



# **The By-laws of The Pharmacy Bachelor's Degree Program (PharmD)**

According To the Credit Hour System  
Faculty of Pharmacy Mansoura University

(June 2019)

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## **Vision, Mission and Goals of the College of Pharmacy, Mansoura University**

### **Vision:**

**Leadership & excellence in education, scientific research, and community service locally and internationally in all pharmaceutical fields.**

### **Mission**

**The Mansoura University College of Pharmacy is committed to the continuous improvement and development of its study programs, scientific research, and community service to graduate distinguished pharmacists to meet the needs of the labor market and to prepare researchers at an international level within the academic standards framework and social values.**

### **Strategic Goals of the College**

- 1. Continuous development of study programs and the professional level of graduates.**
- 2. Upgrading scientific research.**
- 3. Expanding community participation and maximizing its returns.**
- 4. Commitment to the quality of academic and administrative performance.**

**Academic departments:**

The college consists of the following departments:

1. **Pharmaceutics Department**
2. **Pharmacognosy Department**
3. **Pharmacy Practice Department**
4. **Pharmacology and Toxicology Department**
5. **Microbiology and Immunology Department**
6. **Pharmaceutical Organic Chemistry Department**
7. **Department of Pharmaceutical Analytical Chemistry**
8. **Medicinal Chemistry Department**
9. **Department of Biochemistry**

# Articles and Bylaws

## **Article 1:**

### **Program vision:**

Scientific excellence and continuous development to serve the curative health system and reach a prominent position globally in the field of clinical pharmacy.

### **Program message:**

Preparing pharmacists with professional ethics and qualified with the latest concepts of pharmacy and curative care that enable them to contribute to the development of pharmaceutical industries and raise the efficiency of the pharmaceutical care system at the local and regional levels in hospitals and private pharmacies by providing pharmaceutical services at a professional skill level in public and private pharmacies, factories, pharmaceutical companies, and control laboratories Pharmaceutical and food analysis, in addition to working in the field of media and pharmaceutical marketing, and actively participating in scientific research through research centers and universities to serve the community.

### **Program Goals**

- Graduating a Distinguished Alumni of Mansoura's University, who is eligible to work in public and private pharmacies, pharmaceutical factories and companies, drug control laboratories, food analysis, and work in the field of media, marketing, research, and universities.
- Focusing on the role of the pharmacist in providing appropriate health care to the patient inside and outside hospitals through educating and providing advice to individuals and communities to improve treatment outcomes and reduce disease incidence, taking into account that he practices the profession with its responsibilities and authorities, respecting its laws and ethics, and respecting patients' rights.
- Preparing a pharmacist who uses evidence-based data to provide contemporary pharmaceutical products and pharmaceutical services, in addition to being able to have effective communication skills, leadership, management and entrepreneurship.
- Graduation of a pharmacist who works as a lifelong learner with the aim of sustainable professional development and demonstrates the ability to perform performance evaluation and self-evaluation skills.
- Increasing the competitiveness of the program graduates at the regional level through study and training programs.

- Participation in community service, environmental development and providing a tangible economic return through rationalizing the use of medicines in hospitals.
- Commitment to achieving quality standards in pharmacy education through interactive education and attention to self-learning.

## **Article 2:**

### **Academic degree awarded to graduates**

At the request of the College of Pharmacy Council, The University Council confers a **bachelor's degree in pharmacy (PharmD) "clinical pharmacy" according to the credit hour system.**

## **Article (3):**

### **Graduate Degrees:**

**Bachelor's degree in Pharmacy or PharmD degree (clinical pharmacy) is the first university degree in the field of pharmacy necessary to obtain a license to practice the profession in all available pharmaceutical fields. It also qualifies the graduate to register for a master's degree in any of the scientific departments or in one of the following postgraduate programs in the college:**

#### **First: Diplomas:**

- 1- Clinical Pharmacy (a specific program).
- 2- Pharmaceutical technology.
- 3- Cosmetics.
- 4- Herbal medicine.
- 5- Poisons and forensic chemical analysis.
- 6- Microbiology and Immunology.
- 7- Chemistry of the pharmaceutical industries.
- 8- Design of medicines.
- 9- Quality control and drug analysis.
- 10- Biochemistry.
- 11- Clinical nutrition (a specific program).

#### **Second: Masters:**

1. Master's degree in Pharmaceutical Sciences.

#### **Third: PhD:**

**PhD in Pharmaceutical Sciences**

#### **Fourth: Professional Master's in:**

1. Immunology and Regenerative Medicine with a credit-hour system in French and English.
2. Quality control and pharmacological analysis.

**Fifth:**

Doctor of Pharmacy degree in clinical pharmacy (Professional degree).

**Article 4:**

**Study system**

**The duration of study in the program is five academic years (five levels divided into ten semesters) according to the credit hour system, and an academic year of advanced training (an internship year) in work sites '5+1 internship year.** In addition, 100 hours of field training in private and government pharmacies and hospital pharmacies taking place during the summer vacations for the years of study after the end of the third level and before starting the internship year.

Each academic level (year) is divided into two semesters (fall and spring) and the duration of each semester is fifteen weeks. Some courses may be offered in a summer semester of six to eight weeks.

A credit hour is a unit of study and is equivalent to one hour of weekly theoretical study or a practical lesson of no less than two hours per week and taught over one semester.

**Article 5:**

**Course design**

Learning is through theoretical lectures, panel discussions, practical lessons, workshops, field exercises, research, and presentations, in addition to cooperation with the community surrounding the university.

**Course Design so that:**

**First:** The student studies 175 credit hours over ten semesters that includes: **Compulsory college requirements**, which includes 168 credit hours (Course Schedule), The College's elective requirements, which includes 8 credit hours, provided the student's cumulative average at the time of graduation is not less than one (1).

**Second:** University requirements, which represent 6 credit hours, must be studied and successfully passed, provided they are not included in the calculation of the student's semester or cumulative average.

**Third:** The student must **successfully** complete the Initial field-training period with a total of 100 actual training hours in private and government pharmacies, and hospital pharmacies approved by the College Council, under the supervision of a faculty member. Training takes place during the summer vacations for the years of study after the end of the third level and to complete the internship year (one

Academic Year – 9 months) after finishing the years of study, **according to the detailed regulation for the internship year training program, which includes a graduation project in one of the specializations offered.**

**Fourth:** The College can make amendments by deletion and addition in the description of the courses, including no more than 20% of the scientific content of the course, in order to achieve the necessary addition and update.

**Fifth:** The student's elective courses at the other two levels achieve competencies and skills that help him in professional orientation and specialization. One of the elective courses should be in one of the clinical pharmacy fields.

## **Article (6):**

### **Registration**

**Clause (1)** The College assigns to each group of students an academic advisor from the faculty member who performs the tasks of care and guidance. He is responsible for the student in scientific, social, and psychological affairs and directs him in everything related to his university life, and assists students in choosing courses from the list of courses offered by the college each semester.

**Clause (2)** The student shall personally register the courses he wishes to study each semester, provided the courses and the number of credit hours are selected with the help of the academic advisor.

To register for the course, the student must have successfully passed the requirements of this course.

The College Council may, in cases of extreme necessity, allow the student to register some courses in parallel with their requirements that the student did not successfully pass, or if the available academic load for the student is less than 12 credits (Clause (4) the study load), provided a written acknowledgment made by the student's guardian that his success in this course will not be approved until he will complete the requirement for which he was allowed to register in parallel.

The student must fill out the course registration form at the specified times according to the announced university calendar for each semester, and it is not permissible to attend classes until the registration process is completed.

**Clause (3)** The student is not allowed to register later than the specified times except with a compelling excuse accepted by the College Council, provided that the delay period does not exceed one week from the end of the registration period.

### **Clause (4) Study load:**

The study load is the number of credit hours that the student registers in one semester. It must be considered that the student's registered study load in any semester should not be less than 12 credit hours and not more than 22 credit hours, and the academic load for a struggling student should not exceed 12 credit hours (see Article 13).

The study load during the summer semester is a maximum of 10 credit hours.

The College Council may allow the student in the last two semesters to increase the study load beyond the maximum, and shall not exceed 3 credit hours (the student enjoys benefits once), The College Council may also allow the struggling student (see Article 13 - Academic Struggling) to increase the study load more than the maximum during the summer semester and not to exceed 2 credit hours.

**Clause (5) Addition, deletion, and withdrawal:**

After completing the registration procedures, the student may add or delete one or more courses to his credits in any semester, provided this is within the specified periods according to the university calendar announced for each semester, taking into account the minimum and maximum study load.

The student, after being registered, may also withdraw from one or more courses in any semester without being considered a failure in this course, if he submits a withdrawal request during the specified periods according to the university calendar announced for each semester. Whoever withdraws after this specified period is considered a failure, unless he submits a compelling excuse accepted by the College Council and approved by the Vice President for Education and Student Affairs.

**Clause (6) improvement:**

Providing the opportunity for improvement for students with degrees (from 60 to less than 65) by enrolling in the courses in which they have degrees less than 65, and the highest grade obtained by the student is calculated with a maximum of three courses during the study years in order to improve the student's cumulative average.

**Article (7):**

**A. Punctuality**

The student must regularly attend theoretical lectures, panel discussions, practical lessons, field exercises, and assignments. The College Council, at the request of the councils of the specialized scientific departments, may deprive the student of applying for the final written exam if his absence exceeds 25% of the total credit hours for each course.

**B. Attending exams, absenting them, and breaching their rules**

The student must take the final written exams on the dates set for them according to the university calendar announced for each semester. A student who is absent from the final written exam is considered a failure in the courses in which he was absent from the exam. The student is not considered failing in the event of absence with a compelling excuse accepted by the College Council.

## **Article (8):**

### **The language of study**

The Program will be taught in English. However, some courses may be taught in the Arabic language based on the recommendation of the specialized scientific department and the approval of the college and university councils.

