Faculty of Pharmacy

Accredit from the National Authority for Quality Assurance and Accreditation of Education (NAQAAE). Resolution number 155, June 27, 2016

Internal Bylaws

For

Bachelor of Pharmacy - PharmD (Clinical Pharmacy) Program

Credit Hours System

2023

Contents

Introduction

Historical Background

The Faculty of Pharmacy, Alexandria University, is considered one of the leading faculties in pharmacy education in Egypt. It started as the School of Pharmacy in 1947, as part of the Faculty of Medicine at Farouk the 1st University. In November 1956, Law No. 245 was issued to transform the School of Pharmacy into an independent faculty in Alexandria University. The duration of the study was three years preceded by a preparatory year. Later, it became four years after the preparatory year where the first class graduated with a five-year study system was in 1964. The academic degree awarded by the faculty was the Bachelor of Pharmacy and Pharmaceutical Chemistry, and it was changed to the bachelor's degree in Pharmaceutical Sciences in the year 1970, and then to the Bachelor of Pharmacy degree in 2014.

The faculty had four academic departments when it was established: Pharmaceutics (including microbiology), chemistry (including analytical chemistry), pharmacognosy and pharmacology. Then, the departments became seven, which are (1) pharmaceutics, (2) pharmaceutical chemistry, (3) pharmaceutical analytical chemistry, (4) pharmacognosy, and (5) pharmacology and toxicology, (6) industrial pharmacy and (7) microbiology and immunology. Recently, the Department of pharmaceutical biochemistry was added to the academic structure of the faculty, and finally a ninth department, the department of Clinical Pharmacy and Pharmacy Practice, was added in 2019.

In view of the great increase in the number of students admitted to the faculty over the years, the university created a new building to accommodate the increasing numbers of students. The construction work began in that building in 1995, and the cost of construction reached 25 million Egyptian pounds from the state budget, and it was furnished with contributions from pharmaceutical companies and graduates of the faculty until it opened in October 2003.

Because of the faculty devotion to enhancement of its educational programs to keep up with pace of development in the pharmacy profession, the faculty introduced the "Bachelor of Clinical Pharmacy" program in September 2009, where the first intake of this program graduated in June 2014. During recent years the faculty started taking steps towards institutional accreditation and accreditation of educational programs in accordance with the standards of "The National Authority for Quality Assurance and Accreditation of Education – NAQAAE". The faculty was awarded the accreditation by Resolution No. 155 dated 27/6/2016 from NAQAAE and this accreditation was renewed in 2021.

Development of the Faculty Regulations:

The "Bachelor of Pharmacy" program for study in the faculty was in accordance with the regulations issued by Ministerial Resolution No. 10 of 8/1/1970, and amendments were made to some provisions of the internal regulations in the years 1974, 1994, 1995, 1998 and 2007. The study in the old program of Bachelor of Pharmacy was not credit hours system, but rather extended semesters. On the other hand, the Bachelor of clinical pharmacy is a credit hours system program. Both programs were 5-year programs.

In 2019, the current (5+1) Bachelor of Pharmacy - PharmD (Clinical Pharmacy) program was introduced. It is a credit hours system in accordance with the directives of the Alexandria University and the Pharmaceutical Studies Sector Committee and has been prepared in accordance with the National Academic Reference Standards (NARS) mentioned in the second edition dated April 2017 and based on competencies.

Faculty Vision, Mission, and Goals

Vision:

Achieving excellence in pharmacy education and practice both regionally and globally.

Mission:

The Faculty of Pharmacy at Alexandria University is committed to provide the regional community with distinguished pharmacists; scientifically, professionally and ethically, capable of promoting the healthcare system and pharmaceutical industries via excellent education, endorsing innovation, scientific research and entrepreneurship as well as social engagement.

Values:

- Creativity and innovation
- Quality and excellence
- Teamwork and team spirit
- Commitment
- Freedom of thinking
- Justice and equity
- Integrity and transparency

Aims:

- Updating all programs and curricula taught at the faculty to keep pace with the developments in the field of pharmaceutical sciences.
- Supporting scientific research in the field of pharmaceutical sciences.
- Enhancing community engagement and environmental development.
- Developing performance and raising the efficiency of the financial and administrative systems.

Academic Departments

Code	Department
01	Pharmaceutics
02	Pharmacology and Toxicology
03	Industrial Pharmacy
04	Microbiology and Immunology
05	Pharmaceutical Chemistry

06	Pharmacognosy
07	Pharmaceutical Analytical Chemistry
08	Pharmaceutical Biochemistry
09	Clinical Pharmacy and Pharmacy Practice

Internal Bylaws

Article (1): Program vision, mission and aims.

Program vision: Achieving scientific excellence and continuous development to serve the therapeutic health-care system and reach a world-class position in the field of clinical pharmacy.

Program mission: Preparing qualified pharmacists with the latest pharmacy and medical concepts that can contribute to raising the efficiency of the health-care system at the local and regional levels through dealing with the health team in hospitals and providing pharmaceutical services at a professional level in public and private pharmacies, pharmaceutical factories, drug control laboratories and food analysis, in addition to working in the field of drug information and marketing, and actively participating in scientific research through research centers and universities to serve the community.

Program aims:

- Focusing on the pharmacist's role in providing the appropriate health care to the patient inside and outside hospitals by following up the patient's medication regimen and studying the principles of clinical pharmacokinetics and their applications in treatment in various pathological conditions and finding appropriate treatment regimes in cooperation with the attending physician which results in improving patient health care and reducing drug interactions.
- Graduating a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories and food analysis, and working in the field of marketing, research, and universities.
- Increasing the competitiveness of graduates of the program at the regional level through study and training programs.
- Participating in community service, developing the environment, and providing solid economic return through rationalizing the use of medicines in hospitals.
- Commitment to achieving quality standards in pharmacy education through interactive learning and self-learning.

Article (2): Academic degree awarded to the graduates.

Upon the request of the Faculty Council, the University Council awards the Bachelor of Pharmacy - PharmD - (Clinical Pharmacy) degree according to the credit hours system.

Article (3): Qualifications for higher academic degrees

The Bachelor of Pharmacy -PharmD - (Clinical Pharmacy) degree is the first university degree in the field of pharmacy necessary to obtain a license to practice the profession in all available pharmacy fields, and the graduate qualifies for registration for the master's degree and diplomas in any of the academic departments of the faculty.

Article (4): Education system

The duration of the study in the program is five academic years (five levels over ten semesters) and a mandatory advanced training year as an internship year (5 + 1) according to the credit hours system in addition to 100 hours of introductory pharmacy field training hours in private and government pharmacies and hospital pharmacies that take place during the summer holidays after the end of the third or fourth level and before starting the mandatory advanced training year.

Each academic level 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 for six to eight weeks of intensive study. The study in the summer semester is optional, whether for the student or the lecturer who teaches the course according to the facilities available in the faculty. Courses can be taught fully or partially electronically, and students can be assessed, and exams can be taken electronically.

The credit hour is the unit of study and is equivalent to one contact hour of theoretical weekly study or two contact hours of practical lessons in one semester (15 weeks), or four contact hours of field training per week in a semester (a total of 48 contact hour of field training is equivalent to one credit hour per semester).

After taking the opinion of the councils of the scientific departments, the Faculty Council may decide to teach one or more courses in the blended education (hybrid) mode so that the courses are studied at a rate of 60% face to face and 40% for distance education or any other percentage approved by the Faculty Council after taking the opinion of the relevant department council according to the nature of the course. The decision of the Faculty Council is submitted to the University's Education and Student Affairs Committee for approval in preparation for raising it to the University Council for approval.

Article (5): Program design and teaching methods

The total number of credit hours in the study plan is 177 credit hours (169 compulsory hours + 8 hours elective courses to be chosen from the list determined by the faculty), in addition to the university requirements, which are 6 credit hours of compulsory courses (2 credit hours for societal issues + 2 credit hours for Critical Thinking course + 2 credit hours for the Entrepreneurship and Innovation course). In addition to 8 elective credit hours from courses delivered by other faculties in the university. The university requirements whether mandatory or elective courses are graded as pass/fail and are not included in the cumulative Grade Point Average (cGPA).

Learning system is through theoretical lectures, group discussions, practical sessions, workshops, field training, research and presentation of proposals, in addition to cooperation with the community surrounding the university and learning through the work environment.

Article (6): Registration

The faculty assigns for each group of students an academic advisor from the faculty members who performs the tasks of care and guidance and is responsible for the student in scientific, social, and psychological affairs and guides him/her in everything related to the university life and assists students in choosing courses from the list of courses offered by the faculty in each semester. Each student must personally register the courses he/she wishes to study in each semester. However, the courses and the number of credit hours should be chosen via consultation with the academic advisor.

For a course to be registered, the student must successfully pass its pre-requisite. The Faculty Council shall, in cases of extreme necessity allow the student to register some courses along with their pre-requisite that the student did not successfully pass before, if the academic load available to the student is less than 12 credit hours (see the following - Paragraph A - the academic load), provided that a declaration is written with the knowledge of the student's parent (guardian) that their son/daughter success in this course will not be approved unless he/she passes the pre-requisite which he/she were allowed to co-register.

The student should fill out the registration form of the courses at the specified times according to the announced university calendar for each academic semester, and it is not permissible to attend the courses until after the registration process is completed.

The student is not allowed to register later than the specified periods for registration except with a compulsory excuse accepted by the faculty dean, provided that the delay period does not exceed a week from the end of the registration dates.

A- The academic load

A- Academic load

Academic load is the number of credit hours a student registers in one semester and it must be taken into account that the student's registered academic load in any semester should not be less than 12 credit hours and not more than 22 credit hours. For students with under achievement, the registered academic load should not exceed 12 credit hours (see article 13).

