

Jordan University of Science and Technology
Faculty of Pharmacy
Bachelor of Pharmacy Curriculum

The bachelor of pharmacy degree is awarded by the Faculty of Pharmacy at the Jordan University of Science and Technology after successfully completing (162) credit hours and after the completion of the training requirements according to the following conditions:

Firstly: Complying with the regulations of granting the Bachelor degree No. 1 of the year 1987 at the Jordan University of Science and Technology that was issued by the Dean's Council according to the Bylaws of Granting the Scientific Degrees and Certificates.

Secondly: The completion of the required credit hours to obtain bachelor of pharmacy degree, which are distributed as shown in Table 1:

Table 1:

Requirments	Core credits	Elective credits	Total
University requirements	16	9	25
Faculty requirements	84	9	99
Program requirements	44	--	38
Total	144	18	162

A. University requirements: 25 credit hours are allocated, and they include:

- Obligatory requirements:** Mandatory for all university students and include (16) credit hours as shown in Table 2:

Table 2:

Course Code	Course Title	Credit Hours	Weekly Hours		Pre-requisite
			Theortical	Practical	
ARB101	Arabic Language	3	3	--	--
ARB103	Applied Arabic Language Studies	1	1	--	--
MS100	Military Sciences [±]	3	3	--	--
ENG111	English Language 1 ^s	3	3	--	ENG099
ENG112	English Language 2	3	3	--	ENG111 or scoring 80% or more in the English Language Level Exam
CI100	Computer Skills*	3	2	1	--
	Total	16	15	1	

[‡]Military Sciences course is requested only from Jordanian students as a pass or fail course. Students graduated from The Royal Military College and other equivalent centers and colleges are exempted from taking this course. Non-Jordanian students have to register for an alternative course that is chosen from the list of university elective courses; grades for this course will be calculated in the overall accumulative average of the student.

[§]This course will be waived for students who score 80% or more in the English Language Level Exam.

* This course will be waived for students who score 50% or more in the Computer Skills Level Exam.

Note: non-Native Arabic speakers have to take two courses in the Arabic Language as alternatives to ARB101 and ARB103 as shown in Table 3

Table 3:

Course Code	Course Title	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
ARB101A	Arabic Language for non-Native Speakers	3	3	--	--
ARB103A	Applied Arabic Language Studies for non-Native Speakers	1	1	--	--

- Elective requirements:** (9) credit hours are allocated and selected from the university list of electives as shown in Table 4.

Table 4:

Course Code	Course Title	Credit Hours
HSS112	Hadith Sharif	3
HSS113	Aqeeda	3
HSS114	Fiqh	3
HSS115	Islam and Contemporary Issues	3
HSS116	Economic System in Islam	3
HSS121	Principles of Sociology	3
HSS126	Principles of Psychology	3
HSS127	Education Technology	3
HSS128	National Education	3
HSS131	Islamic Civilization	3
HSS132	History of The City of Jerusalem	3
HSS133	Civilization and Contemporary Cultures	3
HSS141	Introduction to Economics (for non-Computer Information Systems students)	3
HSS142	Libraries and Information Research	3
HSS151	Introduction to Management Sciences (for non-Computer Information Systems students)	3
HSS161	Contemporary Issues	3
HSS166	Human and Science	3

HSS182	Woman Studies	3
HSS212	Arab Society	3
HSS213	Individual and Society	3
HSS216	Contemporary Global Issues	3
HSS222	Creativity and Problem Solving	3
HSS223	Leadership and Communication Skills	3
HSS241	Economy of the Third World	3
HSS242	Information and Research	3
HSS211	Principles of Sociology (in English)	3
HSS221	Principles of Psychology (in English)	3
HSS231	History of Sciences in Islam	3
HSS429	The Science of Behavior and Interaction with Children	
ES103	Environmental Protection (for non-Environmental sciences students)	3
NUR100	Health Promotion	3
ADS100	Oral and Dental Health	3
PH104	Human Health and Nutrition (for non-Medicine and Nursing students)	3
VM211	Animal Health (for non-Veterinary and Agriculture students)	3
VM212	Pet Animal Care	3
PT100	Health and Life Styles	3
NR200	Natural Resources and Man (for non-Agriculture students)	
ME211	Principles of Automobile Engineering (for non-Mechanical Engineering students)	3
PP200	Home Garden (for non-Agriculture Students)	3
PP201	Beekeeping (for non-Agriculture Students)	3

B. Faculty Requirements: (93) credit hours are allocated for them from The Faculty of Pharmacy and other faculties as follows:

1. **Obligatory courses:** (84) credit hours as shown in Table 5.

Table 5:

Course Code	Course Name	Credit Hours	Pre-requisite
BIO103	General Biology	3	--
BIO107	General Biology Practical	1	BIO103 or concurrent
CS116	Selected Programming Language	3	CI100
MATH102A	Calculus (for biological sciences students)	3	--
PHY103	General Physics	3	--
CHEM103	General Chemistry	3	--
CHEM107	General Chemistry Lab	1	CHEM103 or concurrent
PHAR221	Pharmaceutical Organic Chemistry 1	3	CHEM103
PHAR222	Pharmaceutical Organic Chemistry 2	3	PHAR221
PHAR224	Pharmaceutical Organic Chemistry Laboratory	1	PHAR222 or concurrent
PHAR225	Pharmaceutical Analytical Chemistry	3	CHEM103
PHAR226	Pharmaceutical Instrumental Analysis	3	PHAR225
PHAR227	Pharmaceutical Analytical Chemistry Laboratory	1	PHAR225 or concurrent
PHAR251	Basic Microbiology	3	BIO103
MED222	Biochemistry	3	PHAR221
PHAR321	Medicinal Chemistry 1	3	PHAR222
PHAR322	Medicinal Chemistry 2	2	PHAR321
PHAR341	Pharmacology 1	3	MED372
PHAR342	Pharmacology 2	3	PHAR341
PHAR351	Pharmaceutics 1	3	PHAR222
PHAR353	Pharmacy Practice Laboratory 1	1	PHAR351 or concurrent
PHAR354	Pharmaceutics 2	3	PHAR 351
PHAR356	Pharmacy Practice Laboratory 2	1	PHAR 354 or concurrent
PHAR 361	Clinical Biochemistry	3	MED372
MED372	Pathophysiology (for pharmacy students)	3	MED230
PHAR421	Medicinal Chemistry 3	2	PHAR322
PHAR422	Medicinal Chemistry 4	2	PHAR421
PHAR441	Pharmacology 3	3	PHAR342
PHAR451	Pharmaceutics 3	3	PHAR354
PHAR454	Pharmacy Practice Laboratory 3	1	PHAR451 or concurrent

PHAR456	Biopharmaceutics and Pharmacokinetics	3	PHAR451
PHAR461	Immunology and Vaccines	2	MED372
PHAR462	Pharmaceutical Microbiology and Biotechnology	3	PHAR361
PHAR464	Pharmaceutical Microbiology and Biotechnology Laboratory	1	PHAR462 or concurrent
PHAR562	Clinical Nutrition	2	PHAR361

2. **Elective courses:** Students have to choose courses equivalent to (9) credit hours from the Faculty of Pharmacy elective courses listed in Table 6.

Table 6:

Course Code	Course Name	Credit Hours	Pre-requisite
PHAR504	Selected Topics 1	1	Dean's approval
PHAR505	Selected Topics 2	2	Dean's approval
PHAR531	Advanced Chemistry of Natural Products	3	PHAR334
PHAR532	Toxic Plants	3	PHAR334
PHAR571	Advanced Pharmaceutical Biotechnology	3	PHAR462
PHAR572	Advanced Pharmaceutical Microbiology	3	PHAR462
PHAR573	Communication Skills in Pharmacy	3	PHAR451
PHAR574	Advanced Physical Pharmacy	3	PHAR451
PHAR575	Advanced Pharmaceutical Technology	3	PHAR451
PHAR576	Cosmetic preparations	3	PHAR451
PHAR577	Advanced Industrial Pharmacy	3	PHAR451
PHAR578	History of Pharmacy and Therapy	3	PHAR451
PHAR579	Drug Registration and Approval	3	PHAR451
PHAR581	Advanced Medicinal Chemistry	3	PHAR421 or concurrent
PHAR582	Drug Design	3	PHAR422
PHAR583	Nuclear Pharmacy	3	PHAR422
PHAR584	Radiation Technology	3	PHAR421
PHAR585	Quality Control	3	PHAR451 or concurrent
PHAR591	Advanced Pharmacy Practice	3	PHAR451
PHAR592	Pharmacoeconomics	3	PHAR451
PHAR594	Clinical Pharmacology	3	PHAR441
PHAR595	Molecular Pharmacology	3	PHAR441
PHAR596	Physical Examination	3	MED372
PHAR597	Pharmacogenetics	3	PHAR441

C. Obligatory program requirements: (44) credit hours are allocated from the Faculty of Pharmacy and other faculties as follows:

- Obligatory courses** from the Faculty of Pharmacy (33 credit hours) as shown in Table 7.

Table 7:

Course Code	Course Name	Credit Hours	Pre-requisite
PHAR252	Parasites	2	PHAR251
PHAR325	Chemistry of Heterocycles	1	PHAR222
PHAR327	Pharmaceutical Instrumental Analysis lab.	1	PHAR226
PHAR334	Pharmacognosy and Phytochemistry	3	PHAR222
PHAR336	Pharmacognosy and Phytochemistry Lab.	1	PHAR334 or concurrent
PHAR433	Phytotherapy	3	PHAR334
PHAR463	Ethics and Pharmacy Practice	2	PHAR351 or concurrent
PHAR446	Therapeutics 1	3	PHAR441
PHAR458	Pharmaceutical Technology	3	PHAR451
PHAR547	Therapeutics 2	3	PHAR446
PHAR549	Clinical Cases	1	PHAR547 or concurrent
PHAR552	Marketing and Pharmacoeconomics	3	PHAR463
PHAR555	Drug Delivery Systems	3	PHAR458
PHAR565	Protein and Gene Therapy	2	PHAR462
PHAR568	Patient Counseling	2	PHAR547 or concurrent

- Obligatory courses** from the Faculty of Medicine (8 credit hours) shown in Table 8.

Table 8:

Course Code	Course Name	Credit Hours	Pre-requisite
MED210	General Anatomy	3	BIO103
MED230	General Physiology	3	BIO103
PH311	Biostatistics	2	MATH102A

3. Practical Training: (3 credit hours) as shown in Table 9.

Table 9:

Course Code	Course Name	Credit Hours	Weeks	Pre-requisite
PHAR401	Community Pharmacy*	3	8	Passing 120 credit hours

* Students are trained for 8 consecutive weeks in a registered community pharmacy inside Jordan. Students are not allowed to have training outside Jordan. Students are not allowed, under any circumstances, to register for courses along with the training. Students are eligible for this training only after passing 120 credit hours.

Study Plan for Bachelor of Pharmacy Degree

First Year (33 credit hours)

First Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
BIO103	General Biology	3	3	--	--
BIO107	General Biology Practical	1	--	3	BIO103 or concurrent
CI100	Computer Skills*	3	3	--	--
MATH102A	Calculus (for biological sciences students)	3	3	--	--
ENG111	English Language 1 [§]	3	3	--	ENG099
ARB101	Arabic Language	3	3	--	--
ARB103	Applied Arabic Language Studies	1	--	1	--
Total		17	15	4	

Second Semester

Course Code	Course Name	Credit hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
CS116	Selected Programming Language	3	3	--	CI100
PHY103	General Physics	3	3	--	--
CHEM103	General Chemistry	3	3	--	--
CHEM107	General Chemistry Lab	1	--	3	CHEM103 or concurrent
ENG112	English Language 2	3	3	--	ENG111 or scoring 80% or more in the English Language Level Exam
--	University Elective Course	3	3	--	
Total		16	15	3	

[‡]Military Sciences course is requested only from Jordanian students as a pass or fail course. Students graduated from The Royal Military College and other equivalent centers and colleges are exempted from taking this course. Non-Jordanian students have to register for an alternative course that is chosen from the list of university elective courses; grades for this course will be calculated in the overall accumulative average of the student.

[§] This course will be waived for students who score 80% or more in the English Language Level Exam.

* This course will be waived for students who score 50% or more in the Computer Skills Level Exam.

Second Year
(31 credit hours)

First Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR221	Pharmaceutical Organic Chemistry 1	3	3	--	CHEM103
PHAR225	Pharmaceutical Analytical Chemistry	3	3	--	CHEM103
PHAR227	Pharmaceutical Analytical Chemistry Laboratory	1	--	3	PHAR225 or concurrent
PHAR251	Basic Microbiology	3	3	--	BIO103
MED210	General Anatomy	3	2	3	BIO103
MED230	General Physiology	3	3	--	BIO103
Total		16	14	6	

Second Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR222	Pharmaceutical Organic Chemistry 2	3	3	--	PHAR221
PHAR224	Pharmaceutical Organic Chemistry Laboratory	1	--	3	PHAR222 or concurrent
PHAR226	Pharmaceutical Instrumental Analysis	3	3	--	PHAR225
PHAR252	Parasites	2	2	--	PHAR251
MED222	Biochemistry	3	3	--	PHAR221
MED372	Pathophysiology (for pharmacy students)	3	3	--	MED230
Total		15	14	3	

Third Year
(33 credit hours)

First Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR321	Medicinal Chemistry 1	3	3	--	PHAR222
PHAR325	Chemistry of Heterocycles	1	1	--	PHAR222
PHAR327	Pharmaceutical Instrumental Analysis lab.	1	--	3	PHAR226
PHAR341	Pharmacology 1	3	3	--	MED372
PHAR351	Pharmaceutics 1	3	3	--	PHAR222
PHAR353	Pharmacy Practice Laboratory1	1	--	3	PHAR351 or concurrent
PHAR361	Clinical Biochemistry	3	3	--	MED372
PH311	Biostatistics	2	2	--	MATH102A
Total		17	15	6	

Second Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR322	Medicinal Chemistry 2	2	2	--	PHAR321
PHAR334	Pharmacognosy and Phytochemistry	3	3	--	PHAR222
PHAR336	Pharmacognosy and Phytochemistry Lab.	1	--	3	PHAR334 or concurrent
PHAR342	Pharmacology 2	3	3	--	PHAR341
PHAR354	Pharmaceutics 2	3	3	--	PHAR351
PHAR356	Pharmacy Practice Laboratory 2	1	--	3	PHAR354 or concurrent
	University Elective Course	3	3	--	
Total		16	14	6	

Fourth Year

(34 credit hours)

First Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR421	Medicinal Chemistry 3	2	2	--	PHAR322
PHAR433	Phytotherapy	3	3	--	PHAR334
PHAR441	Pharmacology 3	3	3	--	PHAR342
PHAR451	Pharmaceutics 3	3	3	--	PHAR354
PHAR461	Immunology and Vaccines	2	2	--	MED372
PHAR463	Ethics and Pharmacy Practice	2	2	--	PHAR351 or concurrent
Total		15	15	--	

Second Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR422	Medicinal Chemistry 4	2	2	--	PHAR421
PHAR446	Therapeutics 1	3	3	--	PHAR441
PHAR454	Pharmacy Practice Laboratory 3	1	--	3	PHAR451 or concurrent
PHAR456	Biopharmaceutics and Pharmacokinetics	3	3	--	PHAR451
PHAR458	Pharmaceutical Technology	3	3	--	PHAR451
PHAR462	Pharmaceutical Microbiology and Biotechnology	3	3	--	PHAR361
PHAR464	Pharmaceutical Microbiology and Biotechnology Laboratory	1	--	3	PHAR462 or concurrent
Total		16	14	6	

Summer Semester

Course Code	Course Name	Credit Hours	Weeks	Pre-requisite
PHAR401	Community Pharmacy*	3	8	Passing 120 credit hours
Total		3	8	

* Students are trained for 8 consecutive weeks in a registered community pharmacy inside Jordan. Students are not allowed to have training outside Jordan. Students are not allowed, under any circumstances, to register for courses along with the training. Students are eligible for this training only passing 120 credit hours.

Fifth Year
(31 credit hours)

First Semester

Course Code	Course Name	Credit Hours	Weekly Hours		Pre-requisite
			Theoretical	Practical	
PHAR547	Therapeutics 2	3	3	--	PHAR446
PHAR549	Clinical Cases	1	--	3	PHAR547 or concurrent
PHAR555	Drug Delivery Systems	3	3	--	PHAR458
PHAR565	Protein and Gene Therapy	2	2	--	PHAR462
	Faculty Elective Course	3	3	--	
	Faculty Elective Course	3	3	--	
Total		15	14	3	

Second Semester

Course No.	Course name	Credit hours	No. of weekly hours		Pre-requisite
			Theoretical	Practical	
PHAR552	Marketing and Pharmacoeconomics	3	3	--	PHAR463
PHAR562	Clinical Nutrition	2	2	--	PHAR361
PHAR568	Patient Counseling	2	2	--	PHAR547 or concurrent
MS100	Military Sciences [±]	3	3	--	--
	University Elective Course	3	3	--	
	Faculty Elective Course	3	3	--	
Total		16	16	--	

COURSE DESCRIPTION

PHAR221: Pharmaceutical Organic Chemistry I (3 credit hours)

A detailed discussion of the chemistry and stereochemistry of alkanes, alkenes, alkynes, alkyl halides and conjugated dienes is presented. Reaction mechanisms S_N1 , S_N2 , E_1 , E_2 are also discussed .

Prerequisite: CHEM103

PHAR222: Pharmaceutical Organic Chemistry II (3 credit hours)

A continuation to *P221*, with emphasis on aromatic compounds and the following functional groups: alcohols, ethers, carbonyl containing compounds, amines, and phenols. Pharmaceutically important compounds are cited as examples.

Prerequisite: PHAR221

PHAR224: Pharmaceutical Organic Chemistry Laboratory (1 credit hours, 3 practical hours)

This course trains the students on basic techniques of organic synthesis, single and multistep organic synthetic reactions, and functional groups identification.

Pre- or co-requisite: PHAR222

PHAR225: Pharmaceutical Analytical Chemistry (3 credit hours)

This course deals with the conventional methods of analysis that are applied to pharmaceutical products covering theory, chemical principles and calculations. In addition, this course familiarizes students with pharmacopoeias and the official methods required for pharmaceutical analysis.

Prerequisite: CHEM103

PHAR226: Pharmaceutical Instrumental Analysis (3 credit hours)

This course introduces the student to spectral methods of analysis including UV-Visible, Infra-Red (IR), Nuclear Magnetic Resonance (NMR), and Mass Spectroscopy (MS). The course also covers other types of instrumental analyses such as chromatographic separation techniques.

Prerequisite: PHAR225

PHAR227: Pharmaceutical Analytical Chemistry Lab (1 credit hour, 3 practical hours)

This course train students on qualitative and quantitative methods of analysis, including different types of titrimetric analysis and their applications for analysis of pharmaceutical preparations.

Pre- or co-requisite: PHAR225

PHAR251 Basic Microbiology (3 credit hours)

This course deals with basic biology of bacteria, viruses, fungi, and protozoa, with emphasis on their microbial genetics, metabolism, pathogenesis. Principles of immunobiology, and infection prevention and control are also covered.

Prerequisite: BIO103

PHAR252 Parasites (2 credit hours)

This course includes an introduction to medical parasitology and the identification of the most important parasites that infest human. Detailed description of there life cycles and diseases associated with them and methods of treatment is also covered.

Prerequisite: PHAR251

PHAR321: Medicinal Chemistry I (3 credit hours)

This course introduces students to medicinal chemistry of drugs with special emphasis on the pharmacokinetic, pharmacodynamic and physicochemical properties in relation to biological activity. The effect of the chemical structure on drugs' interaction with different body receptors is demonstrated. The metabolism of drugs and factors affecting it is fully explained. The course also introduces the students to the basic principles of drug design.

Prerequisite: PHAR222

PHAR322: Medicinal Chemistry 2 (2 credit hours)

The course covers the medicinal chemistry of drugs acting on the central nervous system (CNS), the autonomic nervous system (ANS), the cardiovascular system, and drugs used for management of diabetes.

Prerequisite: PHAR321

PHAR325: Chemistry of Heterocycles (1 credit hour)

This course discusses the structure, nomenclature and the properties of saturated and aromatic heterocyclic compounds with emphasis on pentacyclic, hexacyclic, and conjugated ones. Examples of natural and medicinal heterocyclic compounds are also provided.

Prerequisite: PHAR222

PHAR327: Pharmaceutical Instrumental Analysis lab (1 credit hour, 3 practical hours)

This lab. trains students on methods of instrumental analysis. The lab. includes the spectral methods of analysis including UV-Visible, Infra-Red (IR), and chromatographic separation. The lab. Introduces the students with Nuclear Magnetic Resonance (NMR), and Mass Spectroscopy (MS). These methods are used in lab. along with other analytical ways in applications for analysis of pharmaceutical preparations.

Pre- or co-requisite: PHAR226

PHAR334: Pharmacognosy and Phytochemistry (3 credit hours)

This course involves an introduction to pharmacognosy and phytochemistry and includes the study of chemical groups such as glycosides, alkaloids, volatile oils, terpenes and others. The course provides an extensive study of medicinal plants including their scientific names, natural products of each plant group, the existence, parts used and their medical use. The course also deals with methods of isolation, characterization of active compounds and their biological activities.

Pre- or co-requisite: PHAR222

PHAR336: Pharmacognosy and Phytochemistry Lab (1 credit hour)

This course deals with the most important practical methods to identify and examine medicinal plants. The Lab. trains the student on isolation, identification of natural products present in medicinal plants.

Pre- or co-requisite: PHAR334

PHAR341: Pharmacology 1 (3 credit hours)

This course discusses the basic principles of pharmacology. An introduction to drugs' pharmacokinetic and pharmacodynamic principles, pharmacology of drugs acting on the central nervous system (CNS), the autonomic nervous system (ANS), opioids, local anesthetics, autacoids and non-steroidal anti-inflammatory drugs are included.

Prerequisite: MED372

PHAR342: Pharmacology 2 (3 credit hours)

This course covers the pharmacology of drugs acting on the cardiovascular, renal, respiratory and gastrointestinal systems.

Prerequisite: PHAR341

PHAR351: Pharmaceutics 1 (3 credit hours)

This course integrates the principles of physical pharmacy and traditional and modern pharmaceutical dosage forms. Covered topics are oral solutions, otic, nasal and ophthalmic preparations, and sterile pharmaceutical dosage forms.

Prerequisite: PHAR222

PHAR353: Pharmacy Practice Laboratory 1 (1 credit hour, 3 practical hours)

This course is the first in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with pharmacy practice. This course discusses the methods to evaluate vital signs, and medical prescriptions (types and reading). It also covers the practical methods for preparing, evaluating and dispensing pharmaceutical solutions with proper patient counseling.

Pre- or co-requisite: PHAR351

PHAR354: Pharmaceutics 2 (3 credit hours)

This course integrates the principles of physical pharmacy and traditional and modern pharmaceutical dosage forms. Covered topics are suspensions, emulsions, aerosols, and dermatological and rectal route preparations.

Prerequisites: PHAR351

PHAR356: Pharmacy Practice Laboratory 2 (1 credit hour, 3 practical hours)

This course is the second in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with pharmacy practice. This course discusses practical methods for preparing semi-solid pharmaceutical preparations such as creams and suppositories, and dispersed pharmaceutical preparations such as suspensions and emulsions. The course includes evaluating and dispensing these dosage forms with proper patients counseling.

Pre- or co-requisite: PHAR354

PHAR361: Clinical Biochemistry (3 credit hours)

This course discusses the biological and metabolic disturbances related to various disease states. It also covers diagnostic procedures that help in evaluating the efficiency of different body organs.

Prerequisite: MED372

PHAR401: Community Pharmacy (3 credit hours)

In this course students are trained for 8 consecutive weeks in a registered community pharmacy inside Jordan. Students are not allowed to have training outside Jordan. Students are not allowed, under any circumstances, to register for courses along with the training.

Prerequisite: Students are eligible for this training only after passing 120 credit hours.

PHAR421: Medicinal Chemistry 3 (2 credit hours)

The course covers the medicinal chemistry of opioids, non-steroidal anti-inflammatory drugs, steroidal hormones, & other steroid derivatives, anti-hyperlipidemic drugs, anti-histamines, local anesthetics and drugs used for peptic ulcer disease.

Prerequisite: PHAR322

PHAR422: Medicinal Chemistry 4 (2 credit hours)

The course covers the medicinal chemistry of chemotherapeutic agents including antibacterial, antifungal, antiviral, antiparasitic and anticancer agents. The course also presents an introduction to nuclear pharmacy.

Prerequisite: PHAR421

PHAR433: Phytotherapy (3 credit hours)

The course discusses locally and internationally registered plant medications that is used in therapy of diseases and disorders of different body systems including the nervous, cardiovascular, gastrointestinal, respiratory, renal, endocrine, dermatological and musculoskeletal systems. The course focuses on the medical uses of drugs, method and duration of use, drug interactions, and adverse effects.

Prerequisite: PHAR334

PHAR441: Pharmacology 3 (3 credit hours)

This course discusses the pharmacology of chemotherapeutic agents including antibacterial, antifungal, antiviral, antiparasitic and anticancer agents. This course also discusses the pharmacology of hormones and drugs acting on the endocrine system.

Prerequisite: PHAR342

PHAR446: Therapeutics 1 (3 credit hours)

This course includes medications used for neurological and psychiatric disorders, infectious diseases, immunological and hematological diseases, and tumors in relation to the pathophysiologic conditions of the patient. The course discusses concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Students learn 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.

Prerequisite: PHAR441

PHAR451: Pharmaceutics 3 (3 credit hours)

This course integrates the principles of physical pharmacy, and traditional and modern pharmaceutical dosage forms. This course covers solid pharmaceutical dosage forms such as tablets, hard and soft gelatin capsules, powders and granules.

Prerequisite: PHAR354

PHAR454: Pharmacy Practice Laboratory 3 (1 credit hour, 3 practical hours)

This course is the third in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with pharmacy practice. This course covers practical methods for preparing different types of solid pharmaceutical dosage forms. The course also includes evaluating and dispensing these dosage forms with the proper patient counseling.

Pre- or co-requisite: PHAR451

PHAR456: Biopharmaceutics and Pharmacokinetics (3 credit hours)

This course covers the physico-chemical and biological factors involved in the absorption, distribution, and elimination of drugs as well as method of calculating drug levels in blood and urine after single or multiple dosing orally or intravenously. The concepts of bioavailability and bioequivalence are also discussed.

Prerequisite: PHAR451

PHAR458: Pharmaceutical Technology (3 credit hours)

This course covers methods for the development and delivery of modern pharmaceutical formulations such as solutions, disperse systems, solid dosage forms and sterile dosage forms based on the physico-chemical properties of drugs.

Prerequisite: PHAR451

PHAR461: Immunology and Vaccines (2 credit hours)

This course covers the basic principles of immunology and their relation to diseases and therapy. The course also discusses different types of vaccines, and their mechanisms of action.

Prerequisite: MED372

PHAR462: Pharmaceutical Microbiology and Biotechnology (3 credit hours)

This course discusses mechanisms of action and the biological properties of antibiotics and chemical compounds that are used clinically to treat different types of microbial diseases. The course also covers the development of microorganism's resistance, and the methods for preventing or reducing such resistance. The course discusses various methods of sterilization. Principles of biotechnology, recombinant DNA technology, and some biotechnologically produced drugs are also covered.

Prerequisite: PHAR361

PHAR463: Ethics and Pharmacy Practice (2 credit hours)

This course discusses the ethics of pharmacy profession; the principles of pharmacy management, the pharmaceutical marketing and the methods of communicating with patients and medical care team. The course also deals with current laws that govern the practice of pharmacy profession and the registration of drugs in Jordan.

Pre- or co-requisite: PHAR351

PHAR464: Pharmaceutical Microbiology and Biotechnology Laboratory (1 credit hour, practical hours)

Students are trained on the methods of culturing, staining and identifying bacteria. Bacterial metabolism, the way bacteria are affected by antibiotics, the essentials of sterilization and quantifying microorganism growth and the methods of producing antibiotics using biotechnological techniques will also be covered.

Pre- or co-requisite: PHAR462

PHAR504: Selected Topics 1 (1 credit hour)

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

Prerequisite: Dean's approval

PHAR505: Selected Topics 2 (2 credit hours)

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

Prerequisites: Dean's approval

PHAR531: Advanced Chemistry of Natural Products (3 credit hours)

The course focuses on methods and techniques of isolation, identification and biosynthesis of naturally occurring compounds and their chemical reactions.

Prerequisites: PHAR334

PHAR532: Toxic Plants (3 credit hours)

The course deal with the most important toxic plants, their existence, the toxic symptoms, antidotes and drugs to treat intoxication.

Prerequisites: PHAR334

PHAR547: Therapeutics 2 (3 credit hours)

This course includes medications used for cardiovascular diseases, renal systems, respiratory, and gastrointestinal endocrine and in relation to the pathophysiologic conditions of the patient. The course discusses concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Students learn 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.

Pre-requisite: PHAR446

PHAR549: Clinical Cases (1 credit hour, 3 practical hours)

This course helps students to develop clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. This course covers clinical cases in pediatrics, women and men health-related issues.

Pre- or co-requisite: PHAR547

PHAR552: Marketing and Pharmacoeconomics (3 credit hours)

This course covers the essential principles and applications of marketing strategies, pharmaceutical economy, design forms and determinants of the outputs of drug therapy with emphasis on the practical aspects of these principles.

Prerequisite: PHAR463

PHAR555: Drug Delivery Systems (3 credit hours)

This course covers the development of different dosage forms that improve drug delivery to the human body based on the physico-chemical properties of drugs.

Prerequisite: PHAR458

PHAR562: Clinical Nutrition (2 credit hours)

This course covers the basic principles of clinical nutrition during both normal and diseased conditions. This course also discusses obesity and its relation with physical exercises, home parenteral nutrition, food-induced allergy, special nutrition for disease states, and the diagnosis of diseases related to vitamins and minerals deficiency.

Prerequisite: PHAR361

PHAR565: Protein and Gene Therapy (2 credit hours)

This course covers the chemical, pharmaceutical and the therapeutic aspects of proteins and genes medications.

Prerequisite: PHAR462

PHAR568: Patient Counseling (3 credit hours)

This course focuses on essential skills required to provide advice and guidance to patients concerning the treatment plan. This course provides the student with the basic information needed to help the patient treat frequently occurring health problems such as cold, constipation and diarrhea.

Prerequisite: PHAR547

PHAR571: Advanced Pharmaceutical Biotechnology (3 credit hours)

This course covers techniques used in pharmaceutical biotechnology such as molecular biology, gene synthesis and genetic technology. The methods for the synthesis, purification, and formulation of proteins in pharmaceutical dosage forms are also discussed.

Prerequisite: PHAR462

PHAR572: Advanced Pharmaceutical Microbiology (3 credit hours)

This course covers the properties of pathogens (bacteria and fungi) in their single (planctonic) and aggregate (biofilm) forms, the effect of antibiotics on both forms, comparison of antibiotic resistance in both cases and determination of best methods for eradication. The course also discusses the properties of toxins and proteins that are produced by various microorganisms leading to enhancement of their virulence and resistance to antibiotics. The methods of separation, analysis and characterization of these products are also covered.

Prerequisite: PHAR462

PHAR573: Communications Skill in Pharmacy (3 credit hours)

This course discusses the proper communication skills in the pharmaceutical environment. The course also discusses the specific requirements for communicating with elderly and patient with special needs to provide distinguished and specialized pharmaceutical services. The course covers the communication skills used in education, development of creative services, supervision, resolving conflicts and dealing with different groups of the society.

Prerequisite: PHAR451

PHAR574: Advanced Physical Pharmacy (3 credit hours)

This course discusses the physico-chemical characteristics affecting drug actions and the appropriate techniques used to study and evaluate these properties.

Prerequisite: PHAR451

PHAR575: Advanced Pharmaceutical Technology (3 credit hours)

This course covers the latest developments in the pharmaceutical technologies and equipments used in drug manufacturing.

Prerequisite: PHAR451

PHAR576: Cosmetic preparations (3 credit hours)

This course covers the methods used for the development of various types of cosmetic products starting from the idea of the preparation, its formulation, manufacturing, and evaluation for their quality and stability. Proper methods of storage and usage of cosmetic products are also discussed.

Prerequisite: PHAR451

PHAR577: Advanced Industrial Pharmacy (3 credit hours)

This course covers the various technologies used in drug production, packaging, and scale up.

Prerequisite: PHAR451

PHAR578: History of Pharmacy and Therapy (3 credit hours)

This course covers the history and development of pharmacy profession.

Prerequisite: PHAR451

PHAR579: Drug Registration and Approval (3 credit hours)

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

Prerequisite: PHAR451

PHAR581: Advanced Medicinal Chemistry (3 credit hours)

This course covers new trends in medicinal chemistry. The course discusses methods of developing new drugs and their possible metabolism.

Pre- or co-requisite: PHAR421

PHAR582: Drugs Design (3 credit hours)

This course covers essential principles of drug design and synthesis. The course includes studying methods of high-throughput synthesis and computer modeling and the biochemical basis for novel mechanisms of drug action.

Prerequisite: PHAR422

PHAR583: Nuclear Pharmacy (3 credit hours)

This course covers essentials of nuclear pharmacy, method of preparing radioactive isotopes in nuclear reactors, and methods of preparing radioactive pharmaceutical formulations used in treatment and diagnosis of diseases. The quality control methods pertaining to these formulations are also covered.

Prerequisite: PHAR422

PHAR584: Radiation Technology (3 credit hours)

This course covers the various uses of pharmaceutical radiation technology with special emphasis on the uses of radioactive isotopes in the diagnosis and therapy of some pathological conditions.

Pre- or co-requisite: PHAR421

PHAR585: Pharmaceutical Quality Control (3 credit hours)

This course covers quality control systems for pharmaceutical operations in industry and various methods of ensuring quality control of pharmaceutical preparations.

Pre- or co-requisite: PHAR451

PHAR591: Advanced Pharmacy Practice (3 credit hours)

This course covers new developments and trends in the pharmacy practice, and discusses the mechanisms for their efficient application.

Prerequisite: PHAR451

PHAR592: Pharmacoeconomics (3 credit hours)

This course covers the essential principles and applications of pharmaceutical economy, design forms and determinants of the outputs of drug therapy with emphasis on the practical aspects of these principles.

Prerequisite: PHAR451

PHAR593: Clinical Pharmacology (3 credit hours)

This course covers the essential principles of clinical pharmacology. It also covers clinical uses, adverse effects, precautions, drug interactions and contraindications for selected groups of drugs.

Prerequisite: PHAR441

PHAR594: Advanced Therapeutics (For Pharmacy Students) (3 credit hours)

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

Prerequisite: PHAR446

PHAR595: Molecular Pharmacology (3 credit hours)

This course discusses the 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.

Prerequisite: PHAR441

PHAR596: Physical Examination (3 credit hours)

This course covers medical terminologies and procedures used during physical examination and extraction of patient's medical history.

Prerequisite: MED372

PHAR597: Pharmacogenetics (3 credit hours)

This course discusses the essential principles of pharmacogenetics that enable students to interpret the variations in drug responses according to gender and race differences among patients.

Prerequisite: PHAR 441