## **Article (9):**

### **Initial field training and the advanced field training (internship year)**

#### **Clause (1) Initial field training:**

- The student must successfully complete the Initial field-training period with a total of 100 actual training hours in private and government pharmacies, and hospital pharmacies that are approved on by the College Council and under the supervision of a faculty member. The training takes place during the summer vacations for the years of study after the end of the third level and before the beginning of the internship year.

#### **Clause (2) Advanced field training (internship year):**

- The student must complete the internship year (an academic year of 9 months) after completing the academic years with training in human and veterinary pharmaceutical companies and factories - Companies and factories of: medical supplies and devices, cosmetics, nutritional supplements, herbs, medicinal plants, disinfectants and pesticides - distribution companies and drug stores - local and global centers and bodies of drug control and follow-up (MOH-CAPA-NODCAR-...; WHO, FDA, EMA..etc) - Pharmaceutical and medical research centers, bioavailability and clinical studies (CROs) - media and drug marketing ... etc., in addition to hospitals and private and government pharmacies. Those who wish to specialize in the academic field (teaching and research) can spend a training period in pharmacy colleges or research centers. The training program must include one clinical training.
- A student has to pass the graduation project in one of the offered specializations.

**(The College is in the process of preparing the bylaws of the Internship Training Program).**

## **Article (10):**

### **Admission requirements**

**Clause (1)** It is required that whoever applies to join the program must fulfill all the conditions determined by the Supreme Council of Universities and in accordance with what is included in the executive regulations of the Law regulating Universities No. 49 of 1972.

**Clause (2)** the college accepts transfers from Egyptian or foreign universities of the same study program, provided the student fulfills the requirements for admission to the faculty, in accordance with the college intake capacity, and after taking the opinion of the college council.

**Clause (3)** the student transferred from another college of pharmacy of the same program recognized by the Supreme Council of Universities is required to study 60% of the program's credits (109 credit hours) within the College of Pharmacy, Mansoura University. The courses he studied at the college from which he is transferred from are credited to the student according to the rules determined by the college council.

## **Article (11):**

### **Evaluation system**

The final course degree consists of the sum of the semester, practical, written, and oral grades as shown in the study plan tables.

The minimum score for success in any course is 60% of the total marks for this course, and the student is not successful in any course unless he obtains 30% of the final written exam score, and the percentage of the final degrees and grades is as shown in the following table.

## Evaluation system

Percentage	Points	Letter Grade	Level
95 and more	4	A <sup>+</sup>	<b>Excellent</b>
90 to less than 95	3.85	A	
85 to less than 90	3.7	A <sup>-</sup>	
82.5 to less than 85	3.3	B <sup>+</sup>	<b>Very Good</b>
77.5 to less than 82.5	3	B	
75 to less than 77.5	2.7	B <sup>-</sup>	
72.5 to less than 75	2.3	C <sup>+</sup>	<b>Good</b>
76.5 to less than 72.5	2	C	
65 to less than 67.5	1.7	C <sup>-</sup>	
62.5 to less than 65	1.3	D <sup>+</sup>	<b>Pass</b>
60 to less than 62.5	1	D	
Less than 60	0.00	F	<b>Fail</b>
Withdrawal	-	W	<b>Withdrawal</b>
Incomplete	-	I <sup>*</sup>	<b>Incomplete</b>
Absent	-	Abs E <sup>**</sup>	<b>Absent</b>

**I\*:** The student gets this grade if the attendance rate is highly significant and he is unable to enter the final written and oral exam (if any) for one or more academic courses in the same semester for compelling reasons accepted by the College Council. Therefore, he must perform the final written and oral exam (if any) No later than the second week of the following semester, with grade retention.

**Abs E\*\*:** The student gets this grade if he is not able to enter the final written and oral exam (if any) on the aforementioned date in the previous paragraph (I) because the compelling reason has not gone away, and the student must register in this course when it is offered again and studied completely with grade retention.

**There are other result codes - used in some graduation requirements - and they are:**

The **S** does not correspond to any specific letter grade; rather, it is an indication of a “satisfactory level”.

The **U** does not correspond to any specific letter grade; rather, it is an indication of an “unsatisfactory level”.

The **T** does not correspond to any specific letter grade; rather, it is an indication of the grades earned in the previous college (transferred student).

**P:** Graduation Requirements

**The student's semester grade point average (GPA) and cumulative grade point average (cGPA) are calculated as follows:**

- A. For each course (the points shown in the table) are multiplied by the number of credit hours of this course to get the number of points for each course in the semester.
- B. Points are collected for all courses in which the student registered in one semester.
- C. The total points of all academic courses are divided by the total credit hours registered for the student in one semester, in order to obtain the semester average as follows:

**Semester average (GPA) =** 
$$\frac{\text{Total points for all courses in one semester}}{\text{Total credit hours registered in one semester}}$$

**The cumulative average is calculated as follows:**

**Cumulative grade point average (cGPA) =** 
$$\frac{\text{Total points for all courses for all semesters}}{\text{Total registered credit hours for all semesters}}$$

## **Article (12):**

### **Failure in courses**

- If the student is absent from performing the final written exam without an excuse accepted by the College Council.
- If the student obtains less than 30% of the final written exam score.
- Failure to achieve at least 60% of the total course degrees.
- If the student fails a compulsory course in any semester, he must study the same course and take the exam when it will be offered again. If he fails an elective course, he can re-study or study another elective course to complete the graduation requirements, after the approval of the academic advisor and the approval of the College Council.

## **Article (13):**

### **Academic struggling**

- A student may be struggling academically if he/she earns less than a 1.00 semester GPA.
- A student who gets less than a 1.00 semester GPA for six (6) continuous semesters or ten (10) non-continuous semesters shall be dismissed from the college after the *approval* of the College Council. Summer semesters, if any, are not taken into consideration.

## **Article (14):**

### **A. Dropping out of College**

**The student shall be *considered dropped out*** if he did not register for a semester or withdrew from the semester, whether with or without an excuse.

A student may interrupt for a two-consecutive-semester period, or a maximum of three non-consecutive semesters provided the approval of the College Council is obtained. If he is interrupted for a longer period without an excuse accepted by the College Council and approval of the University Council, he will be dismissed from the College and the provisions contained in the executive regulations of the Law regulating Universities will be applied.

### **B. Suspension, Cancellation and Re-enrollment**

**Clause (1). A student may apply for suspension of enrollment in the college according to the terms and conditions set by the university.**

**Clause (2). Suspension of registration:** A student may apply to suspend his registration for one semester, up to a maximum of four continuous or non-continuous semesters for compelling reasons approved by the College Council.

**Clause (3). Cancellation of enrollment:** The student's enrollment is canceled if he commits a moral violation or violates the regulations of the college, university regulations, public morals, or student disciplinary regulations were applied to him, in accordance with the Provisions of Law regulating Universities.

**Clause (4) Re-enrollment:** It is the re-enrollment of a student after being previously enrolled whose enrollment was previously canceled for one of the reasons stipulated in the College Bylaws.

## **Article (15):**

### **Requirements for obtaining a Bachelor of Pharmacy degree (PharmD)**

Obtaining a Bachelor of Pharmacy degree (PharmD) according to the credit hour system requires the student to pass the following:

**First:** Successfully passing 175 credit hours distributed over ten semesters during five levels, and including: **The compulsory college requirements** representing 168 credits (Course Schedule), and **the college elective requirements**, representing 8 credits, provided that the cGPA is no less than one (1).

**Second:** Passing the university graduation requirements, representing 6 credit hours, provided they are not calculated in the student's semester or cumulative average.

**Third:** The student must **successfully** pass the Initial field-training period with a total of 100 actual training hours in private and government pharmacies, and hospital pharmacies approved by the College Council, under the supervision of a faculty member. Training takes place during the summer vacations for the years of study after the end of the third level.

**Fourth:** Successfully passing the internship year (academic year of 9 months) after the completion of the study years, **according to the detailed regulation of the internship year training program, which includes a graduation project in one of the specializations offered.**

**Fifth:** **Successfully** passing the graduation project in one of the specializations offered.

## **Article (16):**

### **Student discipline system**

Students enrolled in the program are subject to the disciplinary system set out in the Law regulating Universities and its Executive Regulations.

## **Article (17):**

### **Clause (1) Code scientific for departments**

No.	Departments	Code
1	Pharmaceutics Department	PT
2	Pharmacognosy Department	PG
3	Pharmacy Practice Department	PP
4	Pharmacology and Toxicology Department	PH
5	Microbiology and Immunology Department	PM
6	Pharmaceutical Organic Chemistry Department	PO
7	Department of Pharmaceutical Analytical Chemistry	PA
8	Medicinal Chemistry Department	PD
9	Department of Biochemistry	PB

Rules of code system for course numbers.

The first letter: represents the College of Pharmacy that teaches the course.

The second letter: represents the scientific department that teaches the course.