The academic load during the summer semester, is of a maximum of 10 credit hours. The Faculty Council may allow the student in the last two semesters to increase the academic load from the maximum with not more than 3 credit hours (the student uses this privilege once).

B- Add, drop and withdrawal:

After completing the registration procedures, the student may add or drop a course or more in any semester, provided that this is during the specified periods according to the announced university calendar for each semester taking into consideration the minimum and maximum academic loads.

After registration, the student may also withdraw from one or more courses in any semester without being considered failing in this course, if he/she submits the request to withdraw during the specified periods according to the university calendar announced for each semester.

Article (7): Attendance

A) Attendance

The student must attend the theoretical lectures, group discussions, practical sessions, field training and assignments, and the Faculty Council, upon the request of the councils of the relevant scientific departments, may forbid the student from attending the final written examination if his/her absence

exceeds 25% of the total contact hours for each course. The student gets a grade of (FW) and he/she must re-sit the course.

B) Attending exam, absence and breaching the rules of the exams

The student must sit for the final written exams according to the dates determined as per the university calendar announced for each semester. The student is not considered to be a failure in case of absence for a compulsive excuse accepted by the Faculty Council. The student or his/her parent (guardian) must complete "Incomplete Course Request", and an "Incomplete (I)" temporary assessment is calculated for this course.

Article (8): Study language

Study in this program is in English. However, some courses may be taught in Arabic based on the recommendation of the relevant scientific department and the approval of the Faculty and University Councils.

Article (9): Field of training

A - Introductory field training (100 actual training hours):

The student must complete a period of introductory pharmacy practice experience (IPPE) during summer field training with a total number of 100 actual training hours, in private and government pharmacies and hospital pharmacies sites approved by the Faculty Council, under the supervision of a faculty member and training is conducted during summer vacations after the end of the third or fourth level of study.

B- Advanced Field Training (Internship Year):

After completing the academic years, the student must complete the advanced field training year which is an advance pharmacy practice experience (APPE) (internship year), and it is divided into six training rounds with a minimum of four rounds within hospitals that apply the clinical pharmacy practice, and one round is devoted to training in the pharmaceutical field (manufacturing - drug control - ... etc.). The training program includes an integrated and systematic training in a rotating, periodic manner recorded in hours and training tasks and under close supervision from the faculty and the training team. It also offers a **graduation project** in a specific specialty that contributes to preparing the student for this specialization. The graduate can work, later, in this field for two years, after which he/she becomes a specialized pharmacist able to provide clinical pharmacy services or various pharmacy practices. (detailed bylaws of the advanced field training year will be added).

Student evaluation during training depends on attendance and performance and the submission of assignments determined by internal and external supervisors for training during this period. Marks are deducted from the student who does not meet the deadlines. If the student provides an acceptable excuse for the training supervisor, he/she can make up for absentee days in another week or in an evening training period depending on the nature of the training site and he/she is not awarded a training certificate unless the training hours are spent in full. The student is considered to have failed during the training period if his/her absence exceeds 25% of the total hours allocated for training and has not made an acceptable excuse to compensate for the period of his/her absence from attendance.

Article (10): Admission requirements

It is required for those applying to join the program to fulfill all the conditions specified by the Supreme Council of Universities (SCU).

Transfer of students enrolled in a similar program in one of the pharmacy colleges in Egyptian or foreign universities may be accepted, provided that the student meets the requirements for admission of the Faculty of Pharmacy at Alexandria University, and the courses that the student studied in the other faculty are transferred according to the rules determined by the Faculty Council, provided that the maximum number of academic hours allowed to be transferred for the student do not exceed 40% of the total number of credit hours for the program the student is enrolled in. Taking into consideration that the cumulative graded point average of the student (cGPA) is not less than (3) and that the proportion of equivalence in the content of accepted courses is not less than 75% of that at the faculty of pharmacy in Alexandria University.

Article (11): Grading and assessment system

The final grade of the course consists of the sum of grades for the semester work and the practical, written and oral exams, as indicated in the study plan schedules. The minimum passing score for any course is 60% of the total marks for this course, and the student does not pass in any course unless he/she obtains 30% of the final written exam marks, and the percentage of final marks and grades are as shown in the following table.

The student's result in each course is estimated with one of the following:

Description of Grade	Grade	Points	Percentage
Excellent	**A^+**	**4.00**	**95 and more**
	A	**3.85**	**From 90 to less than 95**
	A^-	**3.7**	**From 85 to less than 90**
Very Good	**B^+**	**3.3**	**From 82.5 to less than 85**
	B	**3**	**From 77.5 to less than 82.5**
	B^-	**2.7**	**From 75 to less than 77.5**
Good	**C^+**	**2.3**	**From 72.5 to less than 75**
	C	**2**	**From 67.5 to less than 72.5**
	C^-	**1.7**	**From 65 to less than 67.5**
Satisfactory	**D^+**	**1.3**	**From 62.5 to less than 65**
	D	**1**	**From 60 to less than 62.5**
Fail	**F**	**0**	**Less than 60**
Withdrawn	**W**	-	
Forced withdrawal	**FW**	-	
Military withdrawal	**MW**	-	
Incomplete	**I**	-	

Absent	**E**	-	
Audit	**AU**	-	

***I:** The student gets this symbol if the attendance rate is fulfilled and he/she is unable to enter the final written exam and oral exam (if any) for one or more academic courses in the same semester for reasons accepted by the Faculty Council, and he/she must perform the final written exam and oral (if any) at a date not later than the second week of the next semester and the student keeps his/her grades during the semester.

****E:** The student gets this symbol if he/she is unable to enter the final written and oral exam (if any) at the aforementioned date in the previous paragraph because the compelling reason has not disappeared, and the student must register in this course when it is offered again and study it fully again and he will receive the new grades that he/she will score.

There are other evaluation symbols that are not matched by points - used in some graduation requirements - and they are:

P: Satisfactory level for a course not included in the GPA, such as training and university requirements courses (Pass/Fail)

T: Grades obtained by a transferred student from another Faculty of Pharmacy (Transferred)

U: Ungraded Course

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

A- The value of the assessment for each course (the points shown in the previous table) is multiplied by the number of credit hours for this course to get the number of points for each course in the semester.

B - Points are summed for all academic courses in which the student is registered for in one semester.

C - The total points of all the courses are divided by the total credit hours recorded for the student in one semester, in order to obtain the grade point average, GPA of that semester, as follows:

$$\text{Grade Point Average (GPA) in a semester} = \frac{\text{Total Number of Points in the semester}}{\text{Total Number of Registered Credit Hours in that semester}}$$

The GPA ranges between 0 to 4.

Cumulative Grade Point Average, cGPA is calculated as follows:

$$\text{Cumulative Grade Point Average, cGPA} = \frac{\text{Total Number of Points in all semesters}}{\text{Total Number of Registered Credit Hours in all semester}}$$

In calculating both the semester and cumulative GPA, the result is rounded to two decimal places.

The Faculty Council may, after taking the opinion of the councils of the specialized scientific departments and according to the nature of the courses, hold an electronic exam in one or more courses (in the whole course or part of it), and gives a permission for the correction of the exams electronically whenever the infrastructure and technical capabilities are available. The decision of the Faculty Council is submitted to the University's Education and Student Affairs Committee for approval in preparation for raising it to the University Council for approval.

Article (12): Failing courses.

The student fails a course in the following cases:

- The student is absent from the final written exam without an excuse accepted by the Faculty Council.
- The student achieves less than 30% of the final written exam marks.
- The student achieves less than 60% of the total marks of the course.

If a student fails in any mandatory course in any semester, he/she must study the same course and take the exam in it when the course re-opens again and the highest grade, he/she shall receive is (B +). On the other hand, if the student fails in an elective course, he/she can re-study it or study another elective course to complete the graduation requirements, after the approval of his/her academic advisor and he/she shall receive the new grade, he/she accomplishes.

If the student fails in the same course, the failure is counted only once in his/her cGPA, and the number of times that he/she sit for the exam in this course are recoded in his/her academic record.

Article (13): Academic underachievement

The academic underachievement of the student is considered if he/she obtains a GPA of less than "one". A student who obtains a GPA of less than 1 for a period of six consecutive semesters or ten non- consecutive semesters shall be dismissed from the faculty after the approval of the Faculty Council. In this respect, the summer semesters, if any, will not be taken into consideration. The student with underachievement is allowed to re-study the courses he/she has passed with a grade of D in order to improve his/her cGPA and the higher score that the student obtains is calculated in his/her cGPA.

Article (14): Registration suspension

A student suspends his/her study if he/she is not enrolled for a semester or has withdrawn from all the courses in the semester, whether with or without an excuse. The student may suspend his/her study for two consecutive semesters or three non-consecutive semesters as a maximum, after taking the approval of the Faculty Council. If the student suspends his/her study for a period longer than that without an excuse accepted by the Faculty Council and approved by the University Council, the executive regulations of the University Laws shall apply to him/her.

Article (15): Graduation requirements

To be awarded the Bachelor of PharmD (Clinical Pharmacy) degree according to the credit hours system, the following is required:

First: To study and pass 177 credit hours distributed over ten semesters. These include 169 mandatory credit hours (see study plan for the distribution of courses) and 8 elective credit hours, provided that the cGPA of the student is not less than one.

Second: Passing the introductory field training (summer training) with a total number of 100 actual training hours in private and government pharmacies and hospital pharmacies approved by the Faculty Council, under the supervision of a faculty member and training is carried out during summer vacations after the end of the third or fourth level. In addition the student should complete advanced field training year (Internship year) after completing the academic study, according to the detailed regulations for the advanced field training year program, which includes the graduation project in one of the available specialties.

