basis of immunoprophylaxis and immunotherapy. A brief discussion of the application of genomics to future drug development is included.

Pharmacognosy (2 Credit Hours) (1214411)

This course is concerned with the study of drugs from plants. It covers the anatomical structure of plant cells and plant tissue organs, structure development, theory and practice of classification, speciation and environmental variations. Knowledge about the morphological, histological, and other characteristics of the crude drug and its uses is provided.

General Microbiology (3 Credit Hours) (1214321)

A general microbiology course to acquaint students with microorganisms and their activities. Microbial cell structure and function, metabolism, microbial genetics, and the role of microorganisms in disease, immunity, and other selected applied areas will be covered.

The practical part covers a variety of microbiological techniques and experiments to illustrate the major concepts covered.

General Microbiology Lab (1 Credit Hours) (1214322)

The course will train our pharmacy students on the microscope & general laboratory principles and biosafety, preparation of bacteriologic media, environmental plate for growth of bacteria, physical and chemical effects on bacterial growth, isolation of bacteria (Streaking plating), the Gram stain/ The acid fast stain, growth characteristics of bacteria, antibiotic sensitivity testing, lactobacillus activity in saliva, and enzyme linked immunosorbent assay

Applied Biostatistics (2 credit hours) (1217310)

The objective of this course is to provide students with an understanding of basic concepts of data analysis and statistical inference in the medical and health science. The course will make use of case studies and examples drawn from the biomedical and health sciences literature. The major areas covered are: Data description and exploratory data analysis, Describe probability normal and discreet distribution, Inference from two samples, Hypothesis testing Correlations and regressions and Surveys and study designs.

Pharmaceutics 1 (3 Credit Hours) (1215310)

The application of physical and chemical principles in the design, manufacture, and evaluation of different pharmaceutical dosage forms. The course will cover pre-formulation studies, and formulation of liquid and solid dosage forms.

Pharmaceutics 2 (3 Credit Hours) (1215320)

A continuation of pharmaceutics I, the application of physical and chemical principles in the preparation of powders, colloids, suspensions, emulsions, solids and topical dosage forms and the formulation factors affecting drug availability.

Pharmaceutics Lab (1 Credit Hour) (1215321)

The laboratory is designed to allow the student to apply pharmaceutical principles and to develop proficiency when compounding selected formulations as syrups, elixirs, lotions, emulsions, creams, ointments, capsules, and suppositories encountered in Community and Hospital Pharmacies.

First Aid (1 Credit Hour) (1214510)

Basic medical assessment and procedures followed in cases of emergency medical situation and minor injuries.

Pathology (3 Credit Hour) (1214410)

This course focuses on the disease processes and mechanisms of tissue injury to organ systems during selected disease states. Emphasis is placed on the specific alterations,

derangements and mechanisms, which disrupt normal physiology. Various disorders of the Cardiovascular, Respiratory, Renal, Endocrine and Central Nervous System are presented to provide the students with the rationale for drug therapy.

Pharmacology 1 (3 Credit Hours) (1214225)

This course deals with fundamental principles of pharmacology such as pharmacokinetics and pharmacodynamics. It discusses; principles of drug therapy, Drug- Drug interactions, the autonomic nervous system, cholinergic agonists, cholinergic antagonists, adrenergic agonists, adrenergic antagonists, potential therapeutic uses of Dopamine agonists and antagonists, serotonin receptors agonists and antagonists, antihypertensive drugs, and diuretics

Pharmacology 2 (3 Credit Hours) (1214310)

A continuation of pharmacology1, the topics to be covered; Angina and Congestive heart failure, Arrhythmia and Dyslipidemia, Anticoagulants, Drugs for treatment of anemia, Asthma and COPD, Antihistamines, Cough and Common Cold, GI: diarrhea, Emesis, constipation hyperacidity, Pain management, Anti-inflammatory drugs and DMARDs, Endocrine- Hypothalamus and pituitary, Endocrine- thyroid and parathyroid
Endocrine- diabetes and adrenal, Endocrine- Estrogens and androgens, Drugs for obesity
Drugs for bone disorders

Pharmacology 3 (3 Credit Hours) (1214320)

This course will be a continuation for Pharmacology 1 and 2. The course will cover the following topics; CNS: Opioid Analgesics and Antagonists, CNS: Drugs for neurodegenerative diseases, (Parkinson and Alzheimer), CNS: Antidepressants, CNS: Anxiolytic and Hypnotics, CNS: Drugs for epilepsy, CNS: Antipsychotic drugs and CNS stimulants, CNS: Anesthetics, Principles for Antimicrobial therapy, Anti-bacterial- cell wall inhibitors, Anti-bacterial- Protein synthesis inhibitors, Anti-bacterial- DNA synthesis inhibitors, Anti-viral and anti-fungal drugs, Anthelmintic Drugs, Anti-mycobacterial drugs, Cancer chemotherapy, Drugs for dermatologic disorders, Immunosuppressant drugs

