جامعة الإسكندرية
ALEXANDRIA
UNIVERSITY

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

Undergraduate PharmD Program

Credit Hours System

2020

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 I 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 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 "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 will be 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. In 2009, another bachelor's degree program in Pharmacy (clinical pharmacy) was introduced as a new credit hours system program. Both programs were 5-year programs.

In 2019, the current 6-year PharmD program was introduced. It is a credit hours system in accordance with the directives of the University of Alexandria and the Pharmaceutical Studies Sector Committee and has been prepared in accordance with the reference national academic 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 equality
- Integrity and transparency

Aims:

- Developing and 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	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 the pharmaceutical industry and accomplish sustainable development in order to reach a world-class position in the field of pharmacy.

Program mission: Preparing pharmacists with professional ethics and qualified with the latest concepts in pharmacy and health-care that enables them to contribute to the development of pharmaceutical industries and raise the efficiency of the health-care system at the local and regional levels by 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:

- Graduating distinguished pharmacists who are qualified to work in public and private pharmacies, pharmaceutical factories, food analysis laboratories, marketing, as well as research.
- Focusing on the pharmacist's role in providing appropriate patient care inside and outside hospitals by educating and advising individuals and societies to improve treatment outcomes and reduce disease incidence taking into consideration that he/she exercises the profession with its responsibilities, respecting its laws and ethics, and respecting patient rights.
- Preparing pharmacists who use evidence-based data to provide pharmaceutical preparations and pharmaceutical services, and are able to have effective communication, leadership, management and entrepreneurial skills.

- Graduating pharmacists who can work as a lifelong learner with the goal of sustainable professional development and demonstrate the ability of self-evaluation.
- Increasing the competitiveness of graduates of the program at the regional level through learning 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 interest in self-learning.

Article (2): Academic degree awarded to the graduates

Upon the request of the Faculty Council, the University Council awards the 6-year PharmD degree according to the credit hour system.

Article (3): Qualifications for higher academic degrees

The 6-year PharmD 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 (5 + 1) according to the credit hours system in addition to 100 summer 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 of 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 175 credit hours (167 compulsory hours + 8 hours elective courses to be chosen from the list determined by the faculty), in addition to the university requirements, which are 5 credit hours of compulsory courses (2 credit hours for the Critical Thinking course + credit hours for the Human Rights and Anti-Corruption course + 2 hours Accredited for the Entrepreneurship and Innovation course). In addition to 8 elective credit hours from courses delivered by other faculties in the university. These courses are graded as pass/fail (university requirements) and are not included in the GPA.

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 in everything related to his university life and assists students in choosing courses from the list of courses offered by the faculty in each semester. The opinion of the academic advisor is advisory and non-binding. Each student must personally register the courses he wishes to study in each semester. However, the courses and the number of credit hours should be chosen via consultation and agreement with the academic advisor.

The registration of courses is only approved with the approval of the academic advisor in the case of students who have a GPA of less than one. For a course to be registered, the student must pass successfully its pre-requisite.

The Faculty Council shall, in cases of extreme necessity for the student, register some courses in parallel with their pre-requisite that the student did not successfully pass. 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 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 register in it in parallel.

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 study until after the registration process has ended.

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

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 and that the student's load for students with under achievement should not exceed 12 credit hours (see article 12).

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 benefits from it once), and the Faculty

Council may allow the student with underachievement (see Article 12 - Academic) to increase the academic load above the maximum limit during the summer semester with not more than 2 credit hours.

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 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 deprive the student of applying for the final written examination if his/her absence exceeds 25% of the total contact hours for each course. A grade of (FW) is made for him/her and he/her must re-sit the course.

B) Attending exam, absence and breaching their rules

The student must sit for the final written exams according to the dates determined for them according to 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 guardian fulfills an incomplete course request, and an incomplete interim assessment is calculated in this course Incomplete (I).

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 - First field training (100 actual training hours):

The student must complete a period of summer field training with a total number of 100 actual training hours, which is the first field training in private and government pharmacies and hospital pharmacies 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 and before starting the sixth year of advanced field training.

B- Advanced Field Training (Sixth Year):

The student must complete the sixth year of advanced field training completing the five academic years through training in human and veterinary pharmaceutical factories - companies for medical supplies and devices, cosmetics, nutritional supplements, herbs, medicinal plants, disinfectants and pesticides - distribution companies and drug stores - local and international drug control and monitoring centers and bodies (MOH- CAPA-NODCAR-…; WHO, FDA, EMA..etc) - Pharmaceutical, Medical, Bioavailability and Clinical Research Centers (CROs) – Drug Information Centers - Drug

marketing ..... etc, in addition to private and government hospitals and pharmacies. Anyone who wishes to specialization in the academic field (teaching and research) shall spend a training period in the Faculties of Pharmacy and Research Centers. The training program also includes a clinical training round.

Student evaluation during training depends on attendance and performance and the implementation of assignments determined by internal and external supervisors for training during this period. Degrees are deducted from the student who does not meet the deadlines. And 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.

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 assessment of the student (cGPA) is not less than (3) and that the proportion of congruence in the content of accepted courses is not less than 75% and that the number of hours be identical.

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 score for this course, and the student is not successful in any course unless he/she obtains 30% of the final written exam score, and the percentage of final grades and estimates 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 and oral written 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 and oral written exam (if any) only at a date not later than the second week of the next semester and the student keeps his/her scores during the semester.

****E:** The student gets this symbol if he/she is unable to enter the final and oral written 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 a human rights course (Pass/Fail)

T: Degrees 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 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 quarterly and cumulative average, the result is rounded to two decimal places.

Example of calculating the GPA in a semester

Course Title	Credit Hours	Total Marks (Percent Out of 100)	Grade	Points = Credit × Grade
X1	**1**	**95**	**A+ (4.0)**	**1 X 4.0 = 4.0**
X2	**3**	**87**	**A^- (3.7)**	**3 X 3.7 = 11.1**
X3	**3**	**85**	**A^- (3.7)**	**3 X 3.7 = 11.1**
X4	**3**	**72**	**C (2.0)**	**3 X 2.0 = 6**
X5	**3**	**90**	**A+ (4.0)**	**3 X 4.0 = 12**
X6	**2**	**85**	**A^- (3.7)**	**2 X 3.7 = 7.4**
X7	**2**	**77**	**B^- (2.7)**	**2 X 2.7 = 5.4**
X8	**1**	**73**	**C^+ (2.3)**	**1 X 2.3 = 2.3**
X9	**1**	**85**	**A^- (3.7)**	**1 X 3.7 = 3.7**
X10	**1**	**87**	**A^- (3.7)**	**1 X 3.7 = 3.7**
Total	**20**			**66.7**
GPA in the semester = 66.7 ÷ 20 = 3.34				

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 examination 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 in courses

The student fails a course in the following cases:

- The student is absent in the final written exam without an excuse accepted by the Faculty Council.
- The student achieves less than 30% of the final written exam score.
- The student achieves less than 60% of the total score 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 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): Underachievement

The underachievement of the student is considered if he/she obtains a cGPA of less than “one”. A student who obtains a GPA of less than 1 for a period of six consecutive semesters or ten unrelated 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 shall be considered as dropping out of study if he/she has not enrolled in a semester or has withdrawn from the class, whether with or without an excuse. The student may drop out of the study for two consecutive semesters or three non-consecutive semesters as a maximum, after taking the approval of the Faculty Council, and in the event of his/her dropping out of the study for a period longer than that without an excuse accepted by the Faculty Council and approved by the University Council, the the executive regulations of the University Regulation Law shall apply to him.