Third: Passing the university's requirements for graduation, which are six mandatory credit hours (not include the student's semester GPA and cGPA) in addition to military education (for males), and eight elective credit hours from the university elective courses offered by other faculties in the university as follows:

1. Societal Issues (2 credit hours)
2. Critical Thinking (2 credit hours).
3. Entrepreneurial and Innovation (2 credit hours)
4. Eight credit hours of elective courses offered by other faculties

The student passes the university's requirement courses upon obtaining 50% of the grades of the course.

The Filed training:

- Training in all its stages is a mandatory graduation requirement, and its hours are not counted within the student's cGPA. It is a pass and failure only (Pass / Fail) requirement and the student pass it upon obtaining 50% of the marks through the periodic reports of the training supervisors and the student's assignments and presentations.
- Training credit hours are estimated by one credit hour for each 48 hours of actual training (not counted within the cGPA) according to international standards, which facilitates the student exchange process with international universities abroad and facilitates the process of calculating any fees or supervisory hours.
- The graduation project is estimated as five credit hours that are not added to the student's cGPA. The graduation project is supervised by a faculty member and assisted by a member of the teaching assistants who has a master's degree or an expert in the field of pharmacy. The project is judged in two phases, the first is preliminary conducted by project supervisors (100 marks). The final judgement of the project shall be at the end of the advanced training year (150 marks) through a committee of 3 members that includes the principal supervisor of the student and two reviewers. All members of the committee shall be among the faculty members of the faculty. It is

permissible to seek the assistance of faculty members from outside the faculty of the same specialty or another specialty or one of the experts in the field of pharmacy according to the nature of the project and its requirements. The student passes the project upon obtaining 50% of the marks.

Article (16): Student discipline system

Students enrolled in the program are subject to the disciplinary system set out in the Egyptian Universities Regulatory Law and its executive regulations.

Article (17): Courses codes and program requirements

Appendix (1)

Article (18): Study plan

Appendix (2)

Article (19): Courses contents

Appendix (3)

Article (20): Updating of course contents

Because the faculty is supporting the sustainable development of pharmacy education, a percentage not exceeding 20% of the content of the academic curricula may be updated based on the proposal of the relevant scientific department council and the approval of the Faculty Council and the approval of the University Council after giving the necessary justifications. Courses can be taught fully or partially electronically, and students can be assessed, and exams can be taken electronically.

Article (21): The training program

A training program for the first field training (the summer training after finishing level third or fourth) and the year of advanced field training shall be detailed and implemented.

Article (22): Maximum study period

The maximum time limit for a student to graduate from this program is twice that of the original study period of the program .

Article (23): Graduation times and Honor degree

The faculty allows students to graduate in three times for same academic year:

- Fall semester (January)
- Spring semester (June)
- Summer semester (September)

The honors is awarded to the student who completes the graduation requirements in a period of no more than 10 main semesters and the advanced training year provided that his/her semester average GPA must not be less than 2.70 points in any semester of study and that his cumulative GPA is at least 3.70 and he has not received an estimate Fail (F) in any course, or any disciplinary punishment is imposed on him/her during his/her studies.

In the event that the cGPA for the first graduates is equal during any of the graduation times for the same academic year, the result is rounded to four decimal numbers and a comparison is made between them according to the rules determined by the Faculty Council and the standards approved by the University Council and all the rules, laws and regulations regulated in the law organizing universities and its executive regulations.

Article (24): Listening system

The Faculty Council may, after taking the approval of the councils of the specialized scientific departments, accept the attendance of students from the same faculty or from other faculties or universities as listeners for some of the courses of the faculty in accordance with rules determined by the Faculty Council, and the Faculty awards the listener a statement of attendance as a listener.

Article (25): Student exchange

The student may register in courses from outside the faculty or the university or from a foreign university and is counted in his academic program, after comparing the content of these courses with the corresponding courses in the study plan of the program and the approval of the Faculty Council based on the approval of the relevant department council and these courses may be considered in the student cGPA provided that these courses do not exceeding 25% of the total credit hours required to graduate from the program.

The visiting student is a student from outside the university who studies some courses in the faculty or the field training period without being awarded any full academic degree. The approval of the Faculty Council, the relevant scientific departments councils and the Education and Student Affairs Committee is mandatory in this respect. The maximum academic load in such case is 12 credit hours in Fall and Spring semesters and 9 credit hours in the summer. The student is awarded a certificate of what he/she studied and the grades of the courses he/she studied and successfully passed.

Article (26): Withdrawing from the program and changing the program

The student can cancel his/her enrollment in the program upon his/her request, and he/she can also apply for re-enrollment within four semesters of his/her dropping out of the study, provided that he/she explains the justifications for canceling the enrollment and the justifications for re-enrollment and it is presented to the Faculty Council, and in the case of recommending approval, it is presented to the University Council and the student is treated according to his/her previous position in the faculty before his/her enrollment was canceled in the event of approval by the University Council and he/she does not have the right to cancel his/her enrollment after that once again.

The student may change the academic program after spending a period in the faculty, after fulfilling the conditions for joining the new program and taking the opinion of the academic advisor and the approval of the Faculty's Education and Student Affairs Committee and the approval of the Faculty Council. Courses that the student has previously studied and passed may be counted as being among the requirements of the new academic program, and the rest of the irrelevant courses are not counted within the hours of the new academic program.

Article (27): Addition of executive regulations

The Faculty Council may take the decisions necessary to complete and implement these regulations and facilitate its procedures.

Appendix (1)

Department Codes & Courses Codes

1 - Departments Codes:

Code	Department
01	Pharmaceutics
02	Pharmacology and Toxicology
03	Industrial Pharmacy
04	Microbiology and Immunology
05	Pharmaceutical Chemistry
06	Pharmacognosy
07	Pharmaceutical Analytical Chemistry
08	Pharmaceutical Biochemistry
09	Clinical Pharmacy and Pharmacy Practice

Note: Non-Pharmacy courses have the department code 00

2 - Courses Codes

The course code is composed of 7 digits. The first 2 numbers represent the department followed by 2 letters denoting the course nature (the letter “P” means that the course is offered to students of Pharmacy, while NP means non-pharmacy courses. All course types are shown in the table below). This is followed by 3 digits, the first of which represents the semester number, while the second and third digits represent the course number.

For example: “Pharmaceutical Analytical Chemistry I”
This course belongs to the analytical chemistry courses and will be taught by Pharmaceutical Analytical Chemistry Department. It will be the first course taught by this department and in the first semester. Therefore, its code will be “07-PA 101”

Key for Course Type Abbreviations

PA	Analytical Chemistry Courses
PB	Biochemistry Courses
PC	Pharmaceutical Chemistry Courses
PG	Pharmacognosy Courses
PM	Microbiology and Immunology Courses
PN	Industrial Pharmacy Courses
PO	Pharmacology and Toxicology Courses
PP	Clinical Pharmacy & Pharmacy Practice Courses
PT	Pharmaceutics Courses
PE	Pharmacy Elective Course
NP	Non-pharmacy Courses

3 - University Requirements (Not included in the cGPA):

1. Societal Issues (1 + 1)
2. Innovation and Entrepreneurship (1 + 1)
3. Critical Thinking (2 + 0)
4. University Electives (2+0) of total 8 credit hours

4 - Faculty Requirements: See program curriculum (Appendix 2)

Faculty Elective courses

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

Course Code	Course Title	Credit Hours		
		L	P/T	Total
01-PTE 01	Cosmetic Preparations	1	1	2
01-PTE 02	Veterinary pharmacy	1	1	2
01-PTE 03	Protein Pharmaceuticals	1	1	2
02-POE 01	Biological Standardization	1	1	2
02-POE 02	Veterinary Pharmacology	1	1	2
02-POE 03	Geriatric pharmacotherapy	1	1	2
03-PNE 01	Applied Industrial Pharmacy	1	1	2
03-PNE 02	Good Manufacturing Practices	1	1	2
04-PME 01	Antimicrobial stewardship	1	1	2
04-PME 02	Infection Control	1	1	2
04-PME 03	Bioinformatics	1	1	2
05-PCE 01	Drug Design	1	1	2
06-PGE 01	Herb Industry	1	1	2
06-PGE 02	Chromatography and Separation Techniques	1	1	2
06-PGE 03	Herbal cosmetics	1	1	2
06-PGE 04	Biotechnology of medicinal plants	1	1	2
07-PAE 01	Advanced Pharmaceutical Analysis – Spectroscopy	1	1	2
07-PAE 02	Medical devices	1	1	2
07-PAE 03	Environmental Sustainability	1	1	2
08-PBE 01	Pharmacogenomics and Personalized Medicine	1	1	2
09-PPE 01	Interprofessional Education for Health Profession Students	1	1	2
09-PPE 02	Pharmacoeconomics	1	1	2

L: Lecture; P: Practical; T: Tutorial

The Faculty Council may offer elective courses, after approval of the supervisory committee and after consulting the relevant department councils. The Faculty can add other elective courses, after taking the approval of the University Council, and providing the necessary justifications.

4- University Elective Courses:

The faculty agrees to offer a number of elective courses delivered by other faculties in the university after the approval of the faculties offering these courses. The student has the freedom to choose 8 credit hours from these offered courses. These courses are coded according to what is approved by the university.