The first number: represents the level (1 - 5), (E) represents elective courses, and (ST) represents summer training

The second number: represents the first or second semester

The third or third and fourth number: represents (the course number)

**Codes of non-specialized courses**

No.	Course	Code
1	Medical courses	MD
2	University Requirements	UR
3	Non Pharmaceutical Courses	NP

**Clause (2) Distribution of academic courses to scientific departments:****1. Pharmaceutics Department (PT)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Pharmaceutical Orientation	PT111	1	-	1
Natural pharmacy	PT122	2	1	3
Pharmaceuticals (1)	PT213	2	1	3
Pharmaceuticals (2)	PT224	2	1	3
Pharmaceuticals (3)	PT315	2	1	3
Biopharmacology and pharmacokinetics	PT326	2	1	3
Pharmaceuticals (4)	PT327	2	1	3
Pharmaceutical Technology (1)	PT418	2	1	3
Pharmaceutical Technology (2)	PT429	2	1	3
Good Manufacturing Practice	PT5110	1	1	2
Advanced drug use systems	PT5211	1	1	2
		19	10	29

**2. Pharmacognosy Department (PG)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Medicinal Botany	PG 111	2	1	3
drugs ( 1 )	PG 122	2	1	3

drugs ( 2 )	PG 213	<b>2</b>	<b>1</b>	<b>3</b>
Drug Chemistry ( 1 )	PG 314	<b>2</b>	<b>1</b>	<b>3</b>
Drug Chemistry ( 2 )	PG 325	<b>2</b>	<b>1</b>	<b>3</b>
Practical and legal drugs	PG 416	<b>1</b>	<b>1</b>	<b>2</b>
Herbal treatment	PG 427	<b>3</b>	<b>1</b>	<b>3</b>
		<b>13</b>	<b>7</b>	<b>20</b>

### **3. Pharmacy Practice Department (PP)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Medical terms	PP 111	1	--	1
Hospital pharmacy	PP 322	2	--	2
Medication information	PP 413	1	1	2
Pharmacy legislation and professional ethics	PP 414	1	--	1
Kinetic Clinical Pharmacy	PP 425	2	1	3
Pharmacy practice	PP 426	2	1	3
Clinical Pharmacy (1)	PP 517	2	1	3
Clinical research and pharmacovigilance	PP 518	1	1	2
Clinical pharmacology (2) and pharmacotherapy	PP 529	1	1	2
		<b>13</b>	<b>6</b>	<b>19</b>

### **4. Pharmacology and Toxicology Department (PH)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Physiology	PH 211	2	1	3
Biostatistics	PH 222	1	--	1
Patient Physiology	PH 223	1	1	2
Pharmacology ( 1 )	PH 314	2	1	3
Pharmacology ( 2 )	PH 325	2	1	3
Pharmacology ( 3 )	PH 416	2	1	3

Treatments	PH 427	1	1	2
Poisons and Forensic Chemistry	PH 528	2	1	3
First aid	PH 529	1	--	1
		14	7	21

#### **5. Microbiology and Immunology Department (PM)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
General Microbiology and Immunology	PM 221	2	1	3
Parasites and Viruses	PM 312	2	1	3
Pharmaceutical Microbiology	PM 323	2	1	3
Pharmaceutical Biotechnology	PM 414	2	1	3
Medical Microbiology	PM 515	2	1	3
Public Health	PM 526	2	--	2
		12	5	17

#### **6. Pharmaceutical Organic Chemistry Department (PO)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Pharmaceutical Organic Chemistry ( 1 )	PO 111	2	1	3
Pharmaceutical Organic Chemistry ( 2 )	PO 122	2	1	3
Pharmaceutical Organic Chemistry (3)	PO 213	2	1	3
Spectral Proof	PO 314	2	1	3
		8	4	12

**7. Department of Pharmaceutical Analytical Chemistry (PA)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Pharmaceutical Analytical Chemistry ( 1 )	PA 111	2	1	3
Pharmaceutical Analytical Chemistry ( 2 )	PA 122	2	1	3
Pharmaceutical Analytical Chemistry ( 3 )	PA 213	2	1	3
Automated and Applied Analysis	PA 224	2	1	3
Quality Control and Pharmaceutical Analysis	PA 425	2	1	3
		<b>10</b>	<b>5</b>	<b>15</b>

**8. Medicinal Chemistry Department (PD)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Pharmaceutical Chemistry ( 1 )	PD 411	2	1	3
Pharmaceutical Chemistry ( 2 )	PD 422	2	1	3
Pharmaceutical Chemistry ( 3 )	PD 513	2	1	3
Drug Design	PD 524	2	1	3
		<b>8</b>	<b>4</b>	<b>12</b>

**9. Department of Biochemistry (PB)**

Course	Code	Credit Hours		
		Theoretical	Practical / Discussions	Total
Cell Biology	PB 121	1	1	2
Biochemistry ( 1 )	PB 222	2	1	3
Biochemistry ( 2 )	PB 313	2	1	3
Clinical Biochemistry	PB 414	2	1	3
		<b>7</b>	<b>4</b>	<b>11</b>

**Clause (3) Courses under the supervision of the scientific departments and the Vice Dean for Student Affairs**

**It includes 17 credit hours (6 credit hours as university requirements + 11 credit hours as other courses)**

Code	Course	Credit Hours			Scientific Department
		Theoretical	Practical / Discussions	Total	
NP 111	Mathematics	1	-	1	Pharmacology and Toxicology
UR 111	Information Technology	1	1	2	Pharmaceutical Analytical Chemistry
UR 112	Human rights and Corruption Fighting	1	-	1	Pharmaceutics
UR 123	Psychology	1	-	1	Biochemistry
UR 124	Communication and presentation Skills	1	-	1	Pharmacy Practice
UR 525	Entrepreneurship	1	-	1	Pharmaceutical Analytical Chemistry
NP 212	Scientific writing	1	-	1	Pharmaceutical Organic Chemistry
NP 513	Drug Marketing and pharmaco-economic	2	-	2	Pharmacy Practice
NP 524	Research Methodology	1	-	1	Medicinal Chemistry
NP 525	Professional Ethics	1	-	1	Pharmacology and Toxicology
MD 121	Histology and Anatomy	2	1	3	Pharmacology and Toxicology
MD 512	Pathology	1	1	1	Microbiology and Immunology
		14	3	17	

**Clause (4) University requirements: 6 credit hours** (supervised by the Vice Dean for Education and Student Affairs).

Code	Course	Credit Hours			year's work marks	Exam Marks		Total Marks	Exam Time
		Theor.	Pract.	Total		Pract./ Disc.	Writing		
UR 111	Information Technology	1	1	2	15	25	60	100	1
UR 112	Human rights and Corruption Fighting	1	-	1	25	-	75	100	1
UR 123	Psychology	1	-	1	25	-	75	100	1
UR 124	Communication and presentation Skills	1	-	1	25	-	75	100	1
UR 525	Entrepreneurship	1	-	1	25	-	75	100	1
Total		5	1	6					

**Clause (5) College requirements: 175 credit hours**

**Clause (6) requirements for the study program**

To obtain the degree of the Bachelor of Pharmacy (PharmD), it is required to study and pass 181 credit hours distributed over ten semesters during five levels and divided as follows:

1. University Requirements (UR) 6 credit hours
2. College requirements: 175 credit hours distributed as follows
  - A - Compulsory courses 167 credit hours
  - B - Elective courses 4 courses totaling 8 credit hours
    - ❖ A new elective course may be added based on the proposal of the department council and the approval of the college and university councils.
3. The student must pass the first field training with a total of 100 actual hours after the end of the third level as described in Article (9) and Article (15)
4. The student must pass the internship year (an academic year of 9 months) after completing the years of study
5. The student has passed the graduation project as indicated in Article (9) and Article (15).

Clause (7) Elective Courses (Annex 1)

**Article (18):**

Study plan (Annex 2)

**Article (19):**

Course Content (Annex 3)

**Article (20):**

Course updates

It is permissible to update a percentage not exceeding 20% of the course content based on the proposal of the competent scientific department council and the approval of the college council and the approval of the university council after giving the necessary justifications.

**Article (21):**

Internship Program for the Internship Year:

A detailed program of training for the final year (internship year) is drawn up in the form of rotational courses in an appendix to the bylaws of the rotational training program in a systematic and detailed way.

# Annex 1

## Code of Elective Courses

### Elective Courses:

The Faculty of Pharmacy offers elective courses from which the students are free to select eight credit hours ( 4 courses).

Course Code	Course Title	Credit Hours		
		L	P/T	Total
PAE 01	Advanced Pharmaceutical Analysis - Spectroscopy	1	1	2
PAE 02	Therapeutic Drug Monitoring	1	1	2
POE 03	Combinatorial Chemistry and Quantum Mechanics	1	1	2
POE 04	Modern Trends in Drug Synthesis	1	1	2
PDE 05	Drug Targeting	1	1	2
PDE 06	Advanced Medicinal Chemistry	1	1	2
PBE 07	Clinical Nutrition	1	1	2
PBE 08	Cancer Biology	1	1	2
PHE 09	Geriatrics	1	1	2
PHE 010	Advanced Therapeutics	1	1	2
PME 011	Infection control and antimicrobial stewardship	1	1	2
PME 012	Microbiological control of pharmaceutical products:	1	1	2
PTE 013	Nano & Radiopharmaceuticals	1	1	2
PTE 014	Cosmetic Preparations	1	1	2
PGE 015	Complementary & alternative medicine	1	1	2
PGE 016	Production and Manufacture of Medicinal plants	1	1	2

L: Lecture

P: Practical

T: Tutorial

E: Elective

• The College Council offers elective courses from the examples mentioned in the previous table in each level/semester, after taking the opinion of the councils of the specialized scientific departments. The college can add other elective courses after taking the opinion of the councils of the concerned departments and the approval of the College Council. The approval of the University Council is required after giving the necessary justifications.