Medicinal chemistry 1 (3 Credit Hours) (1216310)

Introduction to the concepts required to understand drugs as organic chemicals whose biological activities are derived from their chemical structures, physicochemical properties, and metabolic pathways. The course continues with a discussion of specific drug classes by covering the chemistry and mechanism of action of drugs affecting the Peripheral and Central Nervous systems.

Medicinal chemistry 2 (3 Credit Hours) (1216320)

Continuation of Medicinal chemistry-1. Chemical and Biochemical principles governing the properties of other drug classes including Cardiovascular agents, Diuretics, Hormones, Antiinflammatory drugs, Steroids, Antidiabetics, and Chemotherapeutics.

Medicinal chemistry 3 (3 Credit Hours) (1216410)

Continuation of Medicinal chemistry-2. Deals primarily with Antibiotics, Antifungals, Antimycotics, and Antivirals. Elements of biotechnology will be introduced.

Phytochemistry (2 credit hours) (1216510)

Selected biosynthetic pathways of the main active secondary metabolites, typical automated extraction methodologies and scaling up techniques will be discussed. Case studies of how to characterize selected pure isolated active ingredient using spectroscopic techniques and how to multistep synthesize them in the laboratory will be exercised.

Pharmacokinetics (3 Credit Hours) (1214423)

Study of the time course of drug absorption, distribution, elimination, and drug accumulation. Concepts of Clearance, Half Life, and Volume of Distribution after single and multiple oral and intravenous dosing regimens are covered.

Industrial Pharmacy (3 Credit Hours) (1215410)

The technology and processes of manufacturing drug products. Unit operations including drying, mixing, and filtrations. Tableting and tablet coating, capsules and micro encapsulation techniques are presented.

Industrial Pharmacy Lab (1 Credit Hours) (1215411)

This is the practical part of the Industrial pharmacy course. It includes practical application of unit processes in mixing, granulation, tablet coating, capsule filling, and aspects of quality control.

Pharmaceutical Instrumental Analysis (3 Credit Hours) (1216420)

This course includes the principals and applications of the instrumental techniques used for the separation, identification, and determination of pharmaceutical products. The chromatographic methods include HPLC, LC/MS, GC, GC/MS, HS-GC/MS, and CE. Spectroscopic methods include UV visible, fluorescence, FT-IR, NIR, MS, AA, flame emission and ICP. Topics such as extraction of pharmaceuticals, analytical method validation according to FDA, ICH will also be discussed.

Pharmaceutical Instrumental Analysis Lab (1 Credit Hour) (1216421)

This practical course provides the students with the experience of applying the instrumental techniques for the quantitative determination of pharmaceutical products. Selected experiments involve HPLC-PDA, FT-IR, UV visible, polarometry, GC-FID, HS-GC/MS, AA/ICP, and flame photometric analysis.

Research methodologies (2 credit hours) (1214425)

The course is designed to provide students with substantive and fundamental knowledge required to conduct research in health sciences. The course equips students with skills necessary for the planning and execution of their research projects, and critically appraising published papers, being aware of problems of design, analysis and interpretation, statistical concepts and analytical methods, ethical issues and consent form, principals of conducting

clinical trials, and scientific writing.

Clinical Chemistry (3 Credit Hours) (1214412)

A lecture laboratory course, which examines the clinical diagnostic tests with regard to the chemical, and biochemical rationale of the testing method. Interpretation of the results of the most commonly used laboratory tests and the major factors influencing test values with special emphasis on the effects of medication. Clinical Laboratory data from patients and the use of some of the available kits will be considered.