Appendix (2)

The Study Plan

Table (1)

Semester (1)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T.	Wr.	Oral		
Pharmaceutical Analytical Chemistry I	07-PA 101	2	1	3	None	15	25	50	10	100	2
Pharmaceutical Organic Chemistry I	05-PC 101	2	1	3	None	15	25	50	10	100	2
Pharmacy Orientation	09-PP 101	1	-	1	None	25	--	75	---	100	1
Medicinal Plants	06-PG 101	2	1	3	None	15	25	50	10	100	2
Medical Terminology	02-PO 101	1	-	1	None	25	--	75	---	100	1
Information Technology	00-NP 101	1	1	2	None	25	25	50	-	100	1
Mathematics	00-NP 102	1	---	1	None	25	---	75	---	100	1
Societal Issues *	00-NP 103	1	1	2	None	--	50	50	--	100	1
Total		10	4	14						700	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (2)

Semester (2)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T.	Wr.	Oral		
Pharmaceutical Analytical Chemistry II	07-PA 202	2	1	3	Pharmaceutical Analytical Chemistry I	15	25	50	10	100	2
Pharmaceutical Organic Chemistry II	05-PC 202	2	1	3	Pharmaceutical Organic Chemistry-I	15	25	50	10	100	2
Cell Biology	08-PB 201	1	1	2	None	15	25	50	10	100	1
Human anatomy& Histology	02-PO 202	2	1	3	None	15	25	60	---	100	2
Physical Pharmacy	01-PT 201	2	1	3	None	15	25	50	10	100	2
Pharmacognosy I	06-PG 202	2	1	3	Medicinal Plants	15	25	50	10	100	2
Psychology	09-PP 202	1	-	1	None	25	-	75	-	100	1
Total		12	6	18						700	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (3)

Semester (3)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pharmaceutical Organic Chemistry-III	**05-PC 303**	**2**	**1**	**3**	**Pharmaceutical Organic Chemistry-II**	**15**	**25**	**50**	**10**	**100**	**2**
Biochemistry I	**08-PB302**	**2**	**1**	**3**	**None**	**15**	**25**	**50**	**10**	**100**	**2**
Pharmacognosy II	**06-PG 303**	**2**	**1**	**3**	**Medicinal Plants**	**15**	**25**	**50**	**10**	**100**	**2**
Physiology and pathophysiology	**02-PO 303**	**2**	**---**	**2**	**None**	**25**	**---**	**75**	**---**	**100**	**2**
Basic Pharmacology	**02-PO 304**	**2**	**1**	**3**	**None**	**15**	**25**	**50**	**10**	**100**	**2**
Pharmaceutical Dosage Forms-I	**01-PT 302**	**2**	**1**	**3**	**Physical pharmacy**	**15**	**25**	**50**	**10**	**100**	**2**
Scientific writing and Communication skills	**09-PP 303**	**1**	**1**	**2**	**None**	**25**	**25**	**50**	**--**	**100**	**1**
Critical Thinking*	**00-NP 304**	**2**	**--**	**2**	**None**	**40**	**---**	**60**	**--**	**100**	**2**
Total		**13**	**6**	**19**						**700**	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (4)

Semester (4)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pathology	04-PM 402	1	1	2	Human Anatomy& Histology	15	25	50	10	100	1
General Microbiology and Immunology	04-PM 401	2	1	3	None	15	25	50	10	100	2
Drug Information	09-PP 404	1	1	2	Basic Pharmacology	10	25	65	-	100	1
Pharmacology –I	02-PO 406	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Instrumental Analysis	07-PA 403	1	1	2	None	15	25	50	10	100	1
Pharmaceutical Dosage Forms-II	01-PT 403	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Biochemistry II	08-PB 403	2	1	3	Biochemistry I	15	25	50	10	100	2
Pharmacy Legislation and professional ethics	09-PP 405	1	-	1	None	25	---	75	---	100	1
University Elective*	02-XX-XXXXX	2	-	-	None	40	--	60	---	100	2
Total		13	6	19						800	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (5)

Semester (5)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pharmacology-II	02-PO 507	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Pharmaceutical Microbiology and Antimicrobials	04-PM 502	2	1	3	General Microbiology & Immunology	15	25	50	10	100	2
Parasitology &Virology	04-PM 503	2	1	3	None	10	25	65	--	100	2
Pharmaceutical Dosage Forms-III	01-PT 504	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Phytochemistry-I	06-PG 504	2	1	3	None	15	25	50	10	100	2
Community Pharmacy Practice	09-PP 506	2	1	3	Pharmacology -I	15	25	50	10	100	2
Total		12	6	18						600	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (6)

Semester (6)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pharmacology-III	02-PO 608	2	1	3	Pharmacology-II	15	25	50	10	100	2
Phytochemistry-II	06-PG 605	2	1	3	Phytochemistry-I	15	25	50	10	100	2
Pharmaceutical Technology	03-PN 601	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Hospital Pharmacy	09-PP 607	2	1	3	None	15	25	50	10	100	2
Clinical Pharmacy Practice	09-PP 608	2	1	3	None	15	25	50	10	100	2
First Aid and Basic Life Support (BLS)	02-PO 609	1	1	2	None	10	25	65	--	100	1
University Elective*	02-XX-XXXXX	2	-	-	None	40	--	60	---	100	2
Total		11	6	17						600	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (7)

Semester (7)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Medicinal Chemistry-I	05-PC 704	2	1	3	Pharmaceutical Organic Chemistry-III	15	25	50	10	100	2
Advanced Drug Delivery Systems	01-PT 705	2	-	2	Physical Pharmacy	15	--	75	10	100	2
Biopharmaceutics and Pharmacokinetics	01-PT 706	2	1	3	Pharmaceutical dosage forms III	15	25	50	10	100	2
Medical Microbiology	04-PM 704	2	1	3	Pharmaceutical Microbiology	15	25	50	10	100	2
Quality Control of Pharmaceuticals	07-PA 704	2	1	3	Instrumental Analysis- Pharmaceutical Microbiology	15	25	50	10	100	2
Faculty Elective course	0X-PXE --	1	1	2	None	15	25	50	10	100	1
Total		11	5	16						600	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (8)

Semester (8)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Medicinal Chemistry-II	05-PC 805	2	1	3	Pharmaceutical Organic Chemistry-III	15	25	50	10	100	2
Pharmacotherapy of Endocrine and Renal Disorders	02-PO 810	2	1	3	Pharmacology III	15	25	50	10	100	2
Pharmacotherapy of Oncological Diseases and Radio pharmacy	02-PO 811	2	1	3	Pharmacology III	15	25	50	10	100	2
Clinical Pharmacokinetics	09-PP 809	2	1	3	Biopharmaceutics and Pharmacokinetics	15	25	50	10	100	2
Clinical Biochemistry	08-PB 804	2	1	3	Biochemistry-II	15	25	50	10	100	2
Public Health and Preventive Medicine	04-PM 805	2	--	2	Medical Microbiology	15	--	75	10	100	2
Faculty Elective Course	0X-PXE-	1	1	2	None	15	25	50	10	100	1
University Elective*	02-XX-XXXXX	2	-	-	None	40	--	60	---	100	2
Total		13	6	19						700	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (9)

Semester (9)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pharmacotherapy of Neuropsychiatric Diseases	02-PO 912	2	1	3	Pharmacology-II	15	25	50	10	100	2
Basic & clinical Toxicology	02-PO 913	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Pharmaceutical Biotechnology	04-PM 906	2	1	3	Pharmaceutical Microbiology	15	25	50	10	100	2
Phytotherapy	06-PG 906	2	1	3	Phytochemistry-II	15	25	50	10	100	2
Clinical Nutrition	08-PB 905	1	1	2	Biochemistry-II	15	25	50	10	100	1
Marketing &Pharmacoeconomics	09-PP 910	2	--	2	None	25	---	75	--	100	2
Innovation and Entrepreneurship*	00-NP 905	1	1	2	None	--	---	100	---	100	1
Faculty Elective Course	0X-PXE-	1	1	2	None	15	25	50	10	100	1
University Elective*	02-XX-XXXXX	2	-	-	None	40	--	60	---	100	2
Total		12	6	18						700	

- ***Lect.*** = Lecture
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- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written
- ***** University Requirements

Table (10)

Semester (10)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	P/T	Total		Period.	P/T	Wr.	Oral		
Pharmacotherapy of Critical Care Patients	02-PO 014	1	1	2	Basic Pharmacology	15	25	50	10	100	1
Pharmacotherapy of Dermatological, Reproductive and Musculoskeletal Diseases	02-PO 015	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Pharmacotherapy of Pediatric Diseases	02-PO 016	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Pharmacotherapy of Cardiovascular Diseases	02-PO 017	2	1	3	Pharmacology-II	15	25	50	10	100	2
Pharmacotherapy of Gastrointestinal Diseases	02-PO 018	2	1	3	Pharmacology-I	15	25	50	10	100	2
Pharmacotherapy of Respiratory Diseases	02-PO 019	1	1	2	Pharmacology-I	15	25	50	10	100	1
Clinical Research and Pharmacovigilance	09-PP 011	1	--	1	Drug information	25	---	75	--	100	1
Faculty Elective Course	0X-PXE-	1	1	2	None	15	25	50	10	100	1
Total		12	7	19						800	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **P/T** = Practical/ Tutorial
- ***Wr.*** = Written

Appendix (3)

Courses Contents
Pharmaceutics Department (Code#01)

01-PT 201 Physical Pharmacy: (2+1)

This course provides students with knowledge of physical and chemical 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 behavior of dosage forms

01-PT 302 Pharmaceutical Dosage Forms 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 aspects of formulation, 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. Particulars of pharmaceutical sterile drug products (Parenterals and ophthalmic products) are discussed. The incompatibilities occurring during dispensing are also covered.

01-PT 403 Pharmaceutical Dosage Forms 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,). It also describes the principles and techniques involved in the formulation and manufacturing of dermatological semisolid dosage forms (creams, ointments, gels and pastes) and cosmetic products. The formulation design, manufacturing and quality control testing of suppositories are also covered

01-PT 504 Pharmaceutical Dosage Forms 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, and stability testing. Physical instability, stabilization techniques and good storage practices are elaborated . The course also describes the principles and techniques involved in the formulation, and manufacturing of solid dosage forms including powders, granules, tablets, capsules.