## مرفق رقم ٢



### Programme Curriculum

### الخطة الدراسية

Table (1)

### Semester (1)

### المستوى الأول - الفصل الدراسي الأول

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Pharmaceutical Analytical Chemistry I	PA 111	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Organic Chemistry I	PO 111	2	1	3	Registration	15	25	50	10	100	2
Pharmacy Orientation	PT 111	1	-	1	Registration	25	--	75	--	100	1
Medicinal Plants	PG 111	2	1	3	Registration	15	25	50	10	100	2
Medical Terminology	PP 111	1	-	1	Registration	25	--	75	--	100	1
Information Technology	UR 111	1	1	2	Registration	15	25	60	---	100	١
Mathematics	NP 111	1	---	1	Registration	25	--	75	--	100	1
Human Rights and Corruption Fighting	UR 112	1	---	1	Registration	25	--	75	--	100	1
<b>Total</b>		<b>11</b>	<b>4</b>	<b>15</b>						<b>800</b>	

○ *Lect.* = Lecture

*Period.* = Periodical

*CW* = course work

*Pract./ Tut.* = Practical / Tutorial

*Wr.* = Written

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



## Table (2)

### Semester (2)

المستوى الأول - الفصل الدراسي الثاني

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Pharmaceutical Analytical Chemistry II	PA 122	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Organic Chemistry II	PO 122	2	1	3	Registration	15	25	50	10	100	2
Cell Biology	PB 121	1	1	2	Registration	15	25	50	10	100	1
Anatomy & Histology	MD 121	2	1	3	Registration	15	25	50	10	100	2
Physical Pharmacy	PT 122	2	1	3	Registration	15	25	50	10	100	2
Pharmacognosy I	PG 122	2	1	3	Registration	15	25	50	10	100	2
Psychology	UR 123	1	-	1	Registration	25	--	75	--	100	1
Communication and Presentation Skills	UR 124	1	-	1	Registration	25	-	75	-	100	1
<b>Total</b>		<b>13</b>	<b>6</b>	<b>19</b>						<b>800</b>	

○ *Lect.* = Lecture

○ *Period.* = Periodical

*CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



**Table (3)**

**Semester (3)**

المستوى الثاني - الفصل الدراسي الأول

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Pharmaceutical Analytical Chemistry III	PA 213	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Organic Chemistry III	PO 213	2	1	3	Registration	15	25	50	10	100	2
Scientific Writing	NP 212	1	-	1	Registration	25	--	75	---	100	1
Pharmacognosy II	PG 213	2	1	3	Registration	15	25	50	10	100	2
Physiology	PH 211	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutics I	PT 213	2	1	3	Registration	15	25	50	10	100	2
<b>Total</b>		<b>11</b>	<b>5</b>	<b>16</b>						<b>600</b>	

○ *Lect.* = Lecture

○ *Period.* = Periodical

*CW*= course work

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



**Table (4)**

**Semester (4)**

**المستوى الثانى - الفصل الدراسى الثانى**

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut .	Wr.	Oral		
Biochemistry I	PB 222	2	1	3	Registration	15	25	50	10	100	2
General Microbiology and Immunology	PM 221	2	1	3	Registration	15	25	50	10	100	2
Instrumental Analysis	PA 224	2	1	3	Registration	15	25	50	10	100	2
Pathophysiology	PH 223	1	1	2	Registration	15	25	50	10	100	1
Pharmaceutics II	PT 224	2	1	3	Registration	15	25	50	10	100	2
Biostatistics	PH 222	1	-	1	Registration	15	--	75	10	100	1
<b>Total</b>		<b>10</b>	<b>5</b>	<b>15</b>						<b>600</b>	

○ *Lect.* = Lecture

○ *Period.* = Periodical

○ *CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written



**Table (5)**

**Semester (5)**

المستوى الثالث - الفصل الدراسي الأول

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Biochemistry II	PB 313	2	1	3	Registration	15	25	50	10	100	2
Parasitology and Virology	PM 312	2	1	3	Registration	15	25	50	10	100	2
Phytochemistry I	PG 314	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutics III	PT 315	2	1	3	Registration	15	25	50	10	100	2
Spectroscopic Identification	PO 314	2	1	3	Registration	15	25	50	10	100	2
Pharmacology I	PH 314	2	1	3	Physiology	15	25	50	10	100	2
<b>Total</b>		<b>12</b>	<b>6</b>	<b>18</b>						<b>600</b>	

- *Lect.* = Lecture
- *Period.* = Periodical
- *CW* = course work
- *Pract./ Tut.* = Practical / Tutorial
- *Wr.* = Written



**Table (6)**

**Semester (6)**

المستوى الثالث - الفصل الدراسي الثاني

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Pharmaceutical Microbiology	PM 323	2	1	3	Registration	15	25	50	10	100	2
Biopharmaceutics and Pharmacokinetics	PT 326	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Phytochemistry II	PG 325	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutics IV	PT 327	2	1	3	Registration	15	25	50	10	100	2
Pharmacology II	PH 325	2	1	3	Physiology	15	25	50	10	100	2
Hospital Pharmacy	PP 322	2	0	2	Registration	15	-	75	10	100	2
<b>Total</b>		<b>12</b>	<b>5</b>	<b>17</b>						<b>600</b>	

○ *Lect.* = Lecture

○ *Period.* = Periodical

○ *CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written



## Table (7)

### Semester (7)

المستوى الرابع - الفصل الدراسي الأول

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Biotechnology	PM 414	2	1	3	Registration	15	25	50	10	100	2
Pharmacology III	PH 416	2	1	3	Physiology	15	25	50	10	100	2
Applied & Forensic Pharmacognosy	PG 416	1	1	2	Registration	15	25	50	10	100	1
Drug Information	PP 413	1	1	2	Registration	15	25	50	10	100	1
Clinical Biochemistry	PB 414	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Technology I	PT 418	2	1	3	Pharmaceutics I	15	25	50	10	100	2
Medicinal Chemistry I	PD 411	2	1	3	Organic Chemistry III	15	25	50	10	100	2
Pharmaceutical Legislations and Regulatory Affairs	PP 414	1	-	1	Registration	25	--	75	--	100	1
Elective	PE---	1	1	2	Registration	15	25	50	10	100	1
<b>Total</b>		<b>14</b>	<b>8</b>	<b>22</b>						<b>900</b>	

○ *Lect.* = Lecture

*Period.* = Periodical

*CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

*Wr.* = Written



**Table (8)**

**Semester (8)**

المستوى الرابع - الفصل الدراسي الثاني

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Clinical Pharmacokinetics	PP 425	2	1	3	Registration	15	25	50	10	100	2
Quality Control and pharmaceutical Analysis	PA 425	2	1	3	Pharmaceutical Analytical Chemistry II	15	25	50	10	100	2
Phytotherapy and Aromatherapy	PG 427	2	1	3	Pharmacognosy I	15	25	50	10	100	2
Therapeutics	PH 427	1	1	2	Pharmacology I	15	25	50	10	100	1
Pharmaceutical Technology II	PT 429	2	1	3	Pharmaceutics I	15	25	50	10	100	2
Community Pharmacy Practice	PP 426	2	1	3	Registration	15	25	50	10	100	2
Medicinal Chemistry II	PD 422	2	1	3	Organic Chemistry III	15	25	50	10	100	2
Elective	PE ---	1	1	2	Registration	15	25	50	10	100	1
<b>Total</b>		<b>14</b>	<b>٨</b>	<b>٢٢</b>						<b>800</b>	

○ *Lect.* = Lecture

*Period.* = Periodical

*CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written



**Table (9)**

**Semester (9)**

**المستوى الخامس - الفصل الدراسي الأول**

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Medical Microbiology	PM 515	2	1	3	General Microbiology	15	25	50	10	100	2
Clinical pharmacy I	PP 517	2	1	3	Pharmacology I	15	25	50	10	100	2
Clinical Research, Pharmacoepidemiology and Pharmacovigilance	PP 518	1	1	2	Registration	15	25	50	10	100	1
Pathology	MD 512	1	1	2	Registration	15	25	50	10	100	1
Good Manufacturing Practice	PT 5110	1	1	2	Registration	15	25	50	10	100	1
Drug Marketing & Pharmacoeconomics	NP 513	2	--	2	Registration	25	---	75	---	100	2
Medicinal Chemistry III	PD 513	2	1	3	Organic Chemistry III	15	25	50	10	100	2
Elective	PE ---	1	1	2	Registration	15	25	50	10	100	1
<b>Total</b>		<b>12</b>	<b>7</b>	<b>19</b>						<b>800</b>	

○ *Lect.* = Lecture

○ *Period.* = Periodical

*CW* = course work

○ *Pract./ Tut.* = Practical / Tutorial

*Wr.* = Written



**Table (10)**

**Semester (10)**

**المستوى الخامس - الفصل الدراسي الثاني**

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period. Activity/CW	Pract./Tut.	Wr.	Oral		
Drug Design	PD 524	2	1	3	Medicinal Chemistry I	15	25	50	10	100	2
Toxicology and Forensic Chemistry	PH 52 <sup>^</sup>	2	1	3	Registration	15	25	50	10	100	2
First Aid	PH 52 <sup>^</sup>	1	--	1	Registration	15	--	75	10	100	1
Research Methodology	NP 524	1	-	1	Registration	25	--	75	--	100	1
Advanced Drug Delivery Systems	PT 5211	1	1	2	Registration	15	25	50	10	100	1
Clinical Pharmacy II & Pharmacotherapeutics	PP 529	1	1	2	Pharmacology II	15	25	50	10	100	1
Entrepreneurship	UR 525	1	-	1	Registration	25	-	75	--	100	1
Public Health	PM 526	2	-	2	Registration	15	-	75	10	100	2
Professional Ethics	NP 525	1	--	1	Registration	٢٥	--	٧٥	--	100	1
Elective	PE ---	1	1	2	Registration	15	25	50	10	100	1
<b>Total</b>		13	5	18						1000	

○ *Lect.* = Lecture

○ *Period.* = Periodical

○ *CW= course work*

○ *Pract./ Tut.* = Practical / Tutorial

○ *Wr.* = Written



## مرفق ٣

### خاص بالمادة (١٩)

## محتوى المقررات الدراسية

### Courses Content

#### **PA 111 Pharmaceutical Analytical Chemistry I (2+1)**

Chemical Kinetics, rate of reaction, first Order reaction, rate law , Second order and third order of reaction, molecularity , Chemical equilibrium, Theories of reaction rate, activation energy and catalysis , Photochemistry, absorbed energy, quantum yield and chemical equilibrium.

Introduction to general chemistry, Types of chemical reactions – calculations of concentrations of substances. Analysis of anions – Analysis of cations – Analysis of mixture of anions and cations.

#### **PA 122 Pharmaceutical Analytical Chemistry II (2+1)**

Acid-Base theory, titration curves, indicators, applications. Titrations in non aqueous media, classification of solvents, theory, applications. Precipitometric titrations: solubility product principle, titration curves, Mohr's method. volhard's method, Fajans' method, pharmaceutical application. Complexometric reactions, theory, reaction with EDTA, indicators, applications.

#### **PA 213 Pharmaceutical Analytical Chemistry III (2+1)**

Redox titrations, theory, oxidation potentials, Nernst equation, titration curves, redox indicators, selected oxidants and reductants, applications of redox titrations . The course also covers applied pharmaceutical analysis such as water analysis (water hardness, analysis of chloride, chlorine, iron, oxidizable matter, ... in water.

Electrochemical methods, electrode potential, reference electrodes, indicator electrode, applications. Conductometric titration : ionic conductance, definition of cell constant, conductance, applications. polarography: Ilkovic equation, dropping mercury electrodes, diffusion current, applications, derivatization polarography.

#### **PA 224 Instrumental Analysis (2+1)**

Spectroscopic methods of analysis which include uv/vis spectroscopy, principal, instrumentation, factors affecting absorption and applications in pharmaceutical analysis. Fluorimetric methods, principal instrumentation, factors affecting fluorescence intensity and applications in pharmaceutical analysis. Atomic spectroscopy; principal and instrumentation.

Chromatographic methods for analytical chemistry which includes: TLC, gel chromatography, column chromatography, HPLC, UPLC, TLC, gas chromatography, capillary electrophoresis.



### **PA 425 Quality Control and Pharmaceutical analysis (2+1)**

This course will cover the following points

I- Good Analytical Practice and Sampling: Introduction, Sampling of pharmaceuticals and related materials, Type of sampling tools, Sampling plans.

II-Documentation

III- Validation of analytical methods according to ICH Guidelines Q2 R1. Compendial testing , Validation of analytical methods, Data elements required for assay validation.

IV- Drug stability, stability studies and stability indicating methods for drugs, Stability testing , Forced degradation studies , stability indicating assay methods for drugs according to ICH Q1 R2 Guidelines. Stress conditions for drug degradation according to ICH Q1 R2 Guidelines. Factors affecting drug degradation, Drug expiration, Drug withdrawal from the market. Pharmaceutical regulations according to FDA & EMA (European medicine agency) and ISO and BSI. Drug-excipient interactions and adduct formation; analytical techniques used to detect drug-excipient compatibility, mechanism of drug-excipient interactions, examples.

V- Official methods of analysis applied to raw materials and end products.

### **PO 111 Pharmaceutical Organic Chemistry I (2+1)**

The objective of this course is to provide students with the basic knowledge in pharmaceutical organic chemistry, which will serve as fundamentals for other courses offered during subsequent semesters. This course involves :Introduction : Atomic Structure, Electronegativity, chemical bonding , Hybridization aspect , Dipole moments , Molecular Orbital theory , Factors Affecting Electron Availability in bonds and individual atoms , Concept of acidity and basicity and Nucleophilicity . Classes of organic compounds1) Saturated hydrocarbons: Alkane and cycloalkane, Conformational isomers. 2) Alkyl halides: Synthesis and nomenclature, Substitution reactions, Elimination reactions.3) Unsaturated hydrocarbons: Alkenes , Alkyne, polyenes . Stereochemistry.

### **PO 122 Pharmaceutical Organic Chemistry II (2+1)**

This course involves different classes of organic compounds:Aromaticity: Aromatic Hydrocarbons, polynuclear Hydrocarbons. Functional groups, Alcohols, phenol, ether and Thioether . Carbonyl containing compounds: Aldehydes & ketones, Acids and its derivatives, Sulphonic acid derivatives. Nitrogen containing compounds: Nitro compounds , Amines, Amino acids and dipeptides .

### **PO 213 Pharmaceutical Organic Chemistry III (2+1)**

This course involves:Nomenclature and Chemistry of organic heterocyclic compounds, five-membered heterocycles, and its fused derivatives (pyrrole, thiopheneFuran and its derivatives, indole, six-membered heterocycles and its Fused derivatives pyridine, quinolines and isoquinolines, Six-membered rings with one or two heteroatoms, and Seven Membered Heterocycles, in addition to Carbohydrate chemistry.



### **PO 314 Spectroscopic Identification (2+1)**

It provides an introduction about the use of different spectroscopic tools, including UV, infrared (IR), nuclear magnetic resonance (NMR) and mass spectrometry (MS) for the structural elucidation of organic compounds. Raman spectroscopy, Mass Spectrometry and  $^1\text{H}$ ,  $^{13}\text{C}$  NMR, Interpretation and conclusions, 2D NMR, 3D NMR in protein Binding, Introduction to NMR based technique in Drug Design

### **PD 411 Medicinal Chemistry I (2+1)**

This course is tailored to assist the students to focus on the chemistry of drugs, particularly an introductory part illustrating the effect of physicochemical properties on drug action, drug-receptor interaction, the molecular aspects governing drugs' pharmacokinetics (ADME) and pharmacodynamics in addition to the in vivo biotransformation of drugs (Drug metabolism). The course also reviews structure activity relationships, mechanisms of action, medicinal uses and syntheses the drugs acting on the autonomic nervous system, cardiovascular drugs, besides the diuretic, antihistamines drugs ( $\text{H}_1$ ,  $\text{H}_2$  blockers and anti-ulcer PPIs) and local anesthetic drugs.

### **PD 422 Medicinal Chemistry II (2+1)**

The course is tailored to assist the students to gain the drugs affecting neurodegenerative disorders, the drug members acting on the central nervous system including CNS depressants and CNS stimulants, drugs controlling pain and inflammation (NSAIDs, prostaglandins, narcotic analgesics and anti-rheumatoid drugs) are also handled. Moreover, steroidal hormones and related drugs are also covered with special emphasis on the structure-activity relationships and modes of action in addition to medicinal uses and side effects of the mentioned classes of drugs.

### **PD 513 Medicinal Chemistry III (2+1)**

The course handles different classes of antibiotics and antimicrobials (natural and synthetic), beside other synthetic chemotherapeutic agents (including antivirals, antifungals, antiprotozoal, anthelmintic and antiparasitics). Additionally, various anticancer therapies and related drugs are also covered. Moreover the course also reviews endocrine-related drugs (Diabetes, thyroid and calcium-regulating agents). The course emphasizes on the chemistry and modes of action, properties, reactivity of drugs and auxiliary substances. Major syntheses, structure-activity relationships, metabolic pathways of the referred classes of drugs will be reviewed.

### **PD 524 Drug Design (2+1)**

The prime objective of this course is to prepare the students for professional practice by understanding the essentials of drug design and how the drugs biological and toxicological activities are strongly correlated to their chemical structures (Structure-activity relationship; SAR), physicochemical properties and metabolic pathways. Focusing on the molecular aspects governing drugs' pharmacokinetics (ADME), pharmacodynamics, optimization of drug action and possible side effects. Additionally, understanding drug interactions are targeted. The course is also designed to familiarize the students with drug design and molecular modelling covering structure-based and ligand-based drug design. This also includes the process of drug discovery and development from target identification until approval of a new drug. Much concern is given to lead structure identification, optimization and targeting certain receptors and enzymes active



sites. Additionally, the course addresses the study of molecular docking, pharmacophore generation, and molecular modifications including prodrug design, stereochemistry alterations, isosteric replacement, drug metabolism and Quantitative Structure-activity relationship (QSAR).

### **PB 121 Cell Biology ( 1+1 )**

The cell theory and cell structure (membranous and non-membranous organelles – cell inclusions and the nucleus). Macromolecules of the cell – DNA and RNA structure and genetic code – From gene to protein (Central dogma) – Cell cycle and control of cell number – Transport of biomolecules across membranes – Ions and voltages – Intercellular communication – cell signaling.

### **PB 222 Biochemistry I (2+1)**

Proteins (structure, biologically important peptides – fate of proteins – folding of peptides) – Amino acids as precursors for biosynthesis of biomolecules (e.g. neurotransmitters, nucleotides,...) – Carbohydrates (glycoproteins and proteoglycans – glucose transporters) – Lipids (physiologically important lipid molecules – cholesterol and steroids – lipoprotein metabolism) – Enzymology (enzyme kinetics – regulation – enzyme inhibitors as drugs) – Hemoglobin and porphyrins (Hb derivatives and types) – Vitamins – Oxidative Stress – Porphyrins.

### **PB 313 Biochemistry II (2+1)**

Energy production from dietary fuels (carbohydrates, lipids and proteins) – Integration of metabolism (Feed/fast cycle) – Nitrogen metabolism and nitrogen balance – Hormonal regulation of metabolism – Inborn errors of metabolism – Biological oxidation.

### **PB 414 Clinical Biochemistry (2+1)**

Biochemical/pathophysiological changes and laboratory diagnostic markers for disorders of (Endocrine glands – Diabetes Mellitus – renal function – hepatic function – gastric function – bone and mineral metabolism – plasma proteins and lipoproteins) – Clinical enzymology and myocardial infarction – Electrolytes, blood gases and acid-base balance – Handling, preservation, storage and analysis of biological samples – Homeostasis and biochemical aspects of hematology and blood analysis – Urine analysis – Tumor markers – Recent diagnostic biomarkers.

### **PG 111 Medicinal Plants (2+1)**

The aim of the course is to provide students with knowledge necessary to identify and prepare a crude drug from the farm to the firm. Students should acquire knowledge concerning dusting powders, plant cytology, physiology and medicinal leafy plants and their taxonomy. In this course, the student will study: importance of natural products, preparation of natural products-derived drugs including collection, storage, preservation and adulteration. The course will introduce the students to the different classes of secondary metabolites. In addition, the course will discuss and address the variability in occurrence of pharmacologically active substances in certain official medicinal leafy plants according to their WHO monographs.



### **PG 122 Pharmacognosy I (2+1)**

Based on the Egyptian flora and other floras of wild and cultivated medicinal plants that are used in the pharmaceutical, cosmetic and food industries in the global & Egyptian market. The course introduces students to some botanical drugs of leaves, flower, seeds, bark and wood origin. During the lectures and practical sessions, students learn to identify examples of these drugs in their entire and powdered forms. Student will learn about the major constituents, folk uses, clinically proven uses, benefits, precautions of those medicinal plants. Possible herbal-drug interactions of selected examples of these drugs and to have an overview over their phytopharmaceuticals available on the market specially the Egyptian market.

### **PG 213 Pharmacognosy II (2+1)**

After completion of the course the student should have the knowledge and skills that enable the student to differentiate between different organs through their monographs. The course comprises the study of identification of different organs through their monographs. (fruits, herbs, Subterranean organs, unorganized drugs in addition to drugs of animal origin) , including identify their active constituents and adulterants describe micro- and macro-morphological characteristics, benefits and precautions of their medicinal uses, side effects and contraindications and to have an overview over their phytopharmaceuticals available on the market specially the Egyptian market.

### **PG 314 Phytochemistry I (2+1)**

Based on complementary medicine and Egyptian medicinal plants that can be used as natural extracts, bioactive raw materials and phytochemical standards to serve the pharmaceuticals, cosmetics and food industries in Egypt. The course aims to gain students the knowledge and skills that enable them to understand, describe and deal with the chemistry of tannins, miscellaneous terpenoids, carbohydrates and glycosides of plant or animal origin and different techniques used for their preparation, identification and determination. Also, the students should become aware of different chromatographic methods used for isolation and analysis of different plant constituents and their pharmacological actions and medicinal uses.

### **PG 325 Phytochemistry II (2+1)**

In continuation with Pharmacognosy I, this course aims to enable students to demonstrate the knowledge and experience that enables them to understand, describe and deal with the chemistry of alkaloids, bitters of plant or animal origin, volatile oils and antioxidants of plant, fungi or animal origin as well as techniques for their isolation, identification and determination in their respective sources. Finally, the course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features.

### **PG 416 Applied & Forensic Pharmacognosy ( 1+1 )**

The course aims to provide pharmacy students with sufficient knowledge concerning quality control from herbal aspects, Sampling, structural, physical and analytical standards, purity, safety and adulteration of drugs and their detection. It also covers the modern chromatographic techniques employed for the evaluation of natural product and their products. It also provides the student with basic knowledge about the application of plant biotechnology for the production of pharmaceutically active materials. The course also include an overview on forensic pharmacognosy including plants and their natural products that



constitute health hazards, or intended for criminal uses to produce abortion, loss of mental control, hallucination, heart arrest.. Also it includes the study of drug dependents, narcotics, analgesics psych energetics, euphoric. Mycotoxin as a serious threat to general health and safety of community, contamination of food material with poisonous fungi.

### **PG 427 Phytotherapy & Aromatherapy (2+1)**

Upon successful completion of this course, the students should be able to know guidelines for prescribing herbal medicinal drugs on the basis of the pharmacological properties of these drugs including therapeutic uses, mechanism of action, dosage, adverse reactions, contraindications & drug interactions. The course also allows students understand pharmacotherapeutic principles applied to the treatment of different diseases, pharmacovigilance and rational use of drugs. Also the student should understand the basis of complementary and alternative medicine with emphasis on herbal remedies, nutritional supplements, homeopathies, aromatherapy & their effect on maintaining optimum health and prevention of chronic diseases. It includes studying of medicinal plants portfolios in relation to Phytopharmaceuticals in the Egyptian Market.

### **PT 111 Pharmacy Orientation (1+0)**

This is a course to acquaint the beginning pharmacy student with the multiple aspects of the profession of pharmacy, including the mission of pharmacy, role of pharmacist in society and pharmacy careers, classification of medications, interpretation of prescriptions and medication orders, general dispensing procedure and factors affecting drug dosage, sources of drugs, different dosage forms and various routes of administration. In addition to the history of pharmacy practice in various civilizations

### **PT 122 Physical Pharmacy (2+1)**

This course provides students with knowledge of physiochemical principles essential for the design and formulation of pharmaceutical products. Students are introduced to the fundamental concepts of states of matter, Phase equilibrium, colligative properties, isotonicity solubility, dissolution, partition coefficient, surface and interfacial phenomena, surface active agents, adsorption and its application in pharmacy and rheological behaviour of dosage forms

### **PT 213 Pharmaceutics I (2+1)**

This course is a study of the system of weights, measures, mathematical expertise and pharmaceutical calculations requisite to the compounding, dispensing, and utilization of drugs in pharmacy practice. It is also concerned with all manufacturing formulations aspects, packaging, storage and stability of liquid dosage forms including solutions (aqueous and non-aqueous), suspensions, emulsions and colloids with emphasis on the technology and pharmaceutical rationale fundamental to their design and development . The incompatibilities occurring during dispensing are also considered

### **PT 224 Pharmaceutics II (2+1)**

This course covers the structure and function of the skin, target area of treatment after topical application to skin, basic principles of diffusion through membranes and factors affecting percutaneous absorption, enhancement of skin penetration, transdermal drug delivery systems (TDDS). It also describes the



principles and techniques involved in the formulation and manufacturing of traditional dermatological semisolid dosage forms (creams, ointments, gels and pastes) and cosmetic products

### **PT 315 Pharmaceutics III ( 2+1)**

The course introduces the students to the kinetics of drug decomposition including rate and order of the reaction, determination of the half-life, expiry date and shelf-life by different methods, stability testing, and in-vitro possible drug/excipients interactions . It also describes the principles and techniques involved in the formulation, and manufacturing of solid dosage forms including powders, granules, tablets, capsules and suppositories.

### **PT 326 Biopharmaceutics and Pharmacokinetics (2+1)**

This course aims to provide students with an understanding of the relation between the physicochemical properties of the drug and its fate in the body. The course explores the principles of biopharmaceutics and strategies for enhancing drug delivery and bioavailability. Integration of knowledge gained from other courses is emphasized to design and assure the quality of drug products. Students will also be introduced to the principles of pharmacokinetics (absorption, distribution, metabolism and elimination). The concepts of bioequivalence, biowaivers and *in vitro-in vivo* correlations (IVIVC's) will be discussed along with different models of drug disposition. The course prepares students for their evolving role in utilizing pharmacokinetics to guide formulation, dosage-regimen design and optimizing drug usage.

### **PT 327 Pharmaceutics IV ( 2+1)**

This course involves principles of formulation, development, sterilization, packaging and quality control testing of pharmaceutical sterile drug products. Principles for calculation and manipulation of parenterals, ophthalmic preparations, vaccines and blood products are emphasized. The course also covers the basic principles of formulation, sterilization, packaging and applications of radiopharmaceuticals in pharmacy and medicine. An in depth study on the formulation, manufacturing, quality control testing and applications of aerosols and other inhalation products is also accentuated.

### **PT 418 Pharmaceutical Technology I (2+1)**

The course provides students with an introduction to industrial pharmacy. It deals with the principles of various unit operations such as heat transfer, evaporation, drying, distillation, filtration, centrifugation, crystallization and extraction. It focuses on the application of these unit operations in pharmaceutical industry with emphasis on the equipment and machines used during the production of different dosage forms.

### **PT 429 Pharmaceutical Technology II (2+1)**

This course is a continuation of the study of the various unit operations in pharmaceutical industry with **emphasis** on size reduction, size separation, size analysis and size enlargement involved in the process development, scale-up and manufacturing of pharmaceutical drug products in industry (conventional / advanced nanotechnology based). In addition to the container/closure systems, some of the packaging processing methods are covered. Moreover, the vision about designing a quality product and its manufacturing process to consistently deliver the intended performance of the product to meet patient needs is discussed by applying Quality-by-Design principles.



### **PT 5110 Good Manufacturing Practice (1+1)**

This course involves the principles of the Current Good Manufacturing Practices (cGMP). It exposes students to all aspects of validation, calibration, inspection and the requirements for manufacturing facilities. It also provides students with a review of the process engineering, technology transfer, personnel management, training and hygiene, premises and contamination control, documentation and auditing, process deviation with emphasis on risk management, complaint handling and product recall theory.

### **PT 5211 Advanced Drug Delivery Systems (1+1)**

The course aims to provide students with insights and competencies related to the principles of pharmaceutical pre-formulation as a gateway to dosage forms design and formulation. Emphasis is placed on developing formulations based on the physical and chemical properties of the drug substance and the intended use of the drug product. The course also introduces the students to the formulation principles and applications of novel and targeted drug delivery systems by transforming proteins, genes, and other biotechnology driven compounds into therapeutic products. In addition to formulation aspects of biotechnology derived pharmaceuticals, it also covers the application of polymers and excipients to solve problems/issues concerning the optimization of absorption, selective transport, and targeting.

### **PM 221 General Microbiology and Immunology (2+1)**

The course provides students with a combination of laboratory and theoretical experience exploring the general aspects of microbiology. It includes knowledge of microorganisms, their morphology, diversity, cell structure and function, cultural characteristics, identification of microorganisms, microbial nutrition. It also explores the basic concepts microbial growth, cultivation and reproduction. It also clarifies different mechanisms of transport across bacterial cell membrane. The course also covers the principles of genetic characters including DNA and RNA structures, replication, different forms of mutation and mutagenic agents. Moreover, it introduces the modern concepts of medical immunology, with an emphasis on host parasite relationship, Non-specific and specific immunity, Mechanism of protective immunity. Molecular and cellular immunology, including antigen and antibody structure, function and reaction between them, effect or mechanisms, complement, and cell mediated immunity and in vitro antigen antibody reactions

### **PM 312 Parasitology and Virology (2 +1)**

Part of this course will focus on parasitic infections of humans with knowledge concerning biological, epidemiological and ecological aspects of parasites causing diseases to humans with special attention to different parasitological related diseases in Egypt causing serious health problems. This part of the course will discuss medical helminthology, protozoology and entomology concerning their morphological features, life cycle, pathogenesis, clinical manifestations, different diagnostic techniques, the most recent lines of treatment and prevention with control strategy for each parasitic infection. Moreover, it also cover laboratory diagnosis of human parasitic infections. The other part of the course provides students with the essential knowledge to recognize the epidemiology, mechanisms of pathogenesis, clinical picture, methods of laboratory diagnosis, treatment, prevention and control measures of RNA and DNA viral infections in humans.