Article (15): Graduation requirements

To be awarded the PharmD degree according to the credit hours system, the following is required:

First: To study and pass 175 credit hours distributed over ten semesters. These include 167 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. University requirements for graduation include Human Rights and Anti-corruption course (one credit hour), Entrepreneurial and Innovation course (2 credit hours) and Critical Thinking course (2 credit hours), which are compulsory and 8 university elective credit hours as Pass/Failure courses and are not counted in the GPA.

Second: Passing the first field training period (summer training) with a total number of 100 actual contact training hours in private and government pharmacies and hospital pharmacies approved by the Faculty Council, under the supervision of a faculty member. Training is carried out during the

summer holidays of study years after the end of the third or fourth level. The student also will have to complete one year of advanced field training (one academic year- 9 months - 38 weeks) after completing the five levels of academic study completely, according to the detailed regulations for the training program, which includes the graduation project in one of the specializations offered, and the graduation project is equivalent to five credit hours that are not added to the student's cGPA.

1. 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 passes it upon obtaining 50% of the grades through the periodic reports of the training supervisors and the student's assignments. And presentations

2. 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 for those who undertake training.

3. The graduation project is estimated at 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 on two phases, the first is preliminary conducted by project supervisors (100 degrees). The final judgement of the project shall be at the end of the advanced training year (150 degrees) through a committee of 3 members that includes the principal supervisor of the student and two judges. 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 grades.

Third: Passing the university's requirements for graduation, which are not include the student's semester GPA and cGPA in addition to military education (for males). These credit hours are as follows:

1. Critical Thinking course, which is two credit hours.
2. The Human Rights and Anti-corruption course, which is one credit hour
3. Entrepreneurial and Innovation course, which is 2 credit hours
4. Eight credit hours from elective courses offered by other faculties in the university

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

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 program (the summer training after finishing level third or fourth) and the year of advanced field training (Year 6) shall be detailed and implemented by the Faculty Council in accordance with the Supreme Council of Universities regulations.

Article (22): Maximum study period

1. The maximum time limit for a student to obtain the PharmD degree is twice that of the original study period of the program .
2. The Faculty Council may consider the possibility of granting a student subject to dismissal as a result of his/her exceeding the maximum period of study, taking into account his position on military recruitment, one last opportunity of two main semesters if he/she was in the final year and has completed at least 80% of the credit hours for the program in which the student is enrolled and has a cGPA of not less than one.

Article (23): Graduation times and Honor degree

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

- January Graduates (after the end of the fall semester of the academic year)
- June Graduates (after the end of the spring semester of the academic year)
- September Graduates (after the end of the summer semester of the academic year)

The honors degree is awarded to the student who completes the graduation requirements in a period of no more than 10 basic 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 studied and successfully passed.

Article (26): Continuous learning

It is permissible for the Faculty Council upon the proposal of the councils of the academic departments and after the approval of the University Council to announce the opening of some courses or packages of courses for graduates from the same faculty or from faculties of pharmacy in other universities in accordance with the rules and regulations determined by the Faculty Council and after approval of the University Council. The learner will be granted, at the end of the period, a certificate of the courses that had been studied and passed.

Article (27): Withdrawing from the program and changing the program

The student can cancel his enrollment in the program upon his/her request, and he/she can also apply for re-enrollment within four semesters of study at most, 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 enrollment was canceled in the event of approval by the University Council and he/she has 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 (28): 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	Pharmacy Practice

2- Courses Codes

Each course in the program has a code consisting of nine digits. Each part of the code has a special significance as shown in the following example: The Course of Pharmaceutical Analytical Chemistry I follows the Department of Pharmaceutical Analytical Chemistry and is the first course in the arrangement of courses offered by the Department of Pharmaceutical Analytical Chemistry for the first academic level and is expressed in the code 02-06-07-101.

Alexandria University Code	Faculty of Pharmacy Code	Academic Department Code	Study level	Couse Code
02 -	06 -	07 -	1	01

3- Faculty Elective Courses:

The Faculty Council shall offer elective courses from the examples stated in the following table after the approval of the departments councils. The faculty can add more elective courses other than the ones listed here after taking the approval of the University Council. The student chooses 8 credit hours of the available opened elective courses.

#	Course Code	Course Title	Credit Hours		
			L	P/T	Total
1	02-06-01-E01	Cosmetic Preparations	1	1	2
2	02-06-01-E02	Formulation of biologics	1	1	2
3	02-06-01-E03	Advanced Compounding	1	1	2
4	02-06-01-E04	Radiopharmaceuticals & Nuclear Medicine	1	1	2
5	02-06-02-E01	Biological Standardization	1	1	2
6	02-06-02-E02	Veterinary Pharmacology	1	1	2
7	02-06-02-E04	Management of Obesity	1	1	2
8	02-06-03-E01	Quality Assurance in Pharmaceutical Industries	1	1	2
9	02-06-03-E02	Research and Development in Industrial Pharmacy	1	1	2
11	02-06-04-E01	Gene regulation and epigenetics	1	1	2
12	02-06-04-E02	Antimicrobial stewardship	1	1	2
13	02-06-04-E03	Infection Control	1	1	2
14	02-06-04-E04	Bioinformatics	1	1	2
15	02-06-05-E01	Advanced Computer Aided Drug Design	1	1	2
16	02-06-06-E01	Complementary and Alternative Medicines	1	1	2
17	02-06-06-E02	Production and Manufacture of Medicinal plants	1	1	2
18	02-06-06-E03	Chromatography and Separation Techniques	1	1	2
19	02-06-06-E04	Applied Forensic Pharmacognosy	1	1	2
20	02-06-07-E01	Advanced Pharmaceutical Analysis - Spectroscopy	1	1	2

21	02-06-07-E02	Reverse Formulation	1	1	2
22	02-06-08-E01	Clinical nutrition	1	1	2
23	02-06-08-E02	Pharmacogenomics and Personalized medicine	1	1	2
24	02-06-09-E01	Health informatics	1	1	2
25	02-06-09-E02	Logistics and Supply Chain Management in Healthcare	1	1	2

L: Lecture - P: Practical - T: Tutorial

4- University Elective Courses:

The Faculty Council shall offer elective courses from the examples stated in the following table or others after the approval of the faculties offering them. The student chooses 8 credit hours of the available opened elective courses.