01-PT 705 Advanced Drug Delivery Systems: (2+0)

The course emphasizes on different classes of novel and targeted drug delivery systems. The application of polymers and excipients to solve problems/issues concerning the optimization of absorption, selective transport, and targeting of drugs via controlled and/or targeted nanocarrier formulations is elaborated. A second main focus area is the formulation of proteins(biopharmaceuticals), gene therapy medicinal products (GTMPs), and other biotechnology driven therapeutic products. The role of molecular modeling in fabricating rational drug delivery systems is discussed. The course also covers formulation of advanced

cell- based therapeutics including somatic cell therapy medicinal products (sCTMPs), and tissue-engineered products (TEPs).

01-PT 706 Biopharmaceutics & Pharmacokinetics: (2+1)
The course is concerned with the exploration and examination of the physicochemical properties of drugs in the physiological environment and their impact on product performance. It explores the principles of biopharmaceutics and strategies for enhancing drug delivery and bioavailability. It also introduces the students to basic pharmacokinetic parameters and mathematical aspects. General principles of pharmacokinetic models are presented as they pertain to the process of absorption, distribution and elimination of drugs in humans and the significance of these processes in drug therapy. Topics also emphasize linear and nonlinear metabolic clearance kinetics, drug-drug interaction mechanisms and kinetics, in vitro-in vivo predictions, pharmacogenetics and other sources of inter-individual variability.

Pharmacology and Toxicology Department (Code#02)

02-PO 101 Medical Terminology (1 + 0)
To ensure that the students have the necessary competency enabling them to recognize, analyze, synthesize, and apply medical terms as well as universally approved abbreviations related to the health profession, medical and paramedical. This course deals with basic components of medical terms (roots, prefixes, suffixes, and linking or combining vowels) and how does the medical terminology work by combining these basic components. The course also includes commonly used prefixes, and roots of body system, as well as the commonly used medical abbreviations .

02-PO 202 Human Anatomy and Histology (2 +1)
The aim of the course is to provide the students with competency concerning the appropriate functions of cells, tissues, organs and body system. The course also enables the student to integrate physiological data and mechanisms with ongoing taught sciences: anatomy and histology. Histology part includes cytology, epithelium, C.T., blood, muscle, vascular, lymphatic, respiratory, gastrointestinal and endocrine systems. Anatomy part includes introduction to human anatomy, tissues of the body, skeletal system, articular system, muscular system, digestive system, cardiovascular, respiratory system, lymphatic system, urinary system, genital system, nervous and endocrine systems.

02-PO 303 Physiology and Pathophysiology (2 + 0)
To ensure that the students have the necessary knowledge & skills enabling them to develop professional competency in the recognition & discussion of different physiological and Pathophysiology aspects of the major body organs and system pertinent to this course and in the application of such competencies in the specialist areas. This course cover the physiological function of different organs including physiology of body fluids, blood, nerve and muscle, central nervous system, special senses, autonomic nervous system, defense mechanisms. Physiology of cardiovascular, respiratory, excretory, endocrine and digestive systems; organic and energy metabolism; exercise and environmental stress are also included. The basic concepts of pathophysiology at the cellular level related to injury, the self-defense mechanism, mutation, and cellular proliferation, and the pathological factors that influence the disease process. Clinical manifestations associated with the diseased organ(s).

02-PO 304 Basic Pharmacology (2 + 1)
This course provides the principles underlying the actions of drugs; including pharmacokinetics, drug-receptor interactions, and drug metabolism. It explores the fundamental mechanism of drug action emphasizing the modulation of interactions between endogenous ligands and targets. Key target types include receptors, enzymes, transporter proteins, ion channels and nucleic acids. Key concepts include enzyme action, regulation, inhibition and signal transduction. In addition, the course provides the basic principles of drug absorption, distribution, metabolism and excretion.

02-PO 406 Pharmacology I (2 + 1)
This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology to disease processes regarding the autonomic, neuromuscular, autacoids and cardiovascular systems

02-PO 507 Pharmacology II (2 + 1)
This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding drugs acting on central nervous system, gastro-intestinal and pulmonary systems. The anti-inflammatory, analgesics as well as gout treatments are also within the scope of the course.

02-PO 608 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. Chemotherapeutic drugs including antimicrobials, anticancer and immunosuppressant are within the scope of the course. Stem cell therapy is also included. This course includes an advanced application of the science of drug information in terms of: its practice within the drug information centers and various clinical sites. The course will focus on Drug information and poison information centers, different drug information resources, use of the internet for drug and research information, evaluating information on the web. The classification of study design and clinical trials, data presentation, and basic statistical concepts are detailed. Basics of pharmacoeconomic literature are described.

02-PO 609 First Aid and Basic Life Support (BLS) (1 + 1)
After completing the course, the student should be able to know how to deal with medical emergency. It includes: introduction & accidents, 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.

02-PO 810 Pharmacotherapy of endocrine &renal diseases (2+1)
This course is shared between the Department of Pharmacy Practice and Department of Pharmacology and Toxicology
This course includes the Pathophysiology, causes, clinical presentation, diagnosis and application of pharmaceutical care plans in different endocrinologic disorders (Diabetes, thyroid disorder, caushing syndrome...) and different renal disorders and related fluid and electrolyte disturbances including acute and chronic renal failure, uremic syndrome, kidney stones. The course develops the students' ability to design, monitor, refine safe and cost-effective treatment plans and provide appropriate information to patient, caregivers, and health professionals. Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 811 Pharmacotherapy of oncological diseases and radio pharmacy (2+1)

This course is shared between the Department of Pharmacy Practice and Department of Pharmacology and Toxicology

Cancer etiology, risk factors, cancer staging and grading, diagnosis, prognosis, optimizing chemotherapeutic regimens, different types of tumors (solid and hematologic) and their management, toxicities of chemotherapy, supportive treatment, pharmaceutical care and patient's support measures. This course also includes studying radioactive isotopes which process medical applications and precautions of their usage. Patient case-based scenarios will be employed to implement knowledge gained in this course.

02-PO 912 Pharmacotherapy of neuropsychiatry diseases (2+1)

This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology

This course aims to provide the student with the knowledge in, pathophysiology, clinical interpretation, pharmacotherapy and management of neuropsychiatric diseases (e. .g mental health disorders, schizophrenia, depression, anxiety, seizure disorders, parkinsonism, migraines, dementia and Alzheimer's disease). Sedative and hypnotics, general anesthetics, opioid analgesics and non-steroidal anti-inflammatory drugs. Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 913 Basic & clinical Toxicology (2 + 1)

To ensure that the students have the necessary knowledge & skills, as well as comprehensive understanding of the basics of toxicology enabling them to have detailed knowledge and to develop professional competence in the recognition, solving, and discussion of different toxicological cases. It includes 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.

02-PO 014 Pharmacotherapy of critical care patients (1+1)

This course is shared between the Department of Pharmacy Practice and the Department of Pharmacology and Toxicology

The course aims to provide the student with the knowledge in, pathophysiology, clinical interpretation, pharmacotherapy and management of critical care illness (e.g. medical and surgical crises, trauma patients, supportive care, ICU infections, burns, neuro-critical care, cardiovascular critical care, sepsis, septic shock, pain and analgesia, bleeding disorders and anticoagulation, nutritional support and therapy, hemodynamic monitoring, fluid and electrolyte disorders). Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 015 Pharmacotherapy of dermatological, reproductive and musculoskeletal diseases (2+1)

This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology. Skin structure and function, primary and secondary lesions. Most popular skin diseases: infective and non-infective types and their differentiation. Sexually transmitted diseases, male infertility, and women health. Musculoskeletal disorders are also included. Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 016 Pharmacotherapy of Pediatric diseases (2+1)
This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology
Nutritional requirements in neonates and infants, nutritional disorders, neonatology, infectious diseases in pediatrics, congenital heart diseases, endocrine, neurological, haematologic, renal, and respiratory disorders, pediatric emergencies. Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 017 Pharmacotherapy of Cardiovascular diseases (2+1)
This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology
Main diseases affecting the cardiovascular system, symptoms, prognosis, pharmacological and non-pharmacological management, patient counseling and monitoring of dyslipidaemias, hypertension, coronary artery disease, acute coronary syndromes, heart failure, dysrhythmias, thromboembolic disorders, and stroke. Patient case-based scenarios will be employed to implement knowledge gained in this course

02-PO 018 Pharmacotherapy of Gastrointestinal diseases (2+1)
This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology
Hepatic disorders including viral hepatitis, pancreatitis, gastrointestinal bleeding, peptic ulcer, gastro-esophageal reflux disease, inflammatory bowel diseases and irritable bowel syndrome as well as gastrointestinal symptoms including nausea, vomiting, constipation, and diarrhea. Patient case-based scenarios will be employed to implement knowledge gained in this course.

02-PO 019 Pharmacotherapy of Respiratory diseases (1+1)
This course is shared between the Department of pharmacy Practice and the Department of Pharmacology and Toxicology
Epidemiology, etiology, pathophysiology, clinical manifestation, investigations, treatment, monitoring, and patient counseling of bronchial asthma, chronic obstructive pulmonary disease, pulmonary hypertension, cystic fibrosis, upper and lower respiratory tract infections, and drug-induced respiratory problems. Patient case-based scenarios will be employed to implement knowledge gained in this course.

Industrial Pharmacy Department (Code#03)

03-PN 601 Pharmaceutical Technology: (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, extraction, size reduction, size separation, size analysis and size enlargement. 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.