### **PM 323 Pharmaceutical Microbiology (2+1)**

This course describes in detail the physical and chemical methods of bacterial eradication and how to effectively control microbial growth in the field of pharmaceutical industry / hospitals. It further describes the means of preservation of pharmaceutical products, as well as cosmetics. Sterilization, sterilization indicators, sterility testing and aseptic area. Validation of sterilization process. Moreover, it explains the different groups of antimicrobials, their mechanism of action and resistance of microbes to biocides. Microbiological evaluation of antiseptics, disinfectants and preservatives. Antibiotics, classification and mechanism of action including the new categories and new approaches to overcome bacterial resistance & antibiotics clinical abuse. Antiviral and antifungal agents. Assay of antimicrobial activity

### **PM 414 Biotechnology (2+1)**

Introduction to biotechnology, fermentation technology, fermentation process and fermenters, Fermented products (Antibiotics, vitamins, amino acids, interferons, interleukins, monoclonal antibodies, vaccines and etc.... Bioremediation, N<sub>2</sub> fixation, detection and monitoring of genetically engineered microorganisms. Genetic Engineering, PCR, Recombinant DNA Technology and Applications of recombinant DNA in the pharmaceutical and medical fields. Basics of Gene therapy and its applications in monogenic and polygenic disorders. Other modern techniques of environmental microbiology.

### **PM 515 Medical Microbiology (2+1)**

The course aims at studying microorganisms causing infectious disease in human beings. The infectious diseases, their etiology, pathogenesis and clinical manifestation, routes of transmission, treatment and techniques in detection and identification of pathogenic bacteria and fungi of major significance to public health will be studied. The course also focusses on immunological diseases and disorders in immunity including hypersensitivity, immuno-deficiency disorders, autoimmunity and auto-immune diseases and organ transplantation.

### **MD 512 Pathology (1+1)**

The main aim of Pathology course is to provide students with knowledge and skills for common diseases affecting body organs and system. It helps the student to understand the causes (etiology) of disease, the mechanisms of its development (pathogenesis) and the associated alterations of structure (morphologic changes) and function (clinical manifestations and complications) to be able to determine the most likely diagnosis of the disease.

### **PM 526 Public Health (2+0)**

This course aims at understanding all scientific disciplines required for health education and promotion directed to the community health. How epidemiology acts as the bases of public health actions will be taught. Detailed scientific information and practices programs will be provided for nosocomial infections, control of communicable, non-communicable diseases including **active and passive immunization**, improving mental, social, environmental, occupational, geriatric and family health, use of sufficient and balanced food and nutrition, supplying safe drinking water, treating and disposing wastes and proper intervention during disasters



### **MD 121 Anatomy & Histology (2+1)**

Histology: Cytology, various tissues (epithelial, connective, muscular, and nervous), heart, blood vessels, lymphatic organs, skin and its appendages, systems (digestive and associated glands, respiratory, urinary, reproductive, and central nervous system), endocrine glands, and eye.

Anatomy : Introduction to skeletal, muscular, and articular systems, fascia, nervous, cardiovascular, and lymphatic systems, digestive, respiratory, and urogenital systems, endocrine glands. Cytology: blood, liver, spleen, lung, kidney, lymph node, cardiac muscle, aorta, stomach, and intestine.

### **PH 211 Physiology (2+1)**

Physiology: Introduction to body water, homeostasis, transport of materials, nervous systems, neuron structure and function (reflex arc), cardiovascular system, blood, respiratory cycle, gastrointestinal, reproductive, and renal systems, endocrine glands and body temperature regulation.

### **PH 222 Biostatistics (1+0)**

This course provides basic concepts of biostatistics and data analysis. It includes introduction to descriptive and inferential statistics, interpretation of estimates, confidence intervals and significance tests, elementary concepts of probability and sampling; binomial and normal distribution, basic concepts of hypothesis testing, estimation and confidence intervals, t-test and chi-square test, linear regression theory and the analysis of variance.

### **PH 223 Pathophysiology (1+1)**

Pathophysiology: Introduction to pathophysiology, cell injury, inflammation and immune response, autonomic nervous system in health and disease, endocrine disorders, pancreatic disorders, fluid and electrolyte imbalance, vascular and haematological disorders, disease of urinary, pulmonary and digestive systems.

### **PH 314 Pharmacology-I (2+1)**

The general principles of pharmacology are presented; such as pharmacokinetics, pharmacodynamics, receptor theory, drug interaction and principle of therapeutics. This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology to disease processes regarding the autonomic, neuromuscular and autacoids.

### **PH 325 Pharmacology-II (2+1)**

This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding drugs acting on cardiovascular systems, gastro-intestinal tract, pulmonary systems and hematologic disorders. Anti-hyperlipidemic drugs are also included. Chemotherapeutic drugs including antimicrobials & anticancer are also included

### **PH 416 Pharmacology-III (2+1)**

This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding drugs acting on endocrine system and central nervous system.



Immunosuppressant are within the scope of the course. Stem cell therapy is also included. The anti-inflammatory, analgesics as well as gout treatments are also included.

### **PH 427 Therapeutics (1+1)**

The course provides the classification, symptoms, principles of therapy & treatment of certain common diseases: Cardiovascular diseases, gastro-intestinal tract disease, pulmonary disease & endocrine abnormalities.

### **PH 52<sup>^</sup> Toxicology & Forensic Chemistry (2+1)**

This course provides basics and concepts of toxicology including the mechanism of toxicity, target organ and treatment of toxicity. Toxic groups including heavy metals, toxic gases, animal, plant and marine poisons, pesticides and radiation hazards are covered. Environmental, occupational, reproductive and genetic toxicology as well as drug abuse are included. Postmortem sampling for detection of poisons, methods of detection, interpretation of results and writing of a report are also covered.

### **PH 52<sup>^</sup> First Aid (1+0)**

The course covers topics of basic life support and medical emergency of different situations including bleeding, shock, poisoning, bone fractures, soft tissue injuries, rescue and transportation. It includes: introduction to first aid ABCs, medical emergencies, effect of temperature, transportation of an injured casualty & first aid kit, respiratory emergencies, fractures and dislocations, bleeding and surgical emergencies, burns and scalds, animal bites or stings and poisoning.

### **PP 111 Medical Terminology (1+0)**

Introduction to medical and pharmaceutical terminologies, medical abbreviations, medical idioms, suffixes and prefixes, medical terms pertaining to major body systems.

### **PP 322 Hospital Pharmacy (2 +0)**

The course aims to introduces students to hospital pharmacy organization, structure, management and related activities on both technical and administrative levels in accordance with national and international established guidelines. Administrative services include: the pharmacy, the pharmacy and therapeutic committee and policy making, the hospital formulary, medication purchasing, distribution and dispensing systems. The pharmaceutical (technical) services include: preparation of Intravenous (IV) admixtures, total parenteral nutrition (TPN) fluids, renal dialysis fluids, dispensing and safe handling of radiopharmaceuticals, cytotoxic drugs, and medical gases.

### **PP 413 Drug Information ( 1+1)**

This course introduces the student to the concept and need of drug information, types of drug information resources (primary, secondary and tertiary literature), computerized and online drug information, literature evaluation and critical appraisal, retrieval of information. It also aims at providing the students with the professional skills required to effectively and accurately answer medication-related questions in a systematic and evidence based approach.



#### **PP 414 Pharmaceutical Legislations and Regulatory Affairs (1+0)**

A detailed presentation of law that governs and affects the practice of pharmacy, legal principles for non-controlled and controlled prescriptions, OTC drug requirements, opening new pharmacies, opening medical stores, opening factories, opening scientific offices, medicine registration, pharmacies and medicine stores management. Pharmacist duties and responsibilities, pharmacist-patient relationship, patient's rights and ethical principles and moral rules.

#### **PP 425 Clinical Pharmacokinetics (2+1)**

This course provides basic principles of pharmacokinetics and their application to the clinical setting. Single Intravenous bolus and oral kinetics, IV infusion, multiple IV bolus, short infusion & oral dosing, non-linear pharmacokinetics, pharmacokinetic models. Sources of variability in pharmacokinetics, dosage regimen and dosage adjustment in children, obese, elderly patients and chronic disease states. Therapeutic drug monitoring and pharmacogenomics approaches.

#### **PP 426 Community Pharmacy Practice (2+1)**

The course provides students with competencies and knowledge for the provision of quality pharmaceutical care in a community pharmacy setting aiming at improving use of medicines and therapeutic outcomes. The course covers differentiation between minor and major ailments and responding to minor ailments with over-the-counter products. It also provides concepts of patient assessment, counseling, and monitoring in community pharmacy and in outpatient care settings and introduces students to pharmaceutical care services for chronic-diseased outpatients and to psychosocial aspects in patient care. In addition, the course provides the students with competencies to promote the public health role of pharmacist including health promotion and disease prevention activities

#### **PP 517 Clinical Pharmacy I (2+1)**

Definition and concepts of clinical pharmacy and pharmaceutical care, and qualification to become a clinical pharmacist. Patient history, medication reconciliation, therapeutic planning and drug-related problems. Interpretation of clinical laboratory data and physical examination. Providing Medication Therapy management services. Principles of special care populations (geriatric, pediatric, renal and hepatic patients, obesity & pregnancy & lactation). The course also introduces the student to the principles of management and supportive care of oncological diseases, blood disorders and nutritional deficiencies.

#### **PP 518 Clinical research, Pharmacoepidemiology and Pharmacovigilance (1+1)**

This course introduces the student to the basic principles of clinical research, design of research studies, types of research studies, clinical trials, statistical presentation of research data and ethical guidelines in drug research. This course addresses a range of study designs and analytic techniques for observational studies on the utilization, safety, and effectiveness of pharmaceuticals. Students will develop an understanding of how to plan, implement, analyse, and criticize pharmacoepidemiological studies. This course also provides the student's with understanding of pharmacovigilance importance, concept, processes, systems, global safety standards and regulations and reporting systems.