Introduction to Clinical Pharmacy (2 Credit hours) (1214422)

The course includes working methods and tools for clinical pharmaceutical work. The student

works with and discuss patient cases with a focus on drug-related problems. Practice is carried

out within the patient care which includes patient care process, pharmacotherapy workup, Collect subjective and objective data, Assess and Plan (SOAP). During the course, the student may also train: - the ability to identify drug related problems, handle medication safely, and reduce medication errors, communicate with patients, physicians and other health-care personnel – the ability to assess the need of drug-related information to patients physicians and other health-care personnel - the ability to search, sort and review scientific literature critically - oral presentation - decision making - independent thinking

Clinical pharmacy 1 (3 Credit Hours) (1214511)

The purpose of this course is to provide didactic framework for the therapeutic management of a number of common diseases. Cardiovascular, respiratory, endocrine and gastrointestinal system disorders The goals of the course are that, coupled with other courses in pathophysiology, pharmacology, pharmacokinetics, and others, the student will be able to develop rational drug therapy plans for patients with common diseases, develop plans for monitoring pharmacotherapy in patients, and identify conditions associated with these common diseases which require referral

Clinical pharmacy 2 (3 Credit Hours) (1214520)

This course continues from clinical pharmacy I, introduces the clinical use of medication in the prevention & treatment of disease and serves as a foundation for the delivery of pharmaceutical care for Rheumatologic Psychiatric Neurologic Oncologic Infectious Diseases . Clinical pharmacy 2 serves the needs of all future pharmacists by focusing on core chronic disease states with an emphasis on outpatient management.

Clinical Nutrition (2 Credit Hours) (1214513)

This course deals with the foundations of the science of nutrition with emphasis on the nutritional aspects of carbohydrates, lipids, proteins, vitamins, electrolytes and trace elements. Consideration of specific nutritional issues associated with Endocrine, Cardiovascular, Gastrointestinal, Metabolic, Renal and Neoplastic disease states. The role of the pharmacist as a specialist in drug nutrition interactions will be emphasized.

OTC Drugs (3 Credit Hours) (1214424)

A study of various nonprescription medications, herbs, vitamins, homeopathic products, medical and Para pharmaceutical devices found in pharmacies and used by patients for self treatment and disease monitoring. The rational use and therapeutic efficacy of such medications in common illnesses as cough and cold, dermatological and gastrointestinal disorders, pregnancy and analgesia among others is presented.

Toxicology (2 Credit Hours) (1214512)

This course discusses the general principles of toxicology, definitions and types of toxic and poisonous materials. It also deals with the diagnosis, treatment, and management of accidental poisoning from drug over dosage, toxic household products, poisonous plants, venomous animals, industrial and environmental toxicants.

Pharmacy Legislation and Ethics (1 Credit Hour) (1217520)

Presentation and discussion of the legal principles and laws that affect the practice, of pharmacy in community and institutional settings. Legal concepts covering professionalism,

negligence, and liabilities are presented and discussed. This course is also devoted to teach future pharmacists the skills they will need to effectively communicate with, teach and counsel patients about their medications and health. It will provide examples on patient's privacy and professional ethics

Pharmacy Management and Marketing (2 Credit Hours) (1217520)

An overview of A) the principles, practices of administration, operation, and communication applicable to the practice of pharmacy in the community, hospitals, and other health services institutions with special focus on technologies and software applied in pharmaceutical approaches, B) Marketing aspects of Pharmacy

Biotechnology and Innovative therapy (3 credit hours) (1215510)

This course is designed to acquaint students with the field of biotechnology. Topics will include a history of the biopharmaceutical industry, protein structure, protein production, protein and DNA isolation, analysis and purification, DNA sequencing, SDS-PAGE, southern and western plotting, ELISA, biotechnologically developed drugs, recombinant DNA basics, genetic engineering, monoclonal antibodies, gene delivery (viral and non viral vectors), gene gun, bioreactors, formulation of proteins and peptides, polymeric systems for oral and peptide delivery, vaccines. Moreover, innovative and modern therapies and treatments will be survived.

Seminar (Graduation Project) (1 Credit Hour) (1217522)

The course will be organized by a faculty member but the whole faculty will participate. Students in their 5th year will be divided into sub-groups and given the opportunity to select a certain topic from a list prepared by each subgroup's adviser. Each student will prepare and deliver a 20-30 minutes presentation that includes title, aims, introduction, recent data available in the literature and conclusions. The presentation will be followed by a discussion (5-10 minutes) that students and faculty members will take part in. The student will submit a written report to his adviser.

Faculty Elective Courses :-

Clinical Pharmacokinetics (2 Credit Hours) (1214581)

Basic pharmacokinetics concepts of drug disposition and response kinetics. The application of these concepts to the clinical setting in monitoring and optimizing specific drug therapies. Emphasis is on learning how to interpret patient specific drug concentration time data.

Drug Metabolism and Disposition (2 Credit Hours) (1214582)

The biotransformation of drugs and other Xenobiotics is considered. Emphasis is placed on substances that are of therapeutic importance. Consideration of the biochemical mecharisms for these biotransformation, variability, active metabolites and their toxicity, pharmacogenetics, in vitro systems, in vivo methods, and inducers of CYP 450 isozymes are covered.

Drug Discovery and Drug Development (2 Credit Hours) (1214583)

A study of the design and discovery of new drugs. Overview of the various traditional and modern approaches and steps that lead to the introduction of new pharmacological agents including the scientific approaches to rational drug design, preclinical evaluations, clinical trials, and regulatory affairs considerations.

Perfumes and Cosmetics (2 Credit Hours) (1215584)

This course deals with basics of cosmetic preparations, characteristics of the materials used, formulae, their effectiveness, and method of preparation.

Biological Chemistry (2 Credit Hours) (1216585)

The course will cover advanced issues related to biological chemistry including structure, folding, function, reactivity and catalysis of biomolecules (proteins, nucleic acids and carbohydrates). Topics include protein and nucleic acid folding, energetics of macromolecular interactions (kinetics and thermodynamics), and mechanistic enzymology.

The folding-function relationship, transition state theory of the enzymatic process will be reviewed as introduction to the directed evolution, RNA aptamers and catalysts. Biophysical methods used in studying biological macromolecular processes such as protein-protein, protein-RNA and DNA-DNA and protein-DNA interaction (X-ray, NMR, flourimetry, calorimetry and mass spectrometry). These issues will addressed in order to understand the structure-folding-conformation and function of macromolecules aiming to design and develop biologically active compounds such specific protein-, DNA- and RNA-binding or cleaving agents.

Chemotherapeutics of Cancer (2 Credit Hours) (1214589)

This course is designed for the pharmacy undergraduate student or medical professional that is interested in the principles of cancer chemotherapy. Initial lectures are focused on the nature of the cancer, describing the genetic, biochemical and pathological changes in cancer cells. Following these introductory sessions the majority of the course is dedicated to reviewing the biochemistry, molecular pharmacology and therapeutic properties of the anticancer and chemotherapeutic agents. These include DNA reactive agents, antimetabolites, intercalators, DNA cutters, alkylating agents, antimitotics, cytoskeletal poisons, cell cycle inhibitors, hormones, molecular targeted agents and biological modifiers.

Selected Topic 1 (2 Credit Hours) (1217591) and Selected Topic 2: (3 Credit Hours) (1217592)

These courses are designed based on the interest of the students and expertise of the faculty members to broaden the knowledge of the students in a selected advanced topic from the field of pharmaceutical sciences. Enrollment requires prior approval by the Faculty. The course numbering (1 or 2) will depend on whether the two courses can be registered in the same semester.

Directed Study (2 Credit Hours) (1215593)

This course requires the completion of a research project supervised by one of the faculty members in pharmacy practice, pharmaceutics, medicinal chemistry or pharmacology. A written report and a presentation dealing with the results obtained, is required.

Enrollment requires prior approval of the Instructor.

Drug Design (2 Credit Hours) (1216595)

This course focuses on the principles of computational drug design. This course presents an introduction to the applications of drug design and "virtual screening" of bioactive compounds. General topics that will be covered in this course include an overview of the molecular modeling, molecular descriptor, and conformational search of small chemical compounds with major focus on the traditional quantitative structure activity relationships (QSAR). Students will have the opportunity to learn to use several software packages for molecular modeling and drug design. They are expected to complete a semester project that focuses upon the advanced use of the computational resources to the specific problems in drug design.

InVivo and *In Vitro* testing of Drugs (2 credit hours, 1 theoretic + 1 lab) (1214590)

This course deals with the evaluation of the biological effects of drugs and other bio-active substances. The student will be enlightened with the *in vitro* methods for the examination of the effect of drugs and other bio-active chemical on cells and tissues, and also with the in vivo testing in laboratory animals. The course will cover cellular and animal models used in current medical and pharmaceutical research for the development of new drugs. In the laboratory students will apply the methods they learned in the theoretical part on laboratory animals and on extracted tissues and cells.

Pharmaceutical Microbiology (2 Credit Hour) (1214507)

This course concentrates on medical microbiology and provides core knowledge of infectious disease processes affecting each organ system, as well as working knowledge of the appropriate clinical laboratory investigations.

Good Manufacturing Practice (2 Credit Hours) (1215520)

The course will cover : an introduction to GMP, the history of GMP, licenses for medicines and GMP enforcement, GMP in the Product Lifecycle, the legal status of GMP, the structure of the EU Guide to GMP / The UK Orange Guide, duties of key personnel and departments, the role of Production, quality control (QC), quality assurance (QA) and the Qualified Person (QP), the principle GMP requirements for documentation and records, GMP in the workplace, GMP and documentation, people training and hygiene, data integrity, dealing with problems and root-cause analysis