Microbiology and Immunology Department (Code#04)

04-PM 401 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, growth, metabolism, role of microorganisms in infectious diseases and microbial pathogenesis. It also clarifies different mechanisms of transport across bacterial cell membrane, metabolic pathways and physiology of bacteria. The course also covers the principles of genetic characters including DNA and RNA structures, replication, different forms of mutation and mutagenic agents. It also explores the basic concepts microbial growth, cultivation and reproduction. Moreover, it introduces the modern concepts of medical immunology, with an emphasis onHost 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, effector mechanisms, complement, and cell mediated immunity. Active and passive immunization. Hypersensitivity and in vitro antigen antibody reactions, Immuno-deficiency disorders, Autoimmunity and auto-immune disease, organ transplantation.

04-PM 402 Pathology (1 + 1)

The study of biochemical, structural and functional changes in cells, tissues and organs, which are caused by diseases

04-PM 502 Pharmaceutical Microbiology and Antimicrobials (2+1)

This course is designed to provide student with basic, practical and professional knowledge on antimicrobial agents, either antibiotics or non-antibiotics. Different sterilization methods and their application scope will be studied in this course.

04-PM 503 Parasitology & Virology (2 +1)

This course will focus on parasitic infections of humans with knowledge concerning biological, epidemiological and ecological aspects of parasites causing diseases to humans. It concerns with different parasitological related diseases in 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.

04-PM 704 Medical Microbiology (2+1)

To educate students about the basic features of general bacteriology, virology and mycology.
- To familiarize students with the common infections and diseases of medical importance, their microbial causes, as well as laboratory diagnosis, treatment, prevention and control of such diseases.

04-PM 805 Public Health and Preventive medicine (2+0)

The course introduces students to the global public health and the Sustainable Development Goals (SDGs). It also includes the fundamentals of epidemiology, communicable and non-

communicable diseases and their control with special emphasis on antibiotic resistance and antibiotic stewardship as well as emerging pathogens. The course also covers nutritional health, occupational medicine and women's, children's and adolescent's health and the relationship between the environment and public health. It is anticipated that students will achieve an understanding of the optimal environmental conditions for improved public health such as air, food and water purity and sanitary water disposal. The ability to understand and evaluate the biological and chemical basis for health threats emanating from the environment is also gained.

04-PM 906 Pharmaceutical Biotechnology (2+1)
The biotechnology subject is crucial for pharmacy students. It mainly aims to provide sufficient foundation for the student on how to learn the concept of the biotechnology, its main components, optimization of fermentation, bioconversion biodegradation and bioremediation – gene therapy and genetic engineering. It simply puts the student on the track of the hot topic and the coming near future of the pharmaceutical industries.

Pharmaceutical Chemistry Department (Code#05)

05-PC 101 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 Electronic structure of atom, alkanes [nomenclature, synthesis and reactions (free radical reactions)], and cycloakanes. Stereochemistry (Optical isomers, racemic modification, nomenclature of configurations). Alkenes, alkadienes and alkynes. Alkyl halides (nomenclature, preparation and chemical reactions (S_N1, S_N2, E_1, E_2). Arenes and aromatic compounds (Kekule structure, Huckel rule, Electrophilic aromatic substitution and orientation).

05- PC 202 Pharmaceutical Organic Chemistry II (2 +1)
This course involves different classes of organic compounds: aryl halides, Alcohols, Phenols, ethers & epoxides, aldehydes, ketones, carboxylic acid & acid derivatives, sulphonic acids, and nitrogenous compounds.

05-PC 303 Pharmaceutical Organic Chemistry III (2+ 1)
This course involves: carbohydrates, amino acid & peptides, polynuclear and heterocyclic chemistry. In addition, 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.

05-PC 704 Medicinal Chemistry I (2+1)
This course is tailored to assist the students to gain the drugs affecting the autonomic nervous system (ANS), drugs acting on the cardiovascular system (CVS), CNS**.** The course handles different classes of antibiotics and antimicrobials (natural and synthetic), beside other synthetic chemotherapeutic agents (including antivirals, antifungals and antiparasitics). Additionally, various anticancer therapies, steroidal hormones and related drugs are also covered.

05-PC 805 Medicinal Chemistry II (2+ 1)
The course is tailored to assist the students to gain the drugs affecting neurodegenerative disorders. Moreover, endocrine-related drugs (Diabetes, thyroid and calcium-regulating

agents), antihistamines (H1, H2 blockers and anti-ulcer PPIs), drugs controlling pain and inflammation (NSAIDs, local anaesthetics and rheumatoid drugs) are also handled.

Pharmacognosy Department (Code#06)

06-PG 101 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. 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.

06-PG 202 Pharmacognosy I (2+1)

Based on the Egyptian flora and other florae 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.

06-PG 303 Pharmacognosy II (2+1)

Based on the Egyptian flora and other florae 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, fruits, subterreans, herbs, unorganized drugs of marine and animal 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 as well as possible herbal-drug interactions of selected examples of these drugs.

06-PG 504 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 the students the knowledge and experience those enable them to understand, describe and deal with the chemistry and Pharmaceutical uses of volatile oils, resins and resin combinations, carbohydrates, and glycosides, and as well as techniques for their, isolation, identification and determination from their respective sources. Clinical applications will be correlated with various clinical analyses.

06-PG 605 Phytochemistry II (2+1)

The course aims to enable students to demonstrate knowledge of basic concepts of chemistry and bioactivities of alkaloids, tannins, bitters of plant or animals and antioxidants as well as chromatographic techniques for their isolation and identification. The course emphasizes on drugs with valuable use in the Egyptian and worldwide markets, such as anti-cancer agents,

drugs affecting CNS, drugs ameliorating liver diseases and anti-inflammatory agents. Finally, the course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features. Clinical applications will be correlated with various clinical analyses.

06-PG 906 Phytotherapy (2+1)
The course aims to enable students to attain the systematic approach for herbal prescribing through a comparative study of both traditional and scientifically based uses of herbal drugs in the treatment of various clinical disorders. The course provides clinical pharmacy students with review of the available information on how botanicals may normalize an altered function. Approval by World Health Organization (WHO), German Federal Institute for Drugs and Medical Devices (Commission E) is the base for selection of the studied herbs. The herbal drugs treated in combined way relative to pharmacognosy, pharmacology and toxicology. Special concern is given to the possible mode of action of the herbal drugs based on experimental and clinical pharmacological studies.
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.

Pharmaceutical Analytical Chemistry Department (Code#07)

07-PA 101 Pharmaceutical Analytical Chemistry I (2+1)
Chemical Kinetics, rate of reaction, first Order reaction, rate law, Second order and third order of reaction, molecularity, Theories of reaction rate, activation energy and catalysis , Photochemistry, absorbed energy and quantum yield.
Introduction to qualitative and quantitative analysis, buffer solutions and acid-base, titration (fundamentals, titration curve. and pharmaceutical application).

07-PA 202 Pharmaceutical Analytical Chemistry II (2+1)
Complexometric titrations; principle, stability of complexes, EDTA titrations Precipitimetry factors affecting precipitate formation and oxidation-reduction titrations (electrical properties of redox systems, Nernest equation factors affecting oxidation potential, redox titration curves, pharmaceutical application on redox reaction), Electrochemistry (potentiometry, conductometry; and polarography).

07-PA 403 Instrumental analysis (1+1)
Spectroscopic methods of analysis including uv/vis spectroscopy, fluorimetry, and atomic spectroscopy. Chromatographic methods of analysis which includes: TLC, , column chromatography, HPLC, UPLC.

07-PA 704 Quality Control of Pharmaceuticals (2+1)
The course is shared between 2 departments: Department of Pharmaceutical Analytical Chemistry and Department of Microbiology and Immunology.
I-The course has to be designed for physicochemical and microbiological quality control**,** Principles, methods and procedures of different quality control tests used for evaluation of safety, potency and palatability of pharmaceutical products of small and large molecules drugs (biologicals). The standard pharmacopeial methods and procedures as well as international guidelines as WHO, EMA, TGA should be discussed.
II-Good Analytical Practice and Sampling: Introduction, Sampling of pharmaceuticals and related materials, Type of sampling tools, Sampling plans.

III-Documentation
IV- Validation of analytical methods according to ICH Guidelines Q2 R1. Compendial testing, Validation of analytical methods, Data elements required for assay validation.
V- drug stability, stability studies and stability indicating methods Drug stability, 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.
VI- Official methods of analysis applied to raw materials and end products.

Pharmaceutical Biochemistry Department (Code#08)

08-PB 201 Cell Biology (1 + 1)

The course aims at studying the structure and function of prokaryotic and eukaryotic cells. In this course study will include many different areas of cellular biology involving: the synthesis and function of macromolecules such as DNA, RNA, and proteins; control of gene expression; membrane and organelle structure and function; bioenergetics; and cellular communication, transformation; transport, receptors, and cell signaling; the cytoskeleton, the extracellular matrix, and cell movements.

08-PB 302 Biochemistry I (2 + 1)

Structure of proteins – Biologically active peptides – Protein turnover – Amino acids as precursors for biosynthesis of biomolecules (e.g. neurotransmitters –nucleotides, …) – Structurally and physiologically important lipids – Lipoprotein metabolism – Carbohydrates and connective tissue – Enzymes (theories of enzyme action – enzyme kinetics – inhibition and regulation of enzyme activity – clinical correlations) – ATP synthesis from reduced metabolites (electron transport chain – inhibitors – uncouplers) – Hemoglobin and myoglobin (structure – synthesis and metabolism – clinical correlations).

08-PB 403 Biochemistry II (2 + 1)

Mobilization of body stores of glycogen and fats -Metabolism and tissue utilization of glucose, amino acids, and fatty acids – Regulation of blood glucose level and clinical correlations – Feed/fast cycle – Nitrogen metabolism and nitrogen balance – Inborn errors of metabolism – Second messengers and signal transduction – Biochemistry of cancer - Biochemistry of aging – Food biochemistry (milk – probiotics) – Oxidative stress and body defense mechanisms.

08-PB 804 Clinical Biochemistry (2 + 1)

Organ function and laboratory diagnostic tests (liver – kidney – heart – pancreas – bone) – Plasma proteins and albumin/globulin ratio – Types and lab differentiation of hyperlipidemia - Examples of different diseases (case study – interpretation of analytical data) - Handling, preservation, storage and analysis of biological samples - Abnormalities of urine analysis – Blood analysis and complete blood count – Tumor markers – Endocrinology (classification of hormones - mechanisms of action – dysfunction) - Electrolytes, blood gases and acid-base balance - Recent diagnostic biomarkers.

08-PB 905 Clinical Nutrition (1+1)

Measures of healthy life-style – Macronutrients and calculation of calories – Basal metabolic rate (BMR) – recommended daily allowance **(RDA) –** Nutritional requirement for pediatrics

and geriatrics - Vitamins and minerals (role in metabolism – clinical significance) – Gut microbiota and human health – Enteral and parenteral nutrition - Dietary care for patients with obesity, diabetes mellitus, cardiovascular, renal and hepatic disorders – Dietary care for cancer patients - Dietary care for sports` men - Dietary care for pregnant and lactating women – Nutrigenomics.

Clinical Pharmacy and Pharmacy Practice Department (Code#09)

09-PP 101 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

09-PP 202 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. The course also provides knowledge on how psychology affects well-being and sickness and the impact of acute and chronic disease on the general mental health. Handling disease-related frustration, anxiety, depression, and social dysfunction are discussed.

09-PP 303 Scientific Writing and Communication Skills (1 + 1)

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. In addition, it will help students develop necessary written and oral communication and presentation skills to improve inter- and intra-professional collaboration and communication with patients and other health care providers. The course will also deal with the underlying attitudes, which form an interpersonal skill. It focuses on concept and meaning of communication; verbal and nonverbal communication (body and vocal language); active listening skills; communication styles and presentation skills. Communication skills in diverse pharmacy practice setting will be discussed

09-PP 404 Drug information (1+1)

This course includes an advanced application of the science of drug information in terms of: its practice within the drug information centers and various clinical sites. The course will focus on Drug information and poison information centers, different drug information resources, use of the internet for drug and research information, evaluating information on the web. The classification of study design and clinical trials, data presentation, and basic statistical concepts are detailed. Basics of pharmacoeconomic literature are described.

09-PP 405 Pharmaceutical Legislations and Professional ethics (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.

09-PP 506 Community Pharmacy Practice (2+1)

This course provides students with competencies and knowledge for the provision of evidence-based pharmaceutical care of the clinical situations that can be handled by the pharmacist in the community pharmacy.These include responding to minor ailments (including upper respiratory tract, gastrointestinal, and musculosketal symptoms, skin, eyes, and ears, and childhood symptoms) with over-the-counter products. Concepts of patient assessment, counselling, and monitoring inoutpatient care settings as components of care planning are presented. The course also introduces students to community pharmacy services for chronic-diseased out-patients as well as pharmacist participation in health screening and disease prevention activities. Integrated case-based learning (ICBL) is adopted in tutorials and/or aligned field-retrieved cases to simulate real practice activities and to enable students acquire skills and competencies targeted in this course.

09-PP 607 Hospital Pharmacy (2+1)

The course introduces students to hospital pharmacy management and related activities on both technical and administrative levels in accordance with national and international established guidelines. Topics covered include: organization and structure of a hospital pharmacy, hospital pharmacy facilities and services (inpatient and outpatient services),, patient's medication record, and rational medication use, hospital formulary, pharmacy and therapeutic committee, I.V. admixtures and incompatibilities, parenteral nutrition, handling of hazardous materials including cytotoxic drugs, patient/health team safety, and risk management including infection control.

09-PP 608 Clinical Pharmacy Practice (2+1)

This course includes the definition and concepts of evidence-based clinical pharmacy approach., case history and case presentation, medication history taking, clinical problem solving, and therapeutic planning, clinical rounding and assessment of patient compliance, medication reconciliation. Detection and avoidance of drug-related problems as a major component of medication therapy management is elaborated Interpretation of clinical laboratory data and physical examination. The tutorials are based on integrated case-based learning (ICBL) to provide the students with target skills and competencies.

09-PP 809 Clinical Pharmacokinetics (2+1)

The course covers: Introduction to clinical pharmacokinetics and its applications, pharmacokinetics, non-compartmental pharmacokinetics and moment analysis. Drug distribution and drug clearance mechanisms, IV infusion kinetics and kinetics following extra-vascular dosing, metabolite kinetics, multiple dose kinetics, non-linear pharmacokinetics, dosage regimen design, dosage individualization of drugs of narrow therapeutic index especially in patients with compromised renal and hepatic function.Sources of variability in pharmacokinetics, dosage regimen and dosage adjustment in geriatrics, pediatrics, and obese patients. Pharmacogenomics approaches to personalized regimens are also covered.The tutorials are based on integrated case-based learning (ICBL) to provide the students with target skills and competencies.

09-PP 910 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.
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.

09-PP 011 Clinical Research and Pharmacovigilance (1+0)
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 also provides the student's with understanding of pharmacovigilance importance, concept, processes, systems, global safety standards and regulations and reporting systems.

Non-Pharmacy Courses (Code#00)

Faculty Mandatory Courses

00-NP 101 Information Technology (1+1)
This course tends to provide students 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.

00-NP 102 Mathematics (1+0)
This course provides an essential guide to the mathematical concepts, techniques, and calculations, a student in the pharmaceutical sciences is likely to encounter. It includes definition of Number, Variable, Function, composition of functions, different types of functions. Definition of Limits of one variable functions, continuity, differentiability and applications of these concepts. Definition of the definite and indefinite integrals. The fundamental theorem of calculus and applications of definite integral. Determined the area arc length, volumes and surfaces of revolutions Differentiation and integrations of

exponential, logarithmic, trigonometric and transcendental functions. Techniques of integrations, trigonometric and transcendental functions. Techniques of integrations. Matrix Algebra and system of linear equations.

University Mandatory Courses
00-NP 101 Societal Issues (1+1)
This course aims to raise students' awareness of a group of important societal issues in order to enhance the concept of participation among the youth. This course consists of six chapters: (1) Problems resulting from over population growth, (2) Human Rights, and (3) Transparency and Anti-Corruption, in addition to three other issues determined by each university annually according to important local issues in the Egyptian society. This course is mandatory for Egyptian students only.

00-NP 304 Critical Thinking (2+0)
The course aims to introduce the student to the importance of learning and introduce him/her to the skills and strategies of self-learning. The course also works to provide the student with research skills on the Internet, which enhances continuous learning, in addition to introducing the importance of thinking science and its characteristics, strategies and methods of critical thinking and creative thinking. The course also tries to teach the student how to deal with audio and visual information and its analysis to determine the extent of its credibility and applicability and how to criticize and build persuasive arguments based on scientific foundations during discussions.

00-NP 905 Innovation and Entrepreneurship (2+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.

02-00-00004 Military Service
This service is mandatory for male Egyptian students only.

Faculty Elective Courses

Course Code	Course Title	Credit Hours		
		L	P/T	Total
01-PTE 01	Cosmetic Preparations	1	1	2
01-PTE 02	Veterinary pharmacy	1	1	2
01-PTE 03	Protein Pharmaceuticals	1	1	2

02-POE 01	Biological Standardization	1	1	2
02-POE 02	Veterinary Pharmacology	1	1	2
02-POE 03	Geriatric pharmacotherapy	1	1	2
03-PNE 01	Applied Industrial Pharmacy	1	1	2
03-PNE 02	Good Manufacturing Practices	1	1	2
04-PME 01	Antimicrobial stewardship	1	1	2
04-PME 02	Infection Control	1	1	2
04-PME 03	Bioinformatics	1	1	2
05-PCE 01	Drug Design	1	1	2
06-PGE 01	Herb Industry	1	1	2
06-PGE 02	Chromatography and Separation Techniques	1	1	2
06-PGE 03	Herbal cosmetics	1	1	2
06-PGE 04	Biotechnology of medicinal plants	1	1	2
07-PAE 01	Advanced Pharmaceutical Analysis – Spectroscopy	1	1	2
07-PAE 02	Medical devices	1	1	2
07-PAE 03	Environmental Sustainability	1	1	2
08-PBE 01	Pharmacogenomics and Personalized Medicine	1	1	2
09-PPE 01	Interprofessional Education for Health Profession Students	1	1	2
09-PPE 02	Pharmacoeconomics	1	1	2

01-PTE 01 Cosmetic Preparations (1+1)
The course aims at introducing students to different aspects of personal care and cosmetic products. Information provided covers the following aspects: pharmaceutical and economic importance of personal care and cosmetic products, definitions and regulatory aspects including product registration, labelling and marketing. Hair preparation, bath preparation, fragrance preparation, make-up preparation, nail lacquers, shaving preparations, after-shave preparations, skin care, anal hygiene products, anti-perspirants and deodorants, quality control tests and evaluation of cosmetic products are discussed.

01-PTE 02 Veterinary pharmacy (1+1)
The course introduces the students to the field of veterinary pharmacy practice, in which the pharmacists may compound medications, fill prescriptions, and manage drug therapies for animals including vaccinations and food supplements. Counseling to animal owners concerning the animal diseases and drug side effects of different drugs will be discussed. Regulatory affairs and veterinary clinics dispensaries as well as management systems concerning veterinary drugs will be covered.

01-PTE 03 Protein Pharmaceuticals (1+1)

This course focuses on production and formulation of biological products especially peptides. Biotechnology concerning their production and formulation and new drug delivery systems are discussed. The course also familiarizes the student with different research methodologies, such as recombinant proteins and genetic engineering and challenges regarding discovery research, formulations and up scaling and manufacturing as well as regulatory, and costs concerns of these new products.

02-POE 01 Biological Standardization (1+1)

The provides the pharmacy student with knowledge and basic principles concerning drug screening and biological assays and standardization. The course introduces the student to advantages and disadvantages of biological assays, biological tests on isolated organ preparations (guinea pig ileum, rat vas deferens, guinea pig tracheal chain), intact animal preparations (cat blood pressure, cat nictitating membrane, rat blood pressure). Different drug groups are tested including skeletal muscle relaxants, cardio tonic drugs, antidysrhythmic drugs, antihypertensive drugs & analgesics). Assay of different endocrine hormone are discussed including gonadal hormones, insulin, and thyroid hormones.

02-POE 02 Veterinary Pharmacology (1+1)

The course provides current, detailed information on using drug therapies in all major domestic animal species. The commonly used veterinary biological and pharmaceutical preparations, general sanitary and management procedures for the prevention and control of livestock diseases; a brief review of infectious diseases and animal parasites. Students gain information on safe selection of therapeutic agents in clinical veterinary practice.

02-POE 03 Geriatric Pharmacotherapy (1+1)

This course introduces the students to changes in pharmacokinetics and pharmacodynamics with aging. The risks of poly pharmacy and inappropriate prescribing and adverse drug reaction in old age is discussed. Appropriate modifications in therapies, patient compliance, patient counseling, and lifestyle and diet modifications will be covered. Integrated patient case-based scenarios will be employed in implementing this course.

03-PNE 01 Applied Industrial Pharmacy (1+1)

This course is designed to expose students to the pharmaceutical industries and its inner workings. The course outlines the business model of the pharmaceutical industry via covering drug development and commercialization. Drug discovery process with a focus on the entrepreneurship and business development is described starting from synthesis of active pharmaceutical ingredients (APIs) process and scaling up of new molecules to animal testing and clinical trials. Patents, marketing and distribution of new products is discussed. The course also deals with increasing innovative capability through new technological possibilities in manufacturing pharmaceuticals such as nanomaterial-based drug delivery systems, manufacturing nano-based thranostics (therapeutic and diagnostic agents) and production of biopharmaceutical via biotechnology techniques. The use of novel technologies to improve bioavailability, or to achieve more convenient or effective routes of delivery, increasing productivity through a higher level of automation and controls on human intervention and using artificial intelligence in production processes as well as and 3D printing for customized patient-specific drugs and orphan drugs that treat rare diseases is also discussed. Other new trends in pharmaceutical industry will be explored

03-PNE 02 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. 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.

04-PME 01 Antimicrobial stewardship (1+1)

This course covers the basic principles of optimal antibiotic use, including how to use these principles for the management of common infections as well as surgical prophylaxis. The course also highlights the main mechanisms driving development of antimicrobial resistance among gram positive and gram-negative pathogens and the impact of the global spread of resistant pathogens on antimicrobial prescribing. The course also describes how to devise an antimicrobial stewardship program. Through case-based examples, the course will highlight how antimicrobial stewardship principles can be applied to common clinical scenarios to improve outcomes.

04-PME 02 Infection Control (1+1)

The course provides pharmacy students with the knowledge and skills to prevent the transmission of microorganisms and control infections in health care settings, principles of epidemiology, chain of infection, components of effective infection control programs, strategies to reduce infection transmission through proper preparation and the evidence-based infection control principles and practices in pharmaceutical industry.

04-PME 03 Bioinformatics (1+1)

In this course, the student will learn the basics of bioinformatics as an indispensable science in modern molecular biology and biotechnology. Topics covered by the course include knowledge of available databases, understanding the individual pieces of information available in GenBank and GenPept databases for DNA and proteins, respectively, employing primer design tools and using Basic Local Alignment Search Tool (BLAST) for DNA and proteins. Furthermore, protein analysis tools such as SignalP, transmembrane domain predictors, epitope predictors, immunogenicity predictors, protein 3D structure predictors and cellular localization predictors will be taught. The student will also learn basic concepts in genome assembly and annotation using online tools.

05-PCE 01 Drug Design (1+1)

The prime objective of this course is to prepare the students for professional practice by understanding the essentials of Medicinal Chemistry, 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 patient-directed clinical care, the molecular aspects governing drugs' pharmacokinetics (ADME), pharmacodynamics, optimization of drug action, possible side effects, in addition to understanding drug interactions are targeted. In terms of chemistry, SAR, mechanism of action and side effects. 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).

06-PGE 01 Herb industry (1+1)
This course will focus on herbal products as indispensable part of the pharmaceutical industry. The impact of good agricultural practices, collection practices, post harvesting treatments and manufacturing practices (GAP, GCP and GMP) on the production of phytopharmaceuticals on industrial scale will be the core of the course. Different methods for extraction, standardization and analysis of herbal raw materials as well as standardization and stability testing of finished products will also be discussed

06-PGE 02 Chromatography and Separation Techniques (1+1)
The course provides the students with modes of separation, gel filtration and permeation, ion exchange chromatography, type properties, ion exchange and non-ion exchange manifestation and applications. High pressure liquid chromatography, gas liquid chromatography and their applications as well as new trends in chromatography and separation techniques.

06-PGE 03 Herbal cosmetics (1+1)
This course will introduce students to general method of preparation and evaluation of Herbal Cosmetics such as skin care products and hair care preparations with examples and claims for the various herbal materials used in them. The course also includes a brief account of plants of cosmetic importance such as Acacia pods, Aloe Vera, Almond oil, Neem, Henna, Liquorice, Olive oil, Sandal wood, tea tree oil and wheat germ oil with special emphasis on their source, active principles and cosmetic properties.

06-PGE 04 Biotechnology of medicinal plants (1+1)
The course pays special emphasis on biopharmaceuticals produced using plants as an expression system using recombinant DNA technology. The course also outlines the general steps involved in manufacturing of genetically engineered medicines and defines plant molecular farming for producing Pharma-crops

07-PAE 01 Advanced Pharmaceutical Analysis – Spectroscopy (1+1)
This course is shared between two departments: The Department of Pharmaceutical Analytical Chemistry and the Department of Pharmaceutical Chemistry
This course will provide an extensive overview of the theoretical principles and the design and operating principles of a range of spectroscopic instruments and their analytical applications for pharmaceutical analysis in bulk and biological fluids with special emphasis on Pharmacopoeial methods of analysis. Application of the information in this course on cases such as analytical investigation of bulk drug materials, intermediates, drug products, drug formulations, impurities and degradation products, and biological samples containing the drugs and their metabolites will be explored. New trends in spectroscopy will be discussed.

07-PAE 02 Medical devices (1+1)
This course outlines the pharmacy student role in medical device use, safety and health technology assessment. The course covers devices commonly sold in community pharmacies as well as devices used in hospitals and clinics. The course also describes new and emerging therapeutic devices that will influence health care. Pharmacovigilance guidelines as well as patient counseling tips will be discussed.

07-PAE 03 Environmental Sustainability (1+1)
This course covers the general understanding of renewable resource harvest, pollution creation, and non-renewable resource depletion where these processes can be continued indefinitely, i.e., without sacrificing the needs of future generations. It is a course to better equipped students for making informed decisions and taking economically feasible actions that are in the interests of protecting the natural world. It will educate the students on the chronological activities of human activities by examining the quantifiable parameters such as the green-house gases, climate change, loss of agricultural land to erosion, etc. The course also includes how to consider the life cycle of a medicine, from design and development to production and finally waste disposal, green chemistry, and greenness assessment tools. This course will educate the pharmacy students on how to work sustainably in their future careers and to increase awareness of patients and the public about the link between climate crisis and health. Fundamental aspects of sustainability, energy cycles and accounting, carbon cycle, emissions and sequestration will be studied. Concepts of green design and life-cycle analysis are to be covered.
Pre-requisite: None

08-PBE 01 Pharmacogenomics and Personalized Medicine (1+1)
Pharmacogenomics is the study of how human genetic variation impacts drug response. This course introduces students to pharmacogenomics and personalized `precision' medicine, where drugs and dose regimen are tailored to each patient. The course provides background to understand the pharmacogenomics, including the methods used in research and the current issues in discovery and implementation of pharmacogenomics. The course gives a review of current best evidence and the use of personalized medicine using patient case-based approach. It also focuses on complex diseases with multigene components influenced by environmental factors that interacted with the human genome such as cancer, heart disease, neurologic and neuropsychiatric disorders, obesity and diabetes.

09-PPE 01 Interprofessional Education for Health Profession Students (1+1)
The course aims at preparing undergraduate students from the faculties of Pharmacy, Medicine and Nursing to deliver patient-centered care as members of an interdisciplinary team. The main goal is to focus on improving health outcomes and avoid conflicts in patient care issues via continuous interaction between students of the three health professions to communicate effectively and understand each other's roles. Through a variety of pedagogical approaches, students will be engaged within a collaborative environment to work in concert sharing knowledge, skills and attitudes that result in interprofessional team competence. In addition, the course will address case studies/simulations about patients with acute & chronic illnesses and the different iatrogenic problems in healthcare settings.

09-PPE 02 Pharmacoeconomics (1+1)
This course is an introduction to the role of pharmacoeconomics (PE) in medical decision making from multiple perspectives. It will introduce the concepts of types of PE/Cost-effectiveness analysis (CEA), general computation involved in these analyses, and how to evaluate a CEA.