#	Course code	Course Title	Credit Hours			Faculty offering the course
			L	P	Total	
1	02-06-00-E01	Mankind and The Environment	2	0	2	Faculty of Science
2	02-06-00-E02	Nutrition and Health	2	0	2	The Higher Institute for Public Health
3	02-06-00-E03	Prevention in the field of dentistry	2	0	2	Faculty of Dentistry
4	02-06-00-E04	Education and prevention of viral hepatitis	2	0	2	Faculty of Medicine
5	02-06-00-E05	Artistic creativity	2	0	2	Faculty of Specialized Education
6	02-06-00-E06	Small and medium agricultural projects	2	0	2	Faculty of Agriculture
7	02-06-00-E07	Industrial Safety	2	1	2	Faculty of Engineering

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		
1	**Pharmaceutical Analytical Chemistry I**	**02-06-07101**	**2**	**1**	**3**	**None**	**15**	**25**	**50**	**10**	**100**	**2**
2	**Pharmaceutical Organic Chemistry I**	**02-06-05101**	**2**	**1**	**3**	**None**	**15**	**25**	**50**	**10**	**100**	**2**
3	**Pharmacy Orientation**	**02-06-09101**	**1**	**---**	**1**	**None**	**25**	**--**	**75**	**--**	**100**	**1**
4	**Medicinal Plants**	**02-06-06101**	**2**	**1**	**3**	**None**	**15**	**25**	**50**	**10**	**100**	**2**
5	**Medical Terminology**	**02-06-02101**	**1**	**---**	**1**	**None**	**25**	**--**	**75**	**--**	**100**	**1**
6	**Information Technology**	**02-06-00101**	**1**	**1**	**2**	**None**	**15**	**25**	**60**	**---**	**100**	**1**
7	**Mathematics**	**02-06-00102**	**1**	**---**	**1**	**None**	**25**	**--**	**75**	**--**	**100**	**1**
8	**Human Rights and Fighting Corruption ***	**02-06-00103**	**1**	**---**	**1**	**None**	**25**	**--**	**75**	**--**	**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		
1	Pharmaceutical Analytical Chemistry II	02-06-07102	2	1	3	Pharmaceutical Analytical Chemistry I	15	25	50	10	100	2
2	Pharmaceutical Organic Chemistry II	02-06-05102	2	1	3	Pharmaceutical Organic Chemistry-I	15	25	50	10	100	2
3	Cell Biology	02-06-08101	1	1	2	None	15	25	50	10	100	1
4	Human Anatomy& Histology	02-06-02102	2	1	3	None	15	25	60	-	100	2
5	Physical Pharmacy	02-06-01101	2	1	3	None	15	25	50	10	100	2
6	Pharmacognosy I	02-06-06102	2	1	3	Medicinal Plants	15	25	50	10	100	2
7	Psychology	02-06-09102	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		
1	Pharmaceutical Analytical Chemistry III	02-06-07203	1	1	2	Pharmaceutical Analytical Chemistry-II	15	25	50	10	100	1
2	Pharmaceutical Organic Chemistry III	02-06-05203	2	1	3	Pharmaceutical Organic Chemistry-II	15	25	50	10	100	2
3	Pharmacognosy II	02-06-06203	2	1	3	Medicinal Plants	15	25	50	10	100	2
4	Physiology and Pathophysiology	02-06-02203	2	1	3	None	15	25	50	10	100	2
5	Pharmaceutics I	02-06-01202	2	1	3	Physical Pharmacy	15	25	50	10	100	2
6	Biochemistry I	02-06-08202	2	1	3	None	15	25	50	10	100	2
7	Critical Thinking *	02-00-00204	2	---	2	None	25	---	75	---	100	2
	Total		11	6	17						600	

- ***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		
1	General Microbiology & Immunology	02-06-04201	2	1	3	None	15	25	50	10	100	2
2	Instrumental Analysis	02-06-07204	2	1	3	Pharmaceutical Analytical Chemistry III	15	25	50	10	100	2
3	Pathology	02-06-04202	1	1	2	Human Anatomy& Histology	15	25	50	10	100	1
4	Pharmaceutics II	02-06-01203	2	1	3	Physical Pharmacy	15	25	50	10	100	2
5	Synthesis and Spectroscopic analysis of organic compounds	02-06-05204	1	1	2	Pharmaceutical Organic Chemistry III	15	25	60	--	100	1
6	Biostatistics & Evidence-based Medicine	02-06-09203	1	1	2	Mathematics	15	25	60	--	100	1
7	Biochemistry II	02-06-08203	2	1	3	Biochemistry-I	15	25	50	10	100	2
8	University Elective*	02-06-EXX	2	--	2	None	25	--	75	--	100	2
	Total		11	7	18						700	

- ***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		
1	Pharmaceutical Microbiology	02-06-04302	2	1	3	General Microbiology and Immunology	15	25	50	10	100	2
2	Phytochemistry I	02-06-06304	2	1	3	None	15	25	50	10	100	2
3	Pharmaceutics III	02-06-01304	2	1	3	Physical Pharmacy	15	25	50	10	100	2
4	Scientific Writing and Communication skills	02-06-09304	1	1	2	None	15	25	50	10	100	1
5	Drug Information	02-06-09305	1	1	2	None	15	25	50	10	100	1
6	Drug Design	02-06-05305	1	1	2	Pharmaceutical Organic Chemistry III	15	25	60	--	100	1
7	Basic Pharmacology	02-06-02305	2	1	3	Physiology & Pathophysiology	15	25	50	10	100	2
	Total		11	7	18						700	

- ***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		
1	Parasitology and Virology	02-06-04303	2	1	3	None	15	25	50	10	100	2
2	Community Pharmacy Practice	02-06-09306	2	1	3	Pharmacy Orientation	15	25	50	10	100	2
3	Phytochemistry II	02-06-06305	2	1	3	Phytochemistry-I	15	25	50	10	100	2
4	Pharmaceutics IV	02-06-01305	2	1	3	Physical Pharmacy	15	25	50	10	100	2
5	Medicinal Chemistry I	02-06-05306	2	1	3	Pharmaceutical Organic Chemistry III	15	25	50	10	100	2
6	Pharmacology & Pharmacotherapeutics I	02-06-02306	2	1	3	Basic Pharmacology	15	25	50	10	100	2
7	University Elective*	02-06-EXX	2	--	2	None	25	--	75	--	100	2
	Total		12	6	18						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		
1	Medical Microbiology	02-06-04404	2	1	3	Pharmaceutical Microbiology	15	25	50	10	100	2
2	Biopharmaceutics and Pharmacokinetics	02-06-01406	2	1	3	Pharmaceutics III	15	25	50	10	100	2
3	Clinical Biochemistry	02-06-08404	2	1	3	Biochemistry-II	15	25	50	10	100	2
4	First Aid	02-06-02407	1	1	2	None	15	25	50	10	100	1
5	Pharmacy Legislations and Professional Ethics	02-06-09407	1	--	1	None	25	--	75	--	100	1
6	Medicinal Chemistry II	02-06-05407	2	1	3	Pharmaceutical Organic Chemistry III	15	25	50	10	100	2
7	Pharmacology & Pharmacotherapeutics II	02-06-02408	2	1	3	Basic Pharmacology	15	25	50	10	100	2
8	Faculty Elective	02-06-0XEXX	1	1	2	None	15	25	60	---	100	1
	Total		13	7	20						800	

- ***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		
1	Clinical Pharmacokinetics	02-06-09408	2	1	3	Biopharmaceutics & Pharmacokinetics	15	25	50	10	100	2
2	Pharmaceutical Technology I	02-06-03401	2	1	3	Physical Pharmacy	15	25	50	10	100	2
3	Phytotherapy	02-06-06406	2	1	3	Phytochemistry-II	15	25	50	10	100	2
4	Toxicology & Forensic Chemistry	02-06-02409	2	1	3	Basic Pharmacology	15	25	50	10	100	2
5	Medicinal Chemistry III	02-06-05408	2	1	3	Pharmaceutical Organic Chemistry III	15	25	50	10	100	2
6	Pharmacology & Pharmacotherapeutics III	02-06-02410	2	1	3	Basic Pharmacology	15	25	50	10	100	2
7	Faculty Elective	02-06-0XEXX	1	1	2	None	15	25	60	---	100	1
8	University Elective*	02-06-EXX	2	--	2	None	25	--	75	--	100	2
	Total		13	7	20						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		
1	Pharmaceutical Biotechnology	02-06-04505	2	1	3	Pharmaceutical Microbiology	15	25	50	10	100	2
2	Public Health	02-06-04506	2	--	2	Medical Microbiology	25	---	75	---	100	2
3	Pharmaceutical Technology II	02-06-03502	2	1	3	Pharmaceutical Technology I	15	25	50	10	100	2
4	Clinical pharmacy I	02-06-09508	2	1	3	Pharmacology & Pharmacotherapeutics III	15	25	50	10	100	2
5	Hospital Pharmacy	02-06-09509	1	1	2	Pharmacology & Pharmacotherapeutics III	15	25	50	10	100	1
6	Pharmaceutical Management, Marketing & Pharmacoeconomics	02-06-09510	2	--	2	None	25	---	75	---	100	2
7	Faculty Elective	02-06-0XEXX	1	1	2	None	15	25	60	---	100	1
8	University Elective*	02-06-EXX	2	--	2	None	25	--	75	--	100	2
	Total		12	5	17						700	

- ***Lect.*** = Lecture
- ***Period.*** = Periodical
- **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		
1	Quality Control of Pharmaceuticals	02-06-07505	2	1	3	Instrumental Analysis	15	25	50	10	100	2
2	Good Manufacturing Practice	02-06-03503	1	1	2	Pharmaceutical Technology II	15	25	50	10	100	1
3	Advanced Drug Delivery Systems	02-06-01507	1	1	2	Physical Pharmacy	15	25	50	10	100	1
4	Drug interaction	02-06-09511	1	1	2	Pharmacology & Pharmacotherapeutics III	15	25	50	10	100	1
5	Clinical Pharmacy II	02-06-09512	1	1	2	Clinical Pharmacy I	15	25	50	10	100	1
6	Clinical Research, Pharmacoepidemiology and & Pharmacovigilance	02-06-09513	1	1	2	Biostatistics & Evidence-based Medicine	15	25	50	10	100	1
7	Faculty Elective	02-06-0XEXX	1	1	2	None	15	25	60	---	100	1
8	Innovation and Entrepreneurship *	02-06-00504	1	1	2	None	15	25	50	10	100	1
	Total		8	7	15						700	

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

Appendix (3)

Related to Article (19)

Courses Contents

Courses Contents
Department of Pharmaceutics (Code # 01):

02-06-01101 Physical Pharmacy (2+1)
This course provides students with knowledge of physicochemical 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.
Pre-requisite: None

02-06-01202 Pharmaceutics I (2+1)
This course is a study of the system of weights, measures, mathematical expertise and pharmaceutical calculations requisite to the compounding, dispensing, and utilization of drugs in pharmacy practice. It is also concerned with all manufacturing formulations aspects, packaging, storage and stability and evaluation of liquid dosage forms including solutions (aqueous and non-aqueous), suspensions, emulsions and colloids with emphasis on the technology and pharmaceutical rationale fundamental to their design and development. The incompatibilities occurring during dispensing are also considered.
Pre-requisite: Physical Pharmacy

02-06-01203 Pharmaceutics II (2+1)
This course covers the structure and function of the skin, target area of treatment after topical application to skin, basic principles of diffusion through membranes and factors affecting percutaneous absorption, enhancement of skin penetration, transdermal drug delivery systems (TDDS). It also describes the principles and techniques involved in the formulation and manufacturing and evaluation of traditional dermatological semisolid dosage forms (creams, ointments, gels and pastes) and cosmetic products. Principles and techniques involved in the design, formulation and quality control testing of suppositories are also covered.
Pre-requisite: Physical Pharmacy

02-06-01304 Pharmaceutics III (2+1)
The course introduces the students to different physicochemical drug properties affecting dosage form design as well as drug stability involving kinetics of drug decomposition including rate and order of the reaction, determination of the half-life, expiry date and shelf-life by different methods, stability testing, and in-vitro possible drug/excipients interactions.

It also describes the principles and techniques involved in the formulation, and manufacturing of solid dosage forms including powders, granules, tablets, capsules.
Pre-requisite: Physical Pharmacy

02-06-01305 Pharmaceutics IV (2+1)
This course involves principles of formulation, development, sterilization, packaging and quality control testing of pharmaceutical sterile drug products. Principles for calculation and manipulation of parenterals, ophthalmic preparations, vaccines and blood products are emphasized. The course also covers the basic principles of formulation, sterilization, packaging and applications of radiopharmaceuticals in pharmacy and medicine. An in-depth study on the formulation, manufacturing, quality control testing and applications of aerosols and other inhalation products is also accentuated.
Pre-requisite: Physical Pharmacy

02-06-01406 Biopharmaceutics and Pharmacokinetics (2+1)
This course aims to provide students with an understanding of the relation between the physicochemical properties of the drug and its fate in the body. The course explores the principles of biopharmaceutics and strategies for enhancing drug delivery and bioavailability. Integration of knowledge gained from other courses is emphasized to design and assure the quality of drug products. Students will also be introduced to the principles of pharmacokinetics (absorption, distribution, metabolism and elimination). The concepts of bioequivalence, biowaivers and in vitro-in vivo correlations (IVIVC's) will be discussed along with different models of drug disposition. The course prepares students for their evolving role in utilizing pharmacokinetics to guide formulation, dosage-regimen design and optimizing drug usage.
Pre-requisite: Pharmaceutics III

02-06-01507 Advanced Drug Delivery Systems (1+1)
The course aims to provide students with insights and competencies related to the principles of pharmaceutical pre-formulation as a gateway to dosage forms design and formulation. Emphasis is placed on developing formulations based on the physical and chemical properties of the drug substance and the intended use of the drug product. The course also introduces the students to the formulation principles and applications of controlled drug delivery systems and novel and targeted drug delivery systems by transforming proteins, genes, and other biotechnology driven compounds into therapeutic products. In addition to formulation aspects of biotechnology derived pharmaceuticals, it also covers the application of polymers and excipients to solve problems/issues concerning the optimization of absorption, selective transport, and targeting. Tissue engineered products along with other new trends in pharmaceuticals will be discussed.
Pre-requisite: Physical Pharmacy

Electives:

02-06-01E01 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.
Pre-requisite: Physical Pharmacy

02-06-01E02 Formulation of biologics (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 familiarizers the student with different research methodologies, such as recombinant proteins and genetic engineering and challenges regarding discovery research, formulations and upscaling and manufacturing as well as regulatory, and costs concerns of these new products.
Pre-requisite: Physical Pharmacy

02-06-01E03 Advanced Compounding (1+1)
Students are introduced to modern compounding methods utilized in many of today's hospitals and community pharmacy practice settings. Students gain knowledge and hands-on experience through diverse prescription preparation exercises where advanced pharmaceutical compounding techniques and use of specialized equipment and instruments are employed.
Pre-requisite: Physical Pharmacy

02-06-01E04 Radiopharmaceuticals & Nuclear Medicine (1+1)
This course is an introduction to the basic aspects of radiopharmaceuticals and nuclear medicine. Topics include the characterization, properties and detection of radioactivity, radiation biology, radiation protection elements of nuclear medicine and radiopharmaceuticals. The student will gain basic knowledge on in vivo imaging with radiopharmaceuticals (Positron Emission Tomography, PET), radionuclide-guided surgery, radionuclide therapy, calculation and dispensing of radiopharmaceutical doses and waste disposal, documentation system and monitoring the level of radiation in hot labs.
Pre-requisite: None

Department of Pharmacology and Toxicology (Code # 02):

02-06-02101 Medical Terminology (1+0)
Introduction to medical and pharmaceutical terminologies, medical abbreviations, medical idioms, suffixes and prefixes, medical terms pertaining to major body systems.
Pre-requisite: None

02-06-02102 Human Anatomy and Histology (2+1)
The course introduces the pharmacy students to human anatomy including skeletal, muscular, and articular systems, nervous, cardiovascular, and lymphatic systems, digestive, respiratory, and urogenital systems, endocrine glands. The clinical importance of anatomical relationships will be introduced where appropriate. The course also provides basic knowledge concerning human histology. Topics include: Cytology, various tissues (epithelial, connective, muscular, and nervous), heart, blood vessels, lymphatic organs, skin and its appendages, systems

(digestive and associated glands, respiratory, urinary, reproductive, and central nervous system), endocrine glands, and the eye. The histological characteristics of normal human tissues and systems are correlated with their function.
Pre-requisite: None

02-06-02203 Physiology and Pathophysiology (2+1)
The course introduces the pharmacy students to the normal physiology of the human body. It includes topics on body water, homeostasis, transport of materials, nervous systems (central and peripheral including the autonomic and somatic nervous systems), neuron structure and function (reflex arc), cardiovascular system, blood, respiratory cycle, gastrointestinal, reproductive, and renal systems, endocrine glands and body temperature regulation. Common pathophysiological disorders associated with some diseases or injuries are also integrated in the form of patient case-based scenarios including cell injury, inflammation and abnormal immune responses, autonomic nervous system diseases, endocrine disorders, pancreatic disorders, fluid and electrolyte imbalance, vascular and hematological disorders, disease of urinary, pulmonary and digestive systems.
Pre-requisite: None

02-06-02305 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. The fundamentals of the autonomic nervous system pharmacology and autacoids are also discussed. Classical wet labs and/or simulation programs are employed to familiarize the students with the basics of animal handling and experimentation in pharmacology.
Pre-requisite: Physiology and Pathophysiology

02-06-02306 Pharmacology and Pharmacotherapeutics -I (2+1)
This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology, drug interaction and principle of therapeutics to disease processes regarding the autonomic and neuromuscular systems as well as autacoids. Ocular, gastrointestinal, pulmonary, and urological disorders are discussed. Disease management therapeutics and treatment guidelines, drugs mechanisms of action, adverse drug reactions and interactions, contraindications are also included in integrated patient case-based scenarios.
Pre-requisite: Basic Pharmacology

02-06-02407 First Aid (1+1)
The course covers topics of basic life support and medical emergency of different situations including bleeding, shock, poisoning, bone fractures, soft tissue injuries, rescue and transportation. It includes: introduction to first aid ABCs, medical emergencies, effect of temperature, transportation of an injured casualty and first aid kit, respiratory emergencies, fractures and dislocations, bleeding and surgical emergencies, burns and scalds, animal bites or stings and poisoning.
Pre-requisite: None

02-06-02408 Pharmacology and Pharmacotherapeutics -II (2+1)
This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes, regarding drugs acting on cardiovascular systems, hematologic disorders and dyslipidemia, central nervous system, and endocrine disorders. Disease management therapeutics and treatment guidelines, drugs mechanisms of action, adverse drug reactions and interactions, contraindications are also included in integrated patient case-based scenarios.
Pre-requisite: Basic Pharmacology

02-06-02409 Toxicology & Forensic Chemistry (2+1)
This course provides basics and concepts of toxicology including the mechanism of toxicity, target organ and treatment of toxicity. Toxic groups including heavy metals, toxic gases, animal, plant and marine poisons, pesticides and radiation hazards are covered. Environmental, occupational, reproductive and genetic toxicology as well as drug abuse are included. Postmortem sampling for detection of poisons, methods of detection, interpretation of results and writing of a report are also covered.
Pre-requisite: Basic Pharmacology

02-06-02410 Pharmacology and Pharmacotherapeutics -III (2+1)
This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding drugs used in infectious diseases, and oncologic and immune disorders. Chemotherapeutic drugs including antimicrobials, anticancer and immunosuppressant are within the scope of the course. Stem cell therapy is also included. The anti-inflammatory, analgesics as well as gout treatments are also included. Disease management therapeutics and treatment guidelines, drugs mechanisms of action, adverse drug reactions and interactions, contraindications are also included in integrated patient case-based scenarios.
Pre-requisite: Basic Pharmacology

Electives:

02-06-02E01 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 (blood pressure, and cat nictitating membrane). Different drug groups are tested including skeletal muscle relaxants, cardio tonic drugs, antidysrhythmic drugs, antihypertensive drugs & analgesics). Assay of different endocrine hormone are discussed.
Pre-requisite: Basic Pharmacology

02-06-02E02 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.
Pre-requisite: Basic Pharmacology

02-06-02E03 Management of Obesity (1+1)
This course is designed to give pharmacy student the knowledge to identify, evaluate and manage patients with high-risk obesity. The knowledge in this course is intended to help the pharmacist in patient counseling in community pharmacy as well as in hospitals. Basic information concerning pathophysiology of obesity, metabolic disorders and genetic factors leading to obesity, obesity comorbidities, medical and surgical management of the adult patient with obesity, lifestyle-based therapies for obesity, including nutritional, physical activity, and behavioral approaches. The pharmacy students are introduced to current pharmacological approaches to the treatment of obesity as well as how to apply effective counseling and behavioral modification techniques for different patients.
Pre-requisite: Basic Pharmacology

Department of Industrial Pharmacy (Code # 03):

02-06-03401 Pharmaceutical Technology I (2+1)
The course provides students with an introduction to industrial pharmacy. It deals with the principles of various unit operations such as heat transfer, evaporation, drying, distillation, filtration, dust control, centrifugation, crystallization and extraction. It focuses on the application of these unit operations in pharmaceutical industry with emphasis on the equipment and machines used during the production of different dosage forms. Pharmaceutical excipients and active pharmaceutical ingredients (APIs) are also discussed.
Pre-requisite: Physical Pharmacy

02-06-03502 Pharmaceutical Technology II (2+1)
This course is a continuation of the study of the various unit operations in pharmaceutical industry with emphasis on mixing, emulsification, size reduction, size separation, size analysis and size enlargement and the application of these unit operations in the process development. Scaling up and manufacturing of pharmaceutical drug products in industry (conventional / advanced nanotechnology based) is discussed with emphasis on the manufacturing of granules, tablets and pellets. The course as well provides an understanding of the manufacture of capsule shell and the capsule filling techniques, container/closure systems, some of the packaging processing methods. Quality control tests of various pharmaceutical dosage forms are also discussed.
Pre-requisite: Pharmaceutical Technology I

02-06-03503 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.
Pre-requisite: Pharmaceutical Technology II

Electives:

02-06-03E01 Quality Assurance in Pharmaceutical Industries (1+1)
The course provides an overview of quality control and assurance in pharmaceutical industry, analytical control, inspection control, documentation and report writing, and environmental control monitoring for the manufacturing of both sterile and non-sterile products. The course covers the regulatory approaches used in Egypt, Europe and the US. The course also gives an idea about the concept of total quality management (TQM) and risk assessment.
Pre-requisite: Pharmaceutical Technology I

02-06-03E02 Research and Development in 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.
Pre-requisite: Pharmaceutical Technology I

Department of Microbiology and Immunology (Code # 04):

02-06-04201 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 this course introduces the modern concepts of medical immunology, with an emphasis on host-parasite relationship, Non-specific and specific immunity, and 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, in-vitro antigen-antibody reactions, immuno-deficiency disorders, auto-immune disease and organ transplantation are also discussed.
Pre-requisite: None

02-06-04202 Pathology (1+1)
The main aim of Pathology course is to provide the pharmacy student with knowledge and skills for common diseases affecting body organs and system. It helps the student to understand the causes (etiology) of disease, the mechanisms of its development (pathogenesis) and the associated alterations of structure (morphologic changes) and function (clinical manifestations and complications) to be able to determine the most likely diagnosis of the disease.
Pre-requisite: Human Anatomy and Histology

02-06-04302 Pharmaceutical Microbiology (2+1)
This course describes in detail the physical and chemical methods of bacterial eradication and how to effectively control microbial growth in the field of pharmaceutical industry / hospitals. It further describes the means of preservation of pharmaceutical products, as well as cosmetics, followed by the proper tests of quality control and sterility assurance. Sterilization, sterilization indicators, sterility testing, aseptic area, the microbiological quality of pharmaceuticals. Validation of sterilization process. Moreover, it explains the different groups of antimicrobials, their mechanism of action and resistance of microbes to biocides. Microbiological evaluation of antiseptics, disinfectants and preservatives. Antibiotics, classification and mechanism of action, Antiviral and antifungal agents, different classes of antibiotics including the new categories and new approaches to overcome bacterial resistance and antibiotics clinical abuse.
Pre-requisite: General Microbiology and Immunology

02-06-04303 Parasitology and Virology (2+1)
Part of this course will focus on parasitic infections of humans with knowledge concerning biological, epidemiological and ecological aspects of parasites causing diseases to humans. It concerns with different parasitological related diseases in in Egypt causing serious health problems. This course will also 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 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.
Pre-requisite: None

02-06-04404 Medical Microbiology (2+1)
The course aims at studying microorganisms causing infectious disease in human beings. The infectious diseases, their etiology and clinical manifestation, routes of transmission, treatment and techniques in detection and identification of pathogenic microorganisms caused by Gram positive and Gram negative bacteria as well as mycobacteria of major significance to public health will be studied.
Pre-requisite: Pharmaceutical Microbiology

02-06-04505 Pharmaceutical Biotechnology (2+1)
The course aims to provide students with fundamentals, scope and applications in biotechnology through studying fermentation technology, upstream, downstream, scaling up

and down processes, use of molecular techniques for production of recombinant products and other major biotechnological products, biotransformation, bioremediation, bioleaching, bioinsecticides, biosurfactants and biopolymer production.
Pre-requisite: Pharmaceutical Microbiology

02-06-04506 Public Health (2+0)
This course aims at understanding all scientific disciplines required for health education and promotion directed to the community health. How epidemiology acts as the bases of public health actions will be taught. Detailed scientific information and practices programs will be provided for control of communicable, non-communicable diseases, improving mental, social, environmental, occupational, geriatric and family health, use of sufficient and balanced food and nutrition, supplying safe drinking water, treating and disposing wastes and proper intervention during disasters.
Pre-requisite: Medical Microbiology

Electives:

02-06-04E01 Gene regulation and epigenetics (1+1)
In this course, the student will learn the basic concepts of gene regulation starting from the transcriptional level with constitutive, inducible and repressible expression. The student will also learn about post-transcriptional modifications such as splicing, alternative splicing and trans-splicing. Furthermore, epigenetics mechanisms will be taught starting from DNA supercoiling, histone modifications, DNA methylation and the RNAi (RNA interference system e.g. miRNA and siRNA) system. Medical and biopharmaceutical applications of gene regulation and measurement of gene expression levels will also be taught.
Pre-requisite: General Microbiology and Immunology

02-06-04E02 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.
Pre-requisite: Pharmaceutical Microbiology

02-06-04E03 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.
Pre-requisite: Pharmaceutical Microbiology

02-06004E04 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.
Pre-requisite: General Microbiology and Immunology

Department of Pharmaceutical Chemistry (Code # 05):

02-06-05101 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 (SN1, SN2, E1, E2). Arenes and aromatic compounds (Kekule structure, Huckel rule, electrophilic aromatic substitution and orientation). The practical work of this course help students gain skills required to purify and identify organic compounds of different classes such as aliphatic and aromatic aldehydes, ketones alcohols and hydrocarbons, halogenated hydrocarbons.
Pre-requisite: None

02-06-05102 Pharmaceutical Organic Chemistry II (2+1)
This course involves different classes of organic compounds: aryl halides, Alcohols, Phenols, ethers and epoxides, aldehydes, ketones, carboxylic acid & acid derivatives, sulphonic acids, and nitrogenous compounds. It also provides students with required skills to handle and dispose of chemicals in a manner ensuring safety of individuals and environment.
Pre-requisite: Pharmaceutical Organic Chemistry I

02-06-05203 Pharmaceutical Organic Chemistry III (2+1)
This course deals with the study of the chemistry of carbohydrates, amino acid and peptides, polynuclear compounds and heterocyclic chemistry of five and six-membered ring systems. The course also introduces the students to application of environmental chemistry (Green Chemistry) for the preparation of some pharmaceutical compounds and comparison with other conventional (Non-green) methods of preparation.
Pre-requisite: Pharmaceutical Organic Chemistry II

02-06-05204 Synthesis and Spectroscopic analysis of organic compounds (1+1)
This course focuses on the applications of organic theories in relation to "Drug Molecules" and involves the synthesis of some biologically and medicinally active substances for the management of some diseases. It also introduces the students to the use of different spectroscopic tools, including UV/visible, infrared (IR), nuclear magnetic resonance (NMR) and mass spectrometry (MS) for the structural elucidation of organic compounds. Applications of these techniques in pharmacy are discussed.
Pre-requisite: Pharmaceutical Organic Chemistry III

02-06-05305 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).
Pre-requisite: Pharmaceutical Organic Chemistry III

02-06-05306 Medicinal Chemistry I (2+1)
This course is tailored to assist the students to recognize the drugs affecting the autonomic nervous system (ANS), antihistamines (H1, H2 blockers and anti-ulcer PPIs), drugs for pain and inflammation (NSAIDs, local anesthetics and rheumatoid drugs) and gout treatments. Drugs used for ocular, gastrointestinal, and pulmonary, disorders are covered. Basic chemical structure of prototype molecules of these drugs will be introduced to explain the structural basis of their biological activity and pharmacokinetic properties. Chemical concerns (chemical drug interactions, metabolism, stability) with impact on clinical practice involving the use of these drugs are discussed. Practical sessions, simulation and computer aided drug design programs will be used to implement concepts in this course.
Pre-requisite: Pharmaceutical Organic Chemistry III

02-06-05407 Medicinal Chemistry II (2+1)
The course is tailored to assist the students to recognize knowledge concerning the drugs affecting cardiovascular and central nervous systems, neurodegenerative disorders. Moreover, endocrine-related drugs (Diabetes, thyroid and calcium-regulating agents). Steroidal hormones and related drugs are also covered. Drugs for hematologic disorders and dyslipidemia are also included. Basic chemical structure of prototype molecules of these drugs will be introduced to explain the structural basis of their biological activity and pharmacokinetic properties. Chemical concerns (chemical drug interactions, metabolism, stability) with impact on clinical practice involving the use of these drugs are discussed. Practical sessions, simulation and computer aided drug design programs will be used to implement concepts in this course.
Pre-requisite: Pharmaceutical Organic Chemistry III

02-06-05408 Medicinal Chemistry III (2+1)
The course handles different classes of antibiotics and antimicrobials (natural and synthetic), beside other synthetic chemotherapeutic agents (including antivirals, antifungals and anti-

parasitic agents). Additionally, various anticancer therapies, chemotherapeutic agents, and immunosuppressant drugs are also discussed. Basic chemical structure of prototype molecules of these drugs will be introduced to explain the structural basis of their biological activity and pharmacokinetic properties. Chemical concerns (chemical drug interactions, metabolism, stability) with impact on clinical practice involving the use of these drugs are discussed. Practical sessions, simulation and computer aided drug design programs will be used to implement concepts in this course.
Pre-requisite: Pharmaceutical Organic Chemistry III

Electives:

02-06-05E01 Advanced Computer Aided Drug Design (CADD) (1+1)
The course focuses on structure activity relationships (SAR), quantum mechanical approaches, molecular connectivity, molecular docking, pharmacophore generation, molecular modification by isosteric replacement. Natural products leading to new pharmaceuticals, mathematical treatment serving prediction, defining sites and targets, molecular modeling, prodrugs are discussed. Different softwares are used to implement the principles and concepts learnt in lectures.
Pre-requisite: None

Department of Pharmacognosy (Code # 06):

02-06-06101 Medicinal Plants (2+1)
The aim of the course is to provide students with knowledge necessary to identify and prepare a crude drug from the farm to the firm. Students should acquire knowledge concerning dusting powders, plant cytology, physiology and medicinal leafy plants and their taxonomy. In this course, the student will study: importance of natural products, preparation of natural products-derived drugs including collection, storage, preservation and adulteration. The course will introduce the students to the different classes of secondary metabolites. In addition, the course will discuss and address the variability in occurrence of pharmacologically active substances in certain official medicinal leafy plants according to their WHO monographs.
Pre-requisite: None

02-06-06102 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 and Egyptian market. The course introduces students to some botanical drugs of leaves, flower, seeds, bark and wood origin. During the lectures and practical sessions, students learn to identify examples of these drugs in their entire and powdered forms. Student will learn about the major constituents, folk uses, clinically proven uses, benefits, precautions of those medicinal plants. Possible herbal-drug interactions of selected examples of these drugs and to have an overview over their phytopharmaceuticals available on the market specially the Egyptian market.
Pre-requisite: Medicinal Plants

02-06-06203 Pharmacognosy II (2+1)
After completion of the course the student should have the knowledge and skills that enable the student to differentiate between different organs of through their monographs. The course comprises the study of identification of different organs through their monographs. (fruits, herbs, Subterranean organs, unorganized drugs in addition to drugs of marine and animal origin) , including identify their active constituents and adulterants describe micro- and macro-morphological characteristics, benefits and precautions of their medicinal uses., side effects and contraindications and to have an overview over their phytopharmaceuticals available on the market specially the Egyptian market.
Pre-requisite: Medicinal Plants

02-06-06304 Phytochemistry I (2+1)
Based on complementary medicine and Egyptian medicinal plants that can be used as natural extracts, bioactive raw materials and phytochemical standards to serve the pharmaceuticals, cosmetics and food industries in Egypt. The course aims to gain students the knowledge and skills that enable them to understand, describe and deal with the chemistry of volatile oils, resins, miscellaneous terpenoids, bitters of plant or animal origin, carbohydrates and glycosides of plant or animal origin and different techniques used for their preparation, identification and determination. Also, the students should become aware of different chromatographic methods used for isolation and analysis of different plant constituents and their pharmacological actions and medicinal uses.
Pre-requisite: None

02-06-06305 Phytochemistry II (2+1)
In continuation with Pharmacognosy I, this course aims to enable students to demonstrate the knowledge and experience that enables her/ him to understand, describe and deal with the chemistry of alkaloids, tannins and antioxidants of plant, fungi or animal origin as well as techniques for their isolation, identification and determination in their respective sources. Finally, the course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features.
Pre-requisite: Phytochemistry I

02-06-06406 Phytotherapy (2+1)
Upon successful completion of this course, the students should be able to know guidelines for prescribing herbal medicinal drugs on the basis of the pharmacological properties of these drugs including therapeutic uses, mechanism of action, dosage, adverse reactions, contraindications and drug interactions. The course also allows students understand pharmacotherapeutic principles applied to the treatment of different diseases, pharmacovigilance and rational use of herbal drugs. Also, the student should understand the basis of complementary and alternative medicine with emphasis on herbal remedies, nutritional supplements, homeopathies, aromatherapy and their effect on maintaining optimum health and prevention of chronic diseases. It includes studying of medicinal plants portfolios in relation to Phytopharmaceuticals in Egyptian Market.
Pre-requisite: Phytochemistry II

Electives:

02-06-06E01 Complementary and Alternative Medicines (1+1)

The course introduces the students to definition of Complementary medicine, where non-conventional medical practices is used in addition to standard treatment, and alternative medicine that substitutes traditional medications. The study of herbal preparations, nutritional supplements, and homeopathies. The study of herbal preparations that are widely used by the general public as self-selected OTC (over the counter) products/NPDs (nonprescription drugs). Food items for therapeutic, disease prevention, or health promotion purposes. Emphasis will be placed on the role of pharmacist to help client make an informed choice and counsel them on the selection of useful and safe products. New trends in complementary and alternative medicine will be discussed.

Pre-requisite: Medicinal Plants

02-06-06E02 Production and Manufacture of Medicinal plants (1+1)

The course deals with commercial production of medicinal plants, cultivation, collection, drying, preservation, extraction, quality control and final packaging of entire or powdered forms of the extract. 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. New trends in production of medicinal plants will be explored.

Pre-requisite: Medicinal Plants

02-06-06E03 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.

Pre-requisite: Instrumental Analysis

02-06-06E03 Applied and Forensic Pharmacognosy (1+1)

The course aims to provide pharmacy students with sufficient knowledge concerning quality control from herbal aspects. Sampling, structural, physical and analytical standards, purity, safety and adulteration of drugs and their detection. It also covers the modern chromatographic techniques employed for the evaluation of natural product and their products. It also provide the student with basic knowledge about the application of plant biotechnology for the production of pharmaceutically active materials. The course also include an overview on forensic pharmacognosy including plants and their natural products that constitute health hazards, or intended for criminal uses to produce, abortion, loss of mental control, hallucination, heart arrest.. Also it includes the study of drug dependents, narcotics, analgesics psych energetics, euphoric. Mycotoxin as a serious threat to general health and safety of community, contamination of food material with poisonous fungi.

Pre-requisite: Instrumental Analysis

Department of Pharmaceutical Analytical Chemistry (Code # 07):

02-06-07101 Pharmaceutical Analytical Chemistry I (2+1)
The course introduces students to general chemistry and fundamental concepts of Analytical Chemistry, types of chemical reactions and calculations of concentrations of substances. The course includes chemical kinetics, rate of reaction, rate law and theories, first order reaction, second order and third order reaction, molecularity, chemical equilibrium, activation energy and catalysis, photochemistry, absorbed energy, quantum yield and chemical equilibrium. Analysis of anions and cations as well as mixture of anions and cations are also discussed.
Pre-requisite: None

02-06-07102 Pharmaceutical Analytical Chemistry II (2+1)
This course provides students with knowledge concerning acid-base theory, titration curves, indicators and their applications. Titrations in non-aqueous media, classification of solvents, theory, applications are also discussed. The course also covers precipitimetric titrations (solubility product principle, titration curves, Mohr's method, Volhard's method, Fajans' method) and their pharmaceutical application as well as complexometric reactions (theory, reaction with EDTA, indicators) and their applications.
Pre-requisite: Pharmaceutical Analytical Chemistry I

02-06-07203 Pharmaceutical Analytical Chemistry III (1+1)
This course provides students with knowledge concerning redox titration (theory, oxidation potentials, Nernest equation, titration curves, redox indicators, selected oxidants and reductants) and applications of redox titrations . The course also covers applied pharmaceutical analysis such as water analysis (water hardness, analysis of chloride, chlorine, iron, oxidizable matter, …etc in water). Electrochemical methods (electrode potential, reference electrodes, indicator electrode) and their applications as well as conductomertric titration (ionic conductance, definition of cell constant, conductance) and their applications. Polarography (ILkovic equation, dropping mercury electrodes, diffusion current, derivatization polarography) and their applications are also discussed.
Pre-requisite: Pharmaceutical Analytical Chemistry II

02-06-07204 Instrumental Analysis (2+1)
This course provides pharmacy students with knowledge concerning spectroscopic methods of analysis, which include UV/Visible spectroscopy (principal, instrumentation, factors affecting absorption) and their applications in pharmaceutical analysis. The course also covers spectroflourimetric methods including principal instrumentation, factors affecting fluorescence intensity and applications in pharmaceutical analysis. Atomic spectroscopy (principal and instrumentation) and chromatographic methods for analytical chemistry, which includes: thin layer chromatography (TLC), gel chromatography, column chromatography, high performance liquid chromatography (HPLC), Ultra-high performance liquid chromatography (UPLC), gas chromatography (GC) and capillary electrophoresis are also discussed.
Pre-requisite: Pharmaceutical Analytical Chemistry III

02-06-07505 Quality Control of Pharmaceuticals (2+1)
The course is shared between 2 departments: Department of Pharmaceutical Analytical Chemistry and Department of Microbiology and Immunology. The contents of the course is designed to familiarize students with the role of quality control microbiology professionals, quality assurance and regulatory affairs personnel who have responsibility for the performance of Bioburden, Endotoxin and Sterility Testing for raw materials, finished pharmaceutical products and medical devices as well as pharmacists performing sterile compounding. 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) including herbal drugs are covered in this course. The standard pharmacopeial methods and procedures as well as international guidelines of the World Health Organization (WHO), European Medicine Agency (EMA) and the Therapeutic Goods Administration (TGA) in Australia are discussed.

This course trains students to execute official methods of analysis applied to raw materials and end products as well as testing their sterility. The students will be familiarized with Good Analytical Practice and sampling (types of sampling tools and sampling plans), documentation, validation of analytical procedures according to International Conference on Harmonization (ICH) Q2(R1) guidelines, compendial testing, and data elements required for assay validation. The course covers drug stability, stability studies, forced degradation studies, stability indicating assay methods, and stress conditions for drug degradation according to ICH Q1(R2) guidelines. The course also explains factors affecting drug degradation, Drug expiration, Drug withdrawal from the market. Pharmaceutical regulations according to Food and Drug Administration (FDA), EMA, International Standards Organization (ISO) and British Standards Institution (BSI) will be discussed. Additionally, the course introduces the students to main concepts and mechanisms of drug-excipient interactions and adduct formation and analytical techniques used to detect drug-excipient compatibility.
Pre-requisite: Instrumental Analysis

Electives

02-06-07E01 Advanced Pharmaceutical Analysis – Spectroscopy (1+1)
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.
Pre-requisite: Instrumental Analysis

02-06-07E02 Reverse Formulation (1+1)
Generics are composed of various excipients, each having a specific purpose. Although excipients are clinically inactive, but they affect stability, dissolution rates and bioavailability of drug products. Reverse engineering of a product (de-formulation) is the science of separation, identification and quantification of ingredients (active drug and excipients) of this product with the aim of re-producing it. This course introduces the pharmacy students to methods of extraction and identification of the components of a pharmaceutical product. Analytical techniques such as chromatography, Fourier Transform Infrared Spectroscopy, Mass Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, and Differential Scanning

Calorimetry are explored for quantitative decoding of pharmaceutical formulas to help in developing good generics.
re-requisite: Pharmaceutical Technology I

Department of Pharmaceutical Biochemistry (Code # 08):

02-06-08101 Cell Biology (1+1)
The course aims to provide the students with basic knowledge of cell theory and cell structure (membranous and non-membranous organelles - cell inclusions and the nucleus - macromolecules of the cell) - DNA and genetic code - Cell cycle and control of cell number – From gene to protein (transcription, protein synthesis, folding of peptides) – Transport of biomolecules across membranes – Cellular energetics - Ions and voltages – Intercellular communication.
Pre-requisite: None

02-06-08202 Biochemistry I (2+1)
The course introduces the aspects of mammalian biochemistry including proteins (protein structure, biologically important peptides – fate of proteins), amino acids as precursors for biosynthesis of biomolecules (e.g. neurotransmitters ,nucleotides, …) – carbohydrates (glycoproteins and proteoglycans - glucose transporters) – lipids (physiologically important lipid molecules – cholesterol and steroids – lipoprotein metabolism) – enzymology (enzyme kinetics – regulation enzyme inhibitors as drugs) - hemoglobin and porphyrins (Hb derivatives and types – metabolism of Hb and regulation) – biological oxidation and ATP synthesis – clinical correlations.
Pre-requisite: None

02-06-08203 Biochemistry II (2+1)
The course provides the pharmacy students with information concerning biochemical metabolic processes in the human body including energy production from dietary fuels (carbohydrates, lipids and proteins), integration of metabolism (Feed/fast cycle – diabetes mellitus – obesity) – nitrogen metabolism and nitrogen balance – hormonal regulation of metabolism – bio-signaling – inborn errors of metabolism – biochemistry of cancer - biochemistry of aging – food biochemistry (milk – probiotics) – free radicals and antioxidants.
Pre-requisite: Biochemistry I

02-06-08404 Clinical Biochemistry (2+1)
The course aims to give an integrated picture between biochemical/pathophysiological changes and laboratory diagnostic markers for disorders of (Endocrine glands – renal function – hepatic function – gastric function bone and mineral metabolism - plasma proteins and lipoproteins) – Clinical enzymology and myocardial infarction - Electrolytes, blood gases and acid-base balance - Homeostasis and biochