



Jordan University of Science and Technology
Faculty of Pharmacy

Study Plan for Doctor of Pharmacy (Pharm D) Degree

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Vision:

Achieving excellence in Pharmaceutical education and Pharmaceutical care.

Mission:

Educating highly qualified Pharmacists that are equipped with efficient skills in their future careers.

Participating in the development of national programs of Pharmaceutical care and Pharmacy practice.

Providing the Jordanian community with high quality Pharmaceutical education, scientific research and Pharmaceutical services.

Objectives:

1. To provide students with the comprehensive scientific knowledge and skills needed for future Pharmacists in different aspects of Pharmaceutical sciences including clinical pharmacy and pharmacy practice in particular.
2. To provide students with high quality practical training in order to develop the students' skills in the field of Clinical Pharmacy and to equip the students with the necessary skills to deal directly with patients in cooperative environment with members of the medical team.
3. To provide the students with special professional knowledge and ethics needed for the profession of Pharmacy.
4. Graduating students with significant Pharmaceutical skills and knowledge needed to deliver the highest levels of pharmaceutical care for patients and providing the necessary knowledge for the optimal use of medicines.

Job Opportunities:

1. Public and private hospitals.
2. Community and hospital Pharmacies.
3. Pharmaceutical marketing/Science liaisons.
4. Drug information centers.
5. Pharmaceutical Industry.
6. Food and Drug administration.
7. Academia.
8. Pharmaceutical research and development.
9. Medical websites.
10. International and national health organizations.

Study Plan of Doctor of Pharmacy degree

Numbering and coding system of courses of the study plan.

Course Coding

The following codes are used to designate courses:

Faculty	Level/year	Field	Sequence
PHAR D	x	y	z

Course Numbering

- The Pharmacy courses are tabled and numbered in such a manner to recognize each course regarding its subject area, year or level, and semester offered.
- Ex. PHAR D xyz: The **PHAR D** symbol in the course number denotes Doctor of Pharmacy and (xyz) is a 3-digits number:
 - A. The first digit denotes the year level of the course according to student’s study plan as follows:

Code	Level/year
1	First
2	Second
3	Third
4	Fourth
5	Fifth
6	Sixth

B. The second digit denotes the course field subject as follows:

Number	Specialization
0	Introductory and Basic Pharmaceutical Sciences
1	Clinical Pharmacy
2	Medicinal Chemistry and Pharmacognosy
3	Medicinal Chemistry and Pharmacognosy
4	Clinical Pharmacy
5	Pharmaceutical Technology
6	Clinical Pharmacy
7	Pharmaceutical Technology
8	Clinical Pharmacy
9	Clinical Pharmacy

C. The third digit denotes sequence of semester during which the course is offered according to the study plan. In way that odd numbers are given to the first and summer semesters while even numbers are given to second semesters.

Example: PHAR D351Pharmaceutics 1 means:

PHAR D	3	5	1
Doctor of Pharmacy	Level (Third year)	Field (Pharmaceutical Technology)	Sequence (First semester)

The Doctor of Pharmacy degree at JUST is awarded in accordance with the statute stated by JUST regulations for B.Sc. awarding issued by the Dean's Council based on the adjusted 1987 law for awarding scientific degrees and certifications at JUST after completing (216) credit hours successfully.

The study plan composed of the following:

Classification	Credit hours		
	Compulsory	Elective	Total
University requirement	16	9	25
Faculty requirement	32	9	41
Specialty requirement	142	8	150
Total	190	26	216

A. University Requirements (25 Credit Hours)

1. Compulsory University Requirements: (15 Credit Hours)

Course No.	Course title	Credit hours	Theoretical	Practical
MS 100 ⁽¹⁾	Military sciences	3	3	-
ARB 101	Arabic Language	3	3	-
HSS 110	Social Responsibility	3	2	1
ENG 112 ⁽²⁾	English Language 2	3	3	-
HSS 119	Entrepreneurship and innovation	2	2	-
HSS 129	General Skills	2	2	-

Notice: All non-Arabic speaking international students in the University are required to study one course in Arabic language as a substitute for ARB 101 shown below:

Course No.	Course title	Credit hours	Theoretical	Practical
ARB 101A	Fundamentals of Arabic Language (for non-Arabic speaking students, as a substitute for the course ARB101 Arabic language)	3	3	-

- (1) This course is required from Jordanian students only; graded on Pass/Fail basis. Students graduating from Royal Military faculty and military candidate's school and equivalent institutes are exempted from taking this course. Non-Jordanian Arabic speaking students are required to take a substitute for this course from the elective courses and in this case the grade of this course is included in their grade point average (GPA).
- (2) Pre-requisite: passing Eng 099 or passing English Language Placement Test with a grade > 50%.

2. Elective courses: (9 credit hours) selected from the following courses:

Course No.	Course title	Credit hours	Theoretical	Lab
First Group: Humanity-Related Courses				
ARB 200	Appreciation of Literary Texts	3	3	-
HSS115	Islam and Contemporary Issues	3	3	-
HSS116	Islamic Economic System	3	3	-
HSS121	Principles of Sociology	3	3	-
HSS126	Principles of Psychology	3	3	-
HSS127	Educational Technology	3	3	-
HSS131	Islamic Civilization	3	3	-
HSS132	The History of the City of Jerusalem	3	3	-
HSS133	Civilization and Contemporary Cultures	3	3	-
HSS135	Islamic Culture	3	3	-
HSS137	Human Rights	3	3	-
HSS161	Contemporary Problems	3	3	-
HSS211	Sociology (In English language)	3	3	-
HSS213	Individual and Society (in English language)	3	3	-
HSS221	Introduction to Psychology (In English Language)	3	3	-
HSS231	The History of Science for Islam	3	3	-
Second Group: Scientific-and-agricultural Related Courses				
ES 103	Environmental Protection (for non-Environmental Sciences students)	3	3	-

ME102	Introduction to Renewable Energy (not for mechanical engineering students)	3	3	-
ME211	Introduction to Automobile Mechanics (not for mechanical engineering students)	3	3	-
CHE191	Introduction to Nanotechnology	3	3	-
NF177	Food Preservation (In English Language)	3	3	-
AP200	Farm Animal Products and Production	3	3	-
PP200	Home Gardens (not for Agriculture students)	3	3	-
PP201	Bees Keeping (not for Agriculture students)	3	3	-
NR200	Natural Resources and Man (not for Agriculture students)	3	3	-
Third Group: Health Related Courses				
NUR 100	Health Promotion (not for Medicine, Nursing or Midwifery students)	3	3	-
ADS100	Dental and Oral Health (not for Dental and Allied Dental Sciences)	3	3	-
PH104	Community Health and Nutrition	3	3	-
VM211	Animal Health (not for Veterinary Medical and Agriculture students)	3	3	-
VM212	Pet Animal Care (not for Veterinary Medical and Agriculture students)	3	3	-
PT100	Wellness and Lifestyle (not for Physical and Occupational Therapy)	3	3	-

B. Faculty Requirements:

1. Mandatory courses (32 credit hours)

Course No.	Course title	Credit hours	Theoretical	Lab	Prerequisite or co-request
BIO103	General Biology	3	3	-	-
BIO107	General Biology Practical	1	-	1	BIO103 or Co-requisite
MATH102A	Calculus 2 (for biological sciences students)	3	3	-	-
PHY103	General Physics	3	3	-	-
CHEM103	General Chemistry	3	3	-	-
CHEM107	General Chemistry Lab	1	-	1	CHEM103 or Co-requisite
MED210	Anatomy and Histology	3	2	-	BIO103
MED210	Anatomy and Histology Practical	-	-	1	Co-requisite with MED210
CHEM217	Organic Chemistry	3	3	-	CHEM103
CHEM 218	Organic Chemistry Laboratory	1	-	1	CHEM 217 or Co-requisite
MED 230A	Human Physiology	3	3	-	BIO 103
CHEM262	Biochemistry	3	3	-	CHEM217
PH311	Biostatistics	2	2	-	MATH 102A
MED 372	Pathophysiology (For Pharmacy students)	3	3	-	MED 230
Total		32	28	4	

2. Elective courses: Students have to choose courses equivalent to (9) credit hours from the faculty of Pharmacy elective courses as follows:

Course No.	Course title	Credit hours	Theoretical	Lab	Prerequisite (or Co)
PHAR504	Selected Topics 1	1	1	-	Dean's approval
PHAR505	Selected Topics 2	2	2	-	Dean's approval
PHAR521	Advanced Medicinal Chemistry	3	3	-	PHAR D421
PHAR522	Drug Design	3	3	-	PHAR D421
PHAR523	Nuclear Pharmacy	3	3	-	PHAR D421
PHAR524	Radiation Technology	3	3	-	PHAR D421
PHAR525	Advanced Chemistry of Natural Products	3	3	-	PHAR D421
PHAR526	Quality Control	3	3	-	PHAR D451
PHAR527	Toxic Plants	3	3	-	PHAR D421
PHAR528	Alternative Medicine	3	3	-	PHAR D431
PHAR554	Advanced Pharmaceutical Technology	3	3	-	PHAR D451
PHAR 556	Advanced Industrial Pharmacy	3	3	-	PHAR D451
PHAR558	Pharmaceutical Regulatory Affairs	3	3	-	PHAR D451
PHAR559	Drug Stability	3	3	-	PHAR D451
PHAR571	Advanced Pharmaceutical Biotechnology	3	3	-	PHAR D460
PHAR573	Advanced Pharmaceutical Microbiology	3	3	-	PHAR D460
PHAR574	Gene & Protein Therapy	3	3	-	PHAR D460
PHAR575	Advanced Natural Pharmacy	3	3	-	PHAR D451
PHAR576	Cosmetic preparations	3	3	-	PHAR D451
PHAR577	History of Pharmacy and Therapy	3	3	-	PHAR D451
PHAR578	Drug registration & Approval	3	3	-	PHAR D451
PHAR579	Communication skills in Pharmacy	3	3	-	PHAR D468
PHAR580	Pharmaceutical Intellectual Property	3	3	-	PHAR D451
PHAR585	Pharmacy Management	3	3	-	PHAR D468

PHAR586	Pharmacoepidemiology	3	3	-	PHAR D468
PHAR590	Advanced Pharmacology	3	3	-	PHAR D441
PHAR591	Advanced Pharmacy Practice	3	3	-	PHAR D468
PHAR593	Molecular Pharmacology	3	3	-	PHAR D441
PHAR594	Clinical Examination	3	3	-	PHAR D441
PHAR595	Pharmacogenetics	3	3	-	PHAR D441
PHAR596	Hospital Pharmacy	3	3	-	PHAR D402
PHAR597	Clinical Pharmacology	3	3	-	PHAR D441

C. Program requirements: (150) credit hours allocated from the faculty of Pharmacy as follows:

1. Mandatory courses (107 credit hours)

Course No.	Course title	Credit hours	Theoretical	Lab	Prerequisite (or Co)
PHAR D222	Pharmaceutical Organic Chemistry (for Pharm D students)	3	3	-	CHEM217
PHAR D225	Pharmaceutical Analytical Chemistry (for Pharm D students)	3	3	-	CHEM013
MED231	Pathology	3	2	-	MED210
MED231	Pathology (Practical)	0	-	1	co-requisite with MED231
PHAR D321	Medicinal Chemistry 1 (for Pharm D students)	3	3	-	PHAR D222
PHAR D322	Medicinal Chemistry 2 (for Pharm D students)	3	3	-	PHAR D321
PHAR D323	Pharmaceutical Instrumental Analysis (for Pharm D students)	3	3	-	PHAR D 225 and PHAR D 222
PHAR D329	Pharmaceutical Analytical chemistry & Instrumental Analysis lab (for Pharm D students)	1	-	1	PHAR D323 or Co-requisite
PHAR D332	Chemistry of Natural Products (for Pharm D students)	3	3	-	PHAR D222
PHAR D341	Pharmacology 1 (for Pharm D students)	3	3	-	MED372
PHAR D342	Pharmacology 2 (for Pharm D students)	3	3	-	PHAR D341

PHAR D344	Introduction to Therapeutics (for Pharm D students)	1	1	-	PHAR D341
PHAR D351	Pharmaceutics 1 (for Pharm D students)	3	3	-	PHAR D222
PHAR D353	Pharmacy Practice Laboratory 1 (for Pharm D students)	1	-	1	PHAR D351 or Co-requisite
PHAR D354	Pharmaceutics 2 (for Pharm D students)	3	3	-	PHAR D351
PHAR D356	Pharmacy Practice Laboratory 2 (for Pharm D students)	1	-	1	PHAR D354 or Co-requisite
PHAR D361	Clinical Biochemistry (for Pharm D students)	3	3	-	MED372
PHAR D366	Drug Information Resources (for Pharm D students)	1	1	-	PHAR D341
PHAR D421	Medicinal Chemistry 3 (for Pharm D students)	3	3	-	PHAR D322
PHAR D431	Phytotherapy (for Pharm D students)	3	3	-	PHAR D332
PHAR D441	Pharmacology 3	3	3	-	PHAR D342
PHAR D442	Therapeutics- Immunology, Hematology and Oncology (for Pharm D students)	3	3	-	PHAR D461 and PHAR D441
PHAR D443	Therapeutics- Neurological and Psychiatric Disorders (for Pharm D students)	3	3	-	PHAR D344
PHAR D444	Therapeutics- Cardiovascular System (for Pharm D students)	2	2	-	PHAR D442 or co-requisite
PHAR D445	Therapeutics- Respiratory and Gastrointestinal Systems (for Pharm D students)	2	2	-	PHAR D342 and co-requisite with PHAR443
PHAR D447	Clinical Cases 1 (for Pharm D students)	1	-	1	PHAR D445 or co-requisite
PHAR D448	Clinical Cases 2 (for Pharm D students)	1	-	1	PHAR D444 or co-requisite
PHAR D451	Pharmaceutics 3 (for Pharm D students)	3	3	-	PHAR D354
PHAR D453	Pharmaceutical Microbiology (for Pharm D students)	3	3	-	MED372

PHAR D454	Pharmacy Practice Laboratory 3 (for Pharm D students)	1	-	1	PHAR D451 or Co-requisite
PHAR D456	Biopharmaceutics and Pharmacokinetics (for Pharm D students)	3	3	-	PHAR D451
PHAR D460	Pharmaceutical Biotechnology (for Pharm D students)	3	3	-	PHAR D453
PHAR D464	Pharmaceutical Microbiology and Biotechnology Lab (for Pharm D students)	1	-	1	PHAR D460 or Co-
PHAR D461	Immunology and Vaccines (for Pharm D students)	2	2	-	MED372
PHAR D468	Pharmaceutical marketing and Pharmacoeconomics (for Pharm D students)	2	2	-	PHAR D341
PHAR D515	Drug Literature Evaluation (for Pharm D students)	2	2	-	PHAR D366
PHAR D517	Drug Literature Evaluation Practical (for Pharm D students)	1	-	1	PHAR D515 or co-
PHAR D541	Therapeutics- Endocrine and Renal Systems (for Pharm D students)	2	2	-	PHAR D441 and PHAR D344
PHAR D542	Therapeutics- Pediatric Health (for Pharm D students)	2	2	-	PHAR D541
PHAR D543	Therapeutics- Infectious Diseases (for Pharm D students)	2	2	-	PHAR D541 or co-requisite
PHAR D544	Therapeutics- Woman and Man Health (for Pharm D students)	2	2	-	PHAR D542 or co-requisite
PHAR D545	Clinical Cases 3 (for Pharm D) students)	1	-	1	PHAR D543 or co-requisite
PHAR D546	Clinical Cases 4 (for Pharm D)students)	1	-	1	PHAR D544 or co-requisite
PHAR D548	Therapeutics- Comprehensive (for Pharm D students)	2	2	-	PHAR D542 or co-requisite
PHAR D551	Pharmaceutics 4 (for Pharm D students)	1	1	-	PHAR D451
PHAR D553	Clinical Pharmacokinetics (for Pharm D students)	3	3	-	PHAR D456
PHAR D557	Pharmacy Practice Laboratory 4 (for Pharm D students)	1	-	1	PHAR D551 or co-requisite
PHAR D561	Pharmacy Ethics and Law (for Pharm D students)	2	2	-	PHAR D468
PHAR D562	Clinical Nutrition (for Pharm D students)	2	2	-	PHAR D361

PHAR D564	Early Practice Experience (for Pharm D students)	2	2	-	PHAR D546 or co-requisite
PHAR D568	Clinical Seminar (for Pharm D students)	1	1	-	PHAR D517
TOTAL		107	95	12	

2. Mandatory practical training (35 credit hours)

Course No.	Course title	Credit hours	Weeks	Prerequisite
PHAR D402	Community Pharmacy* (for Pharm D students)	3	8	Passing 130 credit hours
PHAR D640	Clinical Training: Internal Medicine 1 (for Pharm D students)	4	4	The successful completion of all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.
PHAR D641	Clinical Training: Hospital Pharmacy (for Pharm D students)	4	4	
PHAR D642	Clinical Training: Ambulatory Care (for Pharm D students)	4	4	
PHAR D643	Clinical Training: Internal Medicine 2 (for Pharm D students)	4	4	
PHAR D644	Clinical Training: Pediatrics (for Pharm D students)	4	4	
PHAR D645	Clinical Training: Critical Care (for Pharm D students)	4	4	
PHAR D646	Clinical Training: Oncology (for Pharm D students)	4	4	
PHAR D647	Clinical Training: Cardiology (for Pharm D students)	4	4	
TOTAL		35	40	

* 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 successfully completing 130 credit hours.

D- Elective specialization requirements :(8 credit hours)

Elective practical training: (8 credit hours)

Course No.	Course title	Credit hours	Weeks	Prerequisite
PHAR D670	Clinical Training: Clinical Nutritional Support	4	4	The successful completion of all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.
PHAR D671	Clinical Training: Geriatrics	4	4	
PHAR D672	Clinical Training: Pharmaceutical Industry	4	4	
PHAR D673	Clinical Training: Pharmaceutical Academic Education	4	4	
PHAR D674	Clinical Training: Pharmacy Management	4	4	
PHAR D675	Clinical Training: Clinical Pharmaceutical Research	4	4	
PHAR D676	Clinical Training: Disease State Management/Care	4	4	
PHAR D677	Clinical Training: Pharmaceutical Home Care	4	4	
PHAR D678	Clinical Training: Neurology	4	4	
PHAR D679	Clinical Training: Nuclear Medicine	4	4	
PHAR D680	Clinical Training: Respiratory Diseases	4	4	
PHAR D681	Clinical Training: Endocrine Diseases	4	4	
PHAR D682	Clinical Training: Pain Management	4	4	
PHAR D683	Clinical Training: Pharmaceutical Dental Care	4	4	
PHAR D690	Clinical Training: Dermatology	4	4	
PHAR D691	Clinical Training: Gynecology and Obstetrics	4	4	
PHAR D692	Clinical Training: Psychiatry	4	4	
PHAR D693	Clinical Training: Drug Information	4	4	
PHAR D694	Clinical Training: Surgery	4	4	
PHAR D695	Clinical Training: Renal Diseases	4	4	
PHAR D696	Clinical Training: Infectious Diseases	4	4	
PHAR D697	Clinical Training: Poisoning Center	4	4	
PHAR D698	Clinical Training: Gastrointestinal Diseases	4	4	
PHAR D699	Clinical Training: Comprehensive Pharmaceutical care	4	4	

Study Plan

FIRST YEAR											
First semester						Second semester					
Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite	Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite
			Lecture	Lab					Lecture	Lab	
BIO 103	General Biology	3	3	-	--	HSS 119	Entrepreneurship and Innovation	2	2	-	--
BIO 107	General Biology Practical	1	-	2	BIO 103 (or Co)	ARB 101	Arabic Language	3	3	-	--
HSS 110	Social Responsibility	3	2	1	--	PHY 103	General Physics	3	3	-	--
MATH 102A	Calculus 2 (for biological sciences students)	3	3	-	--	HSS 129	General Skills	2	2	-	ENG 112
CHEM 103	General Chemistry	3	3	-	--	MS 100	Military Sciences	3	3	-	--
CHEM 107	General Chemistry lab	1	-	2	CHEM 103 (or Co)	CHEM 217	Organic Chemistry	3	3	-	CHEM103
ENG 112	English Language 2	3	3	-	Passing ENG 099*	CHEM 218	Organic Chemistry Lab	1	-	3	CHEM 217 (or Co)
Total		17	14	5		Total		17	16	3	

* Or scoring 50% or more in the English Language Level Exam

SECOND YEAR											
First semester						Second semester					
Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite	Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite
			Lecture	Lab					Lecture	Lab	
MED 210	Anatomy and Histology	3	2	-	BIO 103	PHAR D225	Pharmaceutical Analytical Chemistry	3	3	-	CHEM 103
MED 210	Anatomy and Histology	0	-	2	MED 210	MED 231	Pathology	3	2	-	MED 210
MED 230	Human Physiology	3	3	-	BIO 103	MED 231	Pathology (Practical)	0	-	2	
PHAR D222	Pharmaceutical Organic Chemistry	3	3	-	CHEM 217	CHEM 262	Biochemistry	3	3	-	CHEM 217
PH 311	Biostatistics	2	2	-	MATH 102A	MED 372	Pathophysiology (For Pharmacy students)	3	3	-	MED 230
	University Elective	3	3	-	--		University Elective	3	3	-	--
	University Elective	3	3	-	--						
Total		17	16	2		Total		15	14	2	

THIRD YEAR											
First semester					Second semester						
Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite	Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite
			Lecture	Lab					Lecture	Lab	
PHAR D321	Medicinal Chemistry 1	3	3	-	PHAR D222	PHAR D322	Medicinal Chemistry 2	3	3	-	PHAR D321
PHAR D323	Pharmaceutical Instrumental Analysis	3	3	-	PHAR D222 PHAR D225	PHAR D332	Chemistry of natural products	3	3	-	PHAR D222
PHAR D320	Pharmaceutical Analytical Chemistry and Instrumental Analysis lab	1	-	2	PHAR D323 (or Co)	PHAR D342	Pharmacology 2	3	3	-	PHAR D341
PHAR D341	Pharmacology 1	3	3	-	MED 372	PHAR D354	Pharmaceutics 2	3	3	-	PHAR D352
PHAR D351	Pharmaceutics 1	3	3	-	PHAR D222	PHAR D356	Pharmacy practice lab 2	1	-	2	PHAR D354 (or Co)
PHAR D353	Pharmacy practice lab 1	1	-	2	PHAR D351 (or Co)	PHAR D361	Clinical Biochemistry	3	3	-	MED 372
PHAR D453	Pharmaceutical Microbiology	3	3	-	MED 372	PHAR D366	Drug Information Resources	1	1	-	PHAR D341
						PHAR D341	Introduction to Therapeutics	1	1		PHAR D341
Total		17	15	4		Total		18	17	2	

FOURTH YEAR											
First semester						Second semester					
Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite	Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite
			Lecture	Lab					Lecture	Lab	
PHAR D421	Medicinal Chemistry 3	3	3	-	PHAR D322	PHAR D442	Therapeutics- Immunology, Hematology and Oncology (for PharmD students)	3	3	-	PHAR D441
PHAR D431	Phytotherapy	3	3	-	PHAR D332	PHAR D444	Therapeutics- Cardiovascular System (for PharmD students)	2	2	-	PHAR D442 (or Co)
PHAR D441	Pharmacology 3	3	3	-	PHAR D 342	PHAR D448	Clinical Cases 2 (for PharmD students)	1	-	2	PHAR D444 (or Co)
PHAR D443	Therapeutics- Neurological and Psychiatric Disorders (for PharmD students)	3	3	-	PHAR D344	PHAR D454	Pharmacy practice lab 3	1	-	2	PHAR D451 (or Co)
PHAR D445	Therapeutics- Respiratory and Gastrointestinal Systems (for PharmD students)	2	2	-	PHAR D342	PHAR D456	Biopharmaceutics and Pharmacokinetics	3	3	-	PHAR D452
PHAR D447	Clinical Cases 1 (for PharmD students)	1	-	2	PHAR 445 (or Co)	PHAR D460	Pharmaceutical Biotechnology	3	3	-	PHAR D453
PHAR D451	Pharmaceutics 3	3	3	-	PHAR D454	PHAR D464	Pharmaceutical Microbiology and Biotechnology lab	1	-	2	PHAR D460 (or Co)
				-		PHAR D461	Immunology and Vaccines	2	2	-	MED 372
						PHAR D468	Pharmaceutical Marketing & Pharmacoeconomics	2	2	-	PHAR D342
Total		18	17	2		Total		18	15	6	

Summer semester				
Course No.	Course Name	Credit Hours	Weeks	Pre-requisite
PHAR D402	Community Pharmacy*	3	8	Passing 130 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 except graduating students whom may register a course or a seminar or both along the training course. Students are eligible for this training only passing 130 credit hours.

FIFTH YEAR											
First semester						Second semester					
Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite	Course No.	Course name	Total credits	Weekly hours		Prerequisite/ Co-requisite
			Lecture	Lab					Lecture	Lab	
PHAR D515	Drug Literature Evaluation (for PharmD students)	2	2	-	PHAR D366	PHAR D542	Therapeutics- Pediatrics Health (for PharmD students)	2	2	-	PHAR D541
PHAR D517	Drug Literature Evaluation Practical (for PharmD students)	1	-	2	PHAR D515 (or Co)	PHAR D544	Therapeutics- Woman and Man Health (for PharmD students)	2	2	-	PHAR D542 (or Co)
PHAR D541	Therapeutics- Endocrine and Renal Systems (for PharmD students)	2	2	-	PHAR D441 PHAR D344	PHAR D548	Therapeutics- Comprehensive (for PharmD students)	2	2	-	PHAR D542 (or Co)
PHAR D543	Therapeutics- Infectious Diseases (for PharmD students)	2	2	-	PHAR D541 (or Co)	PHAR D546	Clinical cases 4 (for PharmD students)	1	-	2	PHAR D544
PHAR D545	Clinical Cases 3 (for PharmD students)	1	-	2	PHAR D543 (or Co)	PHAR D564	Early Practice Experience (for PharmD students)	2	2	-	PHAR D546(or Co)
PHAR D551	Pharmaceutics 4	1	1	-	PHAR D541	PHAR D568	Clinical Seminar (for PharmD students)	1	1	-	PHAR D517
PHAR D553	Clinical Pharmacokinetics	3	3	-	PHAR D456	PHAR D562	Clinical Nutrition	2	2	-	PHAR D361
PHAR D557	Pharmacy practice Lab 4	1	-	3	PHAR D551 (or Co)		Faculty Elective	3	3	-	
PHAR D561	Pharmacy Ethics & Law	2	2	-	PHAR D468		Faculty Elective	3	3	-	
	Faculty Elective	3	3	-							
Total		18	15	7		Total		18	17	2	

Summer semester				
Course No.	Course name	Credit hours	No. of weeks	Pre-requisite
PHAR D640	Clinical Training: Internal Medicine 1 (for Pharm D students)	4	4	The successful completion of all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.
PHAR D641	Clinical Training: Hospital Pharmacy (for Pharm D students)	4	4	
Total		8	8	

SIXTH YEAR									
First semester					Second semester				
Course No.	Course name	Total credits	Weeks	Prerequisite	Course No.	Course name	Total credits	Weeks	Prerequisite
PHAR D643	Clinical Training: Internal Medicine 2 (for Pharm D students)	4	4	The successful completion of all courses: theoretical (both obligatory and elective), and practical as stated in the curriculum	PHAR D642	Clinical Training: Ambulatory Care (for Pharm D students)	4	4	The successful completion of all courses: theoretical (both obligatory and elective), and practical as stated in the curriculum.
PHAR D645	Clinical Training: Critical Care (for Pharm D students)	4	4		PHAR D644	Clinical Training: Pediatrics (for Pharm D students)	4	4	
PHAR D647	Clinical Training: Cardiology(for Pharm D students)	4	4		PHAR D646	Clinical Training: Oncology (for Pharm D students)	4	4	
	Clinical Training: Elective 1(for Pharm D students)	4	4			Clinical Training: Elective 2(for Pharm D students)	4	4	
Total		16	16		Total		16	16	

Course Description

PHAR D222: Pharmaceutical Organic Chemistry (for Pharm D students; 3 credit hours)

Review of organic functional groups with emphasis on the physicochemical properties of biological importance such as carboxylic acid and its derivatives, amines, sulfuric acids and sulfonic acids, sulfonamides, carbonates and urea's. Chemistry of aliphatic and aromatic heterocycles with emphasis on five and six membered ring and fused rings heterocycles. Stereochemistry of organic compounds; chirality, enantiomers and diastereomers, conformational and geometrical isomerism, and the stereoselectivity in nature.

Prerequisite: CHEM217

PHAR D225: Pharmaceutical Analytical Chemistry (for Pharm D students; 3 credit hours)

Conventional analytical methods including quantitative and qualitative analysis, stoichiometric calculations, concepts of chemical equilibrium, titrimetric methods including: acid-base titration, compleximetric titration, precipitation reactions and titrations, concerning on the methods used in pharmaceutical products analysis. In addition, this course gives information about the pharmacopeias and the methods used in these pharmacopeias for the analysis of pharmaceutical preparations.

Prerequisite: CHEM 103

PHAR D321: Medicinal Chemistry I (for Pharm D students; 3 credit hours)

Medicinal chemistry of drugs with special emphasis on the pharmacokinetic, pharmacodynamic. Effect of the chemical structure on drugs' interaction with different body receptors is demonstrated. Metabolism of drugs and factors affecting it, medicinal chemistry of drugs acting on the central nervous system (CNS), the autonomic nervous system (ANS), and medicinal chemistry of opioids.

Prerequisite: PHAR D222

PHAR D322: Medicinal Chemistry 2 (for Pharm D students; 3 credit hours)

Cardiovascular system, and drugs used for management of diabetes, non-steroidal anti-inflammatory drugs, steroidal hormones, and other steroid derivatives, anti-hyperlipidemic drugs, anti-histamines, local anesthetics and drugs used for peptic ulcer disease.

Prerequisite: PHAR D321

PHAR D323: Pharmaceutical Instrumental Analysis (for Pharm D students; 3 credit hours)

Spectral methods of analysis including: Ultra violet/ visible radiation(UV/Visible), Infra-Red (IR), Nuclear Magnetic Resonance (NMR), and Mass Spectroscopy (MS). Types of instrumental analyses such as chromatographic separation techniques such as

High performance liquid chromatography and gas chromatography and their applications in the quality control of pharmaceutical preparations.

Prerequisite: PHAR D225

PHAR D329: Pharmaceutical Analytical Chemistry and Instrumental Analysis lab (for Pharm D students; 1 credit hour, 2 practical hours)

Different methods of conventional and Instrumental analysis are used for quantitative and qualitative analysis, and quality control of some pharmaceutical preparations. These methods including: titrimetric analysis such as acid-base titration, compleximetric titration, precipitation reactions and titrations, ultraviolet/visible radiation (UV/Vis.), Infra red (IR), Nuclear Magnetic Resonance (NMR), and Spectroscopy (MS), chromatographic methods such as High performance liquid chromatography (HPLC) and others.

Pre- or co-requisite: PHAR D323

PHAR D332: Chemistry of Natural Products (for Pharm D students; 3 credit hours)

Basic information about classes of natural products, secondary metabolites, and their distribution, plants and microorganisms as sources for natural drugs. Methods for discovering natural drugs and the importance of these drugs in pharmaceutical care are also included.

Prerequisite: PHAR D222

PHAR D341: Pharmacology 1 (for Pharm D students; 3 credit hours)

Basic principles of pharmacology. 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, and non-steroidal anti-inflammatory drugs.

Prerequisite: MED372

PHAR D342: Pharmacology 2 (for Pharm D students; 3 credit hours)

Pharmacology of drugs acting on the cardiovascular, renal, respiratory and gastrointestinal systems

Prerequisite: PHAR D341

PHAR D344: Introduction to Therapeutics (for Pharm D students; 1 credit hour)

Discussion of the basic principles of therapeutics

Prerequisite: PHAR D341

PHAR D351: Pharmaceutics 1 (for Pharm D students; 3 credit hours)

Integration of the principles of physical pharmacy and traditional and modern pharmaceutical dosage forms. Oral solutions, otic,

nasal and ophthalmic preparations, and sterile pharmaceutical dosage forms.

Prerequisite: PHAR D222

PHAR D353: Pharmacy Practice Laboratory 1 (for Pharm D students; 1 credit hour, 2 practical hours)

The first in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with pharmacy practice. Methods to evaluate vital signs, and medical prescriptions (types and reading). Practical methods for preparing, evaluating and dispensing pharmaceutical solutions with proper patient counseling.

Pre- or co-requisite: PHAR D351

PHAR D354: Pharmaceutics 2 (for Pharm D students; 3 credit hours)

Integration of the principles of physical pharmacy and traditional and modern pharmaceutical dosage forms. Suspensions, emulsions, aerosols, and dermatological and rectal route preparations.

Prerequisites: PHAR D351

PHAR D356: Pharmacy Practice Laboratory 2 (for Pharm D students; 1 credit hour, 2 practical hours)

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

Pre- or co-requisite: PHAR D354

PHAR D361: Clinical Biochemistry (for Pharm D students; 3 credit hours)

Biological and metabolic disturbances related to various disease states. Diagnostic procedures that help in evaluating the efficiency of different body organs.

Prerequisites: MED372

PHAR D366: Drug Information Resources (for Pharm D students; 1 credit hour)

Various resources for information about drugs, and methods of searching for drug-related information in a fast and efficient manner.

Pre- or Co- requisite: PHAR D341

PHAR D402: Community Pharmacy (for Pharm D students; 3 credit hours)

Training for 8 consecutive weeks in a registered community pharmacy inside Jordan. Pharmacy department, drug brand names,

Pharmacy management and patient counseling will be covered.

Prerequisite: Students are eligible for this training only after passing 130 credit hours.

PHAR D421: Medicinal Chemistry 3 (for Pharm D students; 3 credit hours)

Medicinal chemistry of chemotherapeutic agents including antibacterial, antifungal, antiviral, antiparasitic and anticancer agents.

Prerequisite: PHAR D322

PHAR D431: Phytotherapy (for Pharm D students 3 credit hours)

Locally and internationally registered plant medications that are used in therapy of diseases and disorders of different body systems including the nervous, cardiovascular, gastrointestinal, respiratory, renal, endocrine, dermatological and musculoskeletal systems. Medical uses of herbal drugs, method and duration of use, drug interactions, and adverse effects.

Prerequisite: PHAR D332

PHAR D441: Pharmacology 3 (for Pharm D students 3 credit hours)

Pharmacology of chemotherapeutic agents including antibacterial, antifungal, antiviral, antiparasitic and anticancer agents. Pharmacology of hormones and drugs acting on the endocrine system.

Prerequisite: PHAR D342

PHAR D442: Therapeutics- Immunology, Hematology and Oncology (for Pharm D students; 3 credit hours)

Pharmacotherapy of immunological and hematological diseases, and cancers in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Prerequisite: PHAR D461 and PHAR D441

PHAR D443: Therapeutics- Neurological and Psychiatric Disorders (for Pharm D students; 3 credit hours)

Pharmacotherapy of neurological and psychiatric disorders in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Prerequisite: PHAR D344

PHAR D444: Therapeutics- Cardiovascular System (for Pharm D students; 2 credit hours)

Pharmacotherapy of cardiovascular diseases in relation to the pathophysiologic conditions of the patient. Concepts of drug

action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Pre- or co-requisite: PHAR D442

PHAR D445: Therapeutics- Respiratory and Gastrointestinal Systems (for Pharm D students; 2 credit hours)

Pharmacotherapy of respiratory and gastrointestinal diseases in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Pre-requisite: PHAR D342

Co-requisite: PHAR D443

PHAR D447: Clinical Cases 1 (for Pharm D students; 1 credit hour)

Develop clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. Discussion of clinical cases of patients suffering from psychiatric, neurological, respiratory and gastrointestinal diseases.

Pre- or co-requisite: PHAR D445

PHAR D448: Clinical Cases 2 (for Pharm D students; 1 credit hour)

Developing clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. Discussion of clinical cases of patients suffering from hematological and immune disorders, cancer, diseases of the cardiovascular system, and cases pertaining to women and men health.

Pre- or co-requisite: PHAR D444

PHAR D451: Pharmaceutics 3 (for Pharm D students 3 credit hours)

Integration of the principles of physical pharmacy, and traditional and modern pharmaceutical dosage forms. Solid pharmaceutical dosage forms such as tablets, hard and soft gelatin capsules, powders and granules.

Prerequisite: PHAR D354

PHAR D453: Pharmaceutical Microbiology (for Pharm D students 3 credit hours)

Mechanisms of action and biological properties of antibiotics and chemical compounds that are used clinically to treat different types of microbial diseases. Development of microorganism's resistance, and methods for preventing or reducing such resistance, methods of sterilization.

Prerequisite: MED372

PHAR D454: Pharmacy Practice Laboratory 3 (for Pharm D students 1 credit hour, 2 practical hours)

The third in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with pharmacy practice. Practical methods for preparing different types of solid pharmaceutical dosage forms, and evaluating and dispensing these dosage forms with the proper patient counseling.

Pre- or co-requisite: PHAR D451

PHAR D456: Biopharmaceutics and Pharmacokinetics (for Pharm D students, 3 credit hours)

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. Concepts of bioavailability and bioequivalence

Prerequisite: PHAR D451

PHAR D460: Pharmaceutical Biotechnology (for Pharm D students, 3 credit hours)

Principles and foundations of biotechnology and genetic engineering. Isolation of the gene and inserting it into gene vectors to create recombinant DNA molecules that will facilitate the production of different drugs using biotechnology.

Prerequisite: PHAR D453

PHAR D461: Immunology and Vaccines (for Pharm D students, 2 credit hours)

Basic principles of immunology and their relation to diseases and therapy. Different types of vaccines, and their mechanisms of action.

Prerequisite: MED372

PHAR D464: Pharmaceutical Microbiology and Biotechnology Laboratory (for Pharm D students 1 credit hour, 2 practical hours)

Methods of culturing, staining and identifying bacteria. Bacterial metabolism. The way bacteria are affected by antibiotics. Essentials of sterilization and quantifying microorganism growth and the methods of producing antibiotics using biotechnological techniques.

Pre- or co-requisite: PHAR D460

PHAR D468: Pharmaceutical Marketing and Pharmacoeconomics (for Pharm D students; 2 credit hours)

Methods for managing personnel/employees and various processes in pharmaceutical institutions

Pre- or Co- requisite: PHAR341

PHAR D504: 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

PHAR D505: 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

PHAR D509: History of Pharmacy and Therapy (for Pharm D students; 3 credit hours)

History and development of pharmacy profession and the contribution of Islamic civilization to the Pharmaceutical sciences.

Prerequisite: PHAR D451

PHAR D515: Drug Literature Evaluation (for Pharm D students; 2 credit hours)

Types, components of clinical drug studies including their design, conduction, and related ethical principles. Example studies are discussed to teach students methods of analyzing and evaluating published scientific articles and reports related to drugs and clinical cases.

Prerequisite: PHAR D366

PHAR D517: Drug Literature Evaluation Practical (for Pharm D students; 1 credit hour)

Discussion of published scientific articles/reports to develop students skills in evaluating, analyzing scientific literature, to be able to extract useful clinical and drug-related information/conclusions.

Pre- or co- requisite: PHAR D515

PHAR521: Advanced Medicinal Chemistry (3 credit hours)

New trends in medicinal chemistry. Methods of developing new drugs and their possible metabolism.

Prerequisite: PHAR D421

PHAR522: Drug Design (3 credit hours)

Essential principles of drug design and synthesis. Studying methods of high-throughput synthesis and computer modeling
Biochemical basis for novel mechanisms of drug action.

Prerequisite: PHAR D421

PHAR523: Nuclear Pharmacy (3 credit hours)

Essentials of nuclear pharmacy, method of preparing radioactive isotopes in nuclear reactors, methods of preparing radioactive pharmaceutical formulations used in treatment and diagnosis of diseases, quality control methods pertaining to these formulations.

Prerequisite: PHAR D421

PHAR524: Radiation Technology (3 credit hours)

Various uses of pharmaceutical radiation technology with special emphasis on the uses of radioactive isotopes in the diagnosis, therapy of some pathological conditions.

Prerequisite: PHAR D421

PHAR525: Advanced Chemistry of Natural Products (3 credit hours)

Methods and techniques of isolation, identification and biosynthesis of naturally occurring compounds and their chemical reactions.

Prerequisites: PHAR D421

PHAR526: Quality Control (3 credit hours)

Quality control systems for pharmaceutical operations in industry, methods of ensuring quality control of pharmaceutical preparations.

Prerequisite: PHAR D451

PHAR527: Toxic Plants (3 credit hours)

Important toxic plants, their existence, the toxic symptoms, antidotes, drugs to treat intoxication.

Prerequisites: PHAR D421

PHAR528: Alternative Medicine (3 credit hours)

Methods of alternative treatment and complementary medicine including phytotherapy, Chinese, German and Indian medicine, chiropractics, treatment with bee poison, functional therapy, macrobiotics.

Prerequisites: PHAR D431

PHAR D541: Therapeutics- Endocrine and Renal Systems (for Pharm D students; 2 credit hours)

Pharmacotherapy of endocrine and renal systems diseases in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Prerequisite: PHAR344 and PHAR D441

PHAR D542: Therapeutics- Pediatric Health (for Pharm D students; 2 credit hours)

Pharmacotherapy of pediatric diseases in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Pre- or Co- requisite: PHAR D541

PHAR D543: Therapeutics- Infectious Diseases (for Pharm D students; 2 credit hours)

Pharmacotherapy of infectious diseases in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Pre- or co-requisite: PHAR D541

PHAR D544: Therapeutics- Woman and Man Health (for Pharm D students; 2 credit hours)

Pharmacotherapy of disease states special for woman such as (infertility, post-menopause, pregnancy, delivery, lactation, contraception), and cases special for men such as (prostate diseases, impotence and infertility), in relation to the pathophysiologic conditions of the patient. Concepts of drug action, therapeutic uses, goals of treatment, therapeutic plan, patient counseling, drug monitoring and evaluation of the therapeutic outcomes. Methods of interacting and supporting other members of the medical care team by developing and evaluating patient's therapeutic plans, and offering alternative therapeutic options/plans when needed.

Pre- or co-requisite: PHAR D542

PHAR D545: Clinical Cases 3 (for Pharm D students; 1 credit hour, 2 practical hours)

Developing clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. Discussion of clinical cases of patients suffering from endocrine, renal system and infectious diseases.

Pre- or co-requisite: PHAR D543

PHAR D546: Clinical Cases 4 (for Pharm D students; 1 credit hour, 2 practical hours)

Developing clinical skills necessary to solve problems related to supplying patients with cost-effective and safe treatment. Discussion of clinical cases in pediatrics, and comprehensive and critical care clinical cases.

Pre- or co-requisite: PHAR D544

PHAR D548: Therapeutics- Comprehensive (for Pharm D students; 2 credit hours)

Pharmacotherapy certain therapeutic situations that include diseases or disorders involving more than one system in the body especially critical care cases. A comprehensive view that takes into consideration the interactions of various diseases in the therapy of a patient.

Pre- or co-requisite: PHAR D542

PHAR D551: Pharmaceutics 4 (for Pharm D students; 1 credit hour)

Methods for the development and delivery of modern pharmaceutical formulations based on the physico-chemical properties of

drugs.

Prerequisite: PHAR D451

PHAR D553: Clinical Pharmacokinetics (for Pharm D students; 3 credit hours)

This course covers the applications of drug pharmacokinetics in clinical cases. The course discusses the effect of genetic factors, disease states, and medications on drug pharmacokinetics. Dose adjustment and methods of monitoring drug concentrations in the body are also included. *Prerequisite: PHAR D456*

PHAR D554: Advanced Pharmaceutical Technology (for Pharm D students; 3 credit hours)

Important systems used in the production of different dosage forms such as solutions, semi-solid preparations and sterile dosage forms. *Prerequisite: PHAR D451*

PHAR D556: Advanced Industrial Pharmacy (for Pharm D students; 3 credit hours)

Design of traditional and non-traditional dosage forms, and the physicochemical principles that alter its stability, different forms of capsule and tablet design. Liquid dosage forms and the industrial systems that are currently applied for the manufacturing of such dosage forms.

Prerequisite: PHAR D451

PHAR D557: Pharmacy Practice Laboratory 4 (for Pharm D students; 1 credit hour, 2 practical hours)

This course is the fourth in the series of pharmacy practice labs that connect the theoretical courses in pharmacy with the pharmacy practice. This course covers the practical methods for preparing sterile pharmaceutical preparations such as intravenous solutions. The course also deals with sterilization methods for parenteral preparations within clinical settings. This course includes evaluating and dispensing these preparations with proper counseling for the patients and other health care team members.

Prerequisite: PHAR D551

PHAR558: Pharmaceutical Regulatory Affairs (3 credit hours)

Topics on the drug approval process, current Good Manufacturing Practices, Good Clinical Practices, quality system compliance and the corresponding documentation requirements, and FDA inspection processes and enforcement options.

Prerequisite: PHAR D451

PHAR559: Drug Stability (3 credit hours)

Factors that affect the stability, quality and general safety of pharmaceutical products.

Prerequisite: PHAR D451

PHAR D561: Ethics and Pharmacy Practice (for Pharm D students; 2 credit hours)

Ethics of pharmacy profession; the principles of pharmacy management, pharmaceutical marketing and methods of Communicating with patients and medical care team. Current laws governing the practice of pharmacy profession and the registration of drugs in Jordan.

Prerequisite: PHAR D468

PHAR D562: Clinical Nutrition (for Pharm D students; 2 credit hours)

Basic principles of clinical nutrition during both normal and diseased conditions. 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: PHAR D361

PHAR D564: Early Practice Experience (for pharm D students, 2 credit hours)

Essential clinical pharmacy skills in preparation for their experiential rotations in hospitals and clinics with emphasis on dealing with patients, medical charts, laboratory information, software used in clinical monitoring and institution database systems. An early practice experience (EPE) component that involves a patient workup under the mentorship of preceptors and 6th year pharmacy students on clinical rotations.

Pre- or co-requisite: PHAR D546

PHAR D568: Clinical Seminar (for Pharm D students; 1 credit hour)

This course includes the discussion and evaluation of scientific articles and drug publications.

Prerequisite: PHAR D517

PHAR571: Advanced Pharmaceutical Biotechnology (3 credit hours)

Techniques used in pharmaceutical biotechnology such as molecular biology, gene synthesis and genetic technology. Methods for the synthesis, purification, and formulation of proteins in pharmaceutical dosage forms are also discussed.

Prerequisite: PHAR D460

PHAR572: Over the Counter Drugs (2 credit hours)

Medications dispensed without prescription and patient care pertaining for common symptoms, related diseases, treatments, and determining cases that should be seen by a physician.

Prerequisite: PHAR D547

PHAR573: Advanced Pharmaceutical Microbiology (3 credit hours)

Properties of pathogens (bacteria and fungi) in their single (planktonic) and aggregate (biofilm) forms, effect of antibiotics on

both forms, comparison of antibiotic resistance in both cases and determination of best methods for eradication. Properties of toxins and proteins that are produced by various microorganisms leading to enhancement of their virulence and resistance to antibiotics. Methods of separation, analysis and characterization of these products.

Prerequisite: PHAR D460

PHAR574: Gene and Protein Therapy (3 credit hours)

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

Prerequisite: PHAR D460

PHAR D575: 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: PHAR D451

PHAR576: Cosmetic Preparations (3 credit hours)

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: PHAR D451

PHAR578: 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: PHAR D451

PHAR579: Communications Skill in Pharmacy (3 credit hours)

This course discusses the proper communication skills in the pharmaceutical environment. The course 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: PHAR D451

PHAR580: Pharmaceutical Intellectual Property (3 credit hours)

Drug product life cycle, types and principles of intellectual property with an emphasis on the application of these principles within the pharmaceutical industry, importance of intellectual property to the PI, research and development (R&D) issues, data exclusivity, patent protection, trademarks, and Trade Related Aspects of Intellectual Property Rights (TRIPs) for pharmaceutical products, recording, ownership and registration of IP, strategies, planning and commercialization of IP.

Prerequisite: PHAR D451

PHAR585: Advanced Pharmaceutical Management (3 credit hours)

Personal management, operations management, managing people, marketing, purchasing, value-added services, and managing risks.

Prerequisite: PHAR468

PHAR586: Pharmacoepidemiology (3 credit hours)

An introduction to pharmacoepidemiology as well as sections on data sources, methodology and applications, and evaluating the safety and effectiveness of medicines.

Prerequisite: PHAR D468

PHAR590: Advanced Pharmacology (3 credit hours)

Advanced principles of pharmacology, an in-depth assessment of selected groups of drugs with specific emphasis on the sites and mechanisms of drug action and indications, contraindications, adverse effects and drug-drug interactions.

Prerequisite: PHAR D441

PHAR591: Advanced Pharmacy Practice (3 credit hours)

Advances and new trends in the pharmacy practice, and the mechanisms for their efficient application.

Prerequisite: PHAR D468

PHAR593: Molecular Pharmacology (3 credit hours)

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: PHAR D441

PHAR594: Clinical Examination (3 credit hours)

This course covers medical terminologies and procedures used during physical examination and extraction of patient's medical history. *Prerequisite: PHAR D441*

PHAR595: 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 D441

PHAR596: Hospital Pharmacy (3 credit hours)

Development, functions, organization and administration of pharmaceutical services within a hospital. Methods of drug distribution, inventory control and purchasing.

Prerequisite: PHAR D402

PHAR597: Clinical Pharmacology (3 credit hours)

Essential principles of clinical pharmacology, clinical uses, adverse effects, precautions, drug interactions and contraindications for selected groups of drugs.

Prerequisite: PHAR D441

PHAR D640: Clinical Training: Internal Medicine 1 (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in an internal medicine department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D641: Clinical Training: Hospital Pharmacy (for Pharm D students; 4 credit hours, 4 practical weeks)

Four weeks in the hospital pharmacy departments, which covers inpatient and outpatient pharmacies, inventory, purchase and storage.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D642: Clinical Training: Ambulatory Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in outpatient clinics department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D643: Clinical Training: Internal Medicine 2 (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in an internal medicine department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D644: Clinical Training: Pediatrics (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in a pediatrics department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D645: Clinical Training: Critical Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in a critical care department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D646: Clinical Training: Oncology (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in an oncology department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D647: Clinical Training: Cardiology (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in a cardiology department. This includes various activities such as attending morning rounds, other clinical rounds, and discussing clinical cases based on daily follow-up and monitoring, and detailed evaluation of the pharmacotherapeutics of their assigned patients in the department. The goal is to improve students' practical clinical skills that would enhance the positive contribution of clinical pharmacists in medical care at the hospital.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum

PHAR D670: Clinical Training: Clinical Nutritional Support (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the areas of clinical nutritional support.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D671: Clinical Training: Geriatrics (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the areas of geriatrics.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D672: Clinical Training: Pharmaceutical Industry (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the areas of pharmaceutical industry.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D673: Clinical Training: Pharmaceutical Academic Education (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the areas of pharmaceutical academic education.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D674: Clinical Training: Pharmacy Management (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the areas of Pharmacy Management.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D675: Clinical Training: Clinical Pharmaceutical Research (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in clinical pharmaceutical research.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D676: Clinical Training: Disease State Management/Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of disease state management/care.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D677: Clinical Training: Pharmaceutical Home Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of pharmaceutical home care.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D678: Clinical Training: Neurology (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in clinical pharmaceutical care in the area of neurology.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR679: Clinical Training: Nuclear Medicine (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in nuclear medicine.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D680: Clinical Training: Respiratory Diseases (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care for respiratory diseases.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D681: Clinical Training: Endocrine Diseases (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care for endocrine diseases.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D682: Clinical Training: Pain Management (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care for pain management.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D683: Clinical Training: Pharmaceutical Dental Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of pharmaceutical dental care.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D690: Clinical Training: Dermatology (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in dermatology.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D691: Clinical Training: Gynecology and Obstetrics (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in gynecology and obstetrics.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D692: Clinical Training: Psychiatry (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in psychiatry.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D693: Clinical Training: Drug Information (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in a drug information center.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D694: Clinical Training: Surgery (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in surgery.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D695: Clinical Training: Renal Diseases (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in renal diseases.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D696: Clinical Training: Infectious Diseases (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in infectious diseases.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D697: Clinical Training: Poisoning Center (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in a poisoning center.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D698: Clinical Training: Gastrointestinal Diseases (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of clinical pharmaceutical care in gastrointestinal diseases.

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.

PHAR D699: Clinical Training: Comprehensive Pharmaceutical Care (for Pharm D students; 4 credit hours, 4 practical weeks)

Four experiential training weeks in the area of comprehensive pharmaceutical care

Prerequisite: successfully completing all courses: theoretical (both obligatory and elective), and practical (including PHAR D402 Community Pharmacy) as stated in the curriculum.