### **PP 529 Clinical Pharmacy II& Pharmacotherapeutics (1+1)**

The course introduces the student to the principles of pharmacotherapeutics & management of the common disease states (e.g. obstetrics and gynecology, rheumatic diseases, renal diseases, CNS diseases).

### **UR 111 Information Technology (1+1)**

This course tends to provide students of all university's faculties with a brief introduction to the world of computers and the concept of information technology including: number systems and data representation, computer system components: hardware & software, storage and input/output systems, Operating systems and Utility Systems, software applications. Also it gives an overview about computer networks and internet: data communication, transmission modes, transmission media, computer networks, internet protocol, and internet services. It practices some computer applications in the laboratory such as Internet Access, word processing and power point. It gives students a practical experience on developing projects related to the specialty of each faculty.

### **UR 112 Human Rights and Corruption Fighting ( 1 + 0 )**

يغطي هذا المقرر الموضوعات التالية: حقوق الإنسان في القانون الجنائي، حق الإنسان في تغيير جنسيته أو التخلي عن إحدى جنسياته، المواثيق الدولية المتعلقة بحماية حقوق الإنسان، علاقة العولمة والتنمية بالتحقق الاقتصادية والاجتماعية والثقافية، الحقوق الاقتصادية والاجتماعية والثقافية للإنسان، حقوق الإنسان في الشريعة الإسلامية، حقوق المرأة في قانوني العمل والتأمين الاجتماعي، حقوق الإنسان في التقاضي، الحقوق المدنية والسياسية للإنسان

### **UR 123 Psychology (1+0)**

The course introduces different principles, theories and vocabulary of psychology as a science. The course also aims to provide students with basic concepts of social psychology, medical sociology and interpersonal communication which relate to the pharmacy practice system that involves patients, pharmacists, physicians, nurses and other health care professionals.

### **UR 124 Communication and Presentation skills ( 1+0 )**

**Communication skills:** The course will help students develop necessary written and oral communication and presentation skills to improve inter- and intra-professional collaboration and communication with health care providers and patients .

**Presentation skills:** The course describes list elements of successful presentations, mention types and methods of presentations. and how how to prepare presentation including selection & use of the media .the course also describes how to develop a personal style of presentation ,describe how to deal with speaking anxiety, explain how to capture an audience's attention .

### **UR 525 Entrepreneurship (1+0)**

This course is designed to enhance a student's knowledge in leadership, business, and financial skills in pharmacy practice while learning the traits of an entrepreneur, current topics in entrepreneurship with a specific focus on pharmacy practice and patient care programs. This course will teach the participants a comprehensive set of critical skills needed to develop a profitable business project. This course is



designed to provide the students the personal and business tools including risk-taking, strategic planning, marketing, competitiveness, and social responsibility to make the transition from the academic environment to the daily practice of pharmacy now and in the future, with an emphasis on entrepreneurship.

### **NP 111 Mathematics (1+0)**

Functions and graphs, limits and continuity, differentiation, exponential, logarithmic, and trigonometric functions, integration, basic differential equations, functions of several variables and problems related to them, probability and random variables, and hypothesis testing.

### **NP 212 Scientific Writing ( 1 + 0 )**

This course is designed to introduce students to the principles of good scientific writing, to be familiar with basic structure of scientific reports and research articles. It covers methods of paraphrasing, common mistakes in scientific writing, different writing styles, how to write a scientific report, proposal and manuscript, appropriate use of tables and figures in data presentation and evaluation of literature and information sources.

### **NP 513 Drug Marketing & Pharmacoeconomics ( 2 + 0 )**

#### **Pharmacoeconomics**

the basic concepts of health economics, learning basic terms of health economics and understand key principles. Topics cover the economic mechanisms of health care markets as market failures, and government intervention. The course covers the key components of health care financing, and some methods of how to contain health care expenditure. Alongside the major definitions in health technology assessment, students should have an overview about different types of economic evaluation, budget impact analysis and their uses. Moreover, students should get familiar with different methods of pricing among which value-based pricing.

#### **Drug Marketing**

The objective of this course is to introduce students to the concepts, analyses, and activities that comprise marketing management, and to provide practice in assessing and solving marketing problems. The course is also a foundation for advanced electives in Marketing as well as other business/social disciplines. Topics include marketing strategy, customer behavior, segmentation, market research, product management, pricing, promotion, sales force management and competitive analysis.

### **NP 524 Research Methodology (1 + 0)**

The course considers the nature of scientific knowledge and investigates various processes involved in research. Both the quantitative and qualitative approaches will be studied. The course covers the sources of knowledge, the scientific method in research, and the ethics of research. The important steps in planning a research project, sampling techniques and measurement tools necessary for conducting a research project will be covered. The course also discusses the considerations involved in writing a research report.



### **NP 525 Professional Ethics (1 + 0)**

Professional ethics provides general principles and history of pharmacy ethics, general principles of medical ethics, conflicts of interests and its management pharmacists relationship with society and family, ethics in disaster, medication error, research ethics and animal ethics.

### **PAE 01 Advanced Pharmaceutical Analysis - Spectroscopy (1+1)**

Advanced Pharmaceutical applications of different instrumental methods of analysis including UV/Visible spectrophotometry, synchronous fluorimetry, chemiluminescence atomic spectroscopy, mass spectroscopy and nanoanalysis.

### **PAE 02 Therapeutic Drug Monitoring (1+1)**

Introduction, serum drug concentrations, drug protein binding, therapeutic drug monitoring of some typical drug classes eg. Antidepressants, benzodiazepines, antipsychotics, antiarrhythmic drugs, toxicological drug monitoring.

### **POE 03 Combinatorial Chemistry and Quantum Mechanics (1+1)**

It includes: Combinatorial chemistry: Introduction, Applications and Techniques.

Target Identification, Biosensors from quantum mechanics and drug design points of view, virtual libraries and molecular modeling, NMR as quantum mechanics based technique in Drug Design, cheminformatics. Application of quantum mechanics and molecular modeling calculations by modern softwares.

### **POE 04 Modern Trends in Drug Synthesis (1+1)**

This course introduces the concepts and applications of some new techniques in drug synthesis. Green chemistry of new efficient environmentally friendly methods. Stereochemistry aspects of regulation of chiral drugs, chiral switches of drugs, and diastereomeric interactions. Polymer Chemistry: polymerization mechanisms, properties and applications of polymers in drug industry. Practical applications of modern synthetic techniques.

### **PDE 05 Drug Targeting (1+1)**

The course covers different divisions such as the fundamental concepts of drug – receptor interaction, the different sites of drug action, including enzymes, receptors and nucleic acids, different methods used to increase drug specificity and delivery of drugs to specific target sites and finally applications and examples of different drug classes.

### **PDE 06 Advanced Medicinal Chemistry (1+1)**

The course is intended to give advanced knowledge in design, synthesis and biological evaluation of small organic substances as potential lead compounds. Conformational analysis and basic cheminformatics; force-field, energy minimization, 3Ds, pharmacophore identification, Sub-structure search, similarity search, databases. Physico-chemical properties: drug-likeness, design (diversity, scaffold-hopping). Combi, click chemistry, libraries and green chemistry. Proteins: structures, protein-ligand interactions, sequence/structure homology, structure-based design, docking. Synthesis of substances; Retrosynthetic analysis, Diversity-oriented synthesis, Scaffold-based synthesis. Biological evaluation of substances; Cell-free assays, Whole cell assays, Animal assays.



### **PBE 07 Clinical Nutrition (1+1)**

Macronutrients – Micronutrients – Energy Balance – Obesity & Management of Obesity – Nutrition in pregnancy - Nutrition in pediatrics & geriatrics – Nutrition in liver disease – Nutrition in kidney disease – Nutrition in G.I.T disorders – Nutrition in Respiratory disorders – Food Allergy.

### **PBE 08 Cancer Biology (1+1)**

DNA replication and its repair – Transcription and post-transcriptional modifications – Translation – Oncogenes & Proto-oncogenes -Normal cell vs. Cancer cell – Cell Cycle & check points – Apoptosis & Necrosis – Tumor Markers – Autophagy-Angiogenesis.

### **PHE 09 Geriatrics (1+1)**

The course integrates the critical issues of aging, and the importance of team-based health care for geriatric patients in long term care facilities. The Geriatrics course is designed to provide students with the knowledge, skills, and experience to recognize and approach common problems in older adults in inpatient and outpatient settings as well as in the nursing home, common disease in old ages (neurodegenerative disease, osteoarthritis, fall & dizziness, hypertension, ischemic heart disease, arrhythmias and stroke).

### **PHE 010 Advanced therapeutics: (1+1)**

The course provides the classification, symptoms, principles of therapy & treatment of certain disease (Autonomic nervous system disorders, peripheral vascular disorder, hematological disorder & special sense including eye, ear & skin).

### **PME 011 Infection control and antimicrobial stewardship (1+1)**

The course includes infection prevention and control practices, the chain of infection, standard and transmission-based precautions, barriers and use of personal protective equipment, strategies for preventing the spread of infectious disease to healthcare workers and patients and disposal of biohazard waste. The course also addresses the improvement of antimicrobial agents prescription in the clinical practice through the application of stewardship programs in medical institutions. The course focuses on all elements and considerations required for the establishment and implementation of a successful antimicrobial policy.

### **PME 012 Microbiological control of pharmaceutical products (1+1)**

The course includes methods for quantitative estimation of the biological activity of antimicrobial agents and vaccines according to pharmacopeias. The microbial estimation of non-sterile pharmaceutical products according to USP. Determination of endotoxin limit in sterile pharmaceutical products by LAL test according to USP. Assay of antiviral agents.

### **PTE 013 Nano & Radiopharmaceuticals (1+1)**

Introduction to nanotechnology, nano-disperse system including (nano-emulsion and nano-suspension) - preparation and their application - nano-particles (nano-crystals and polymeric nano-particles) preparation and their application and nano-metals (silver, gold, carbon and nano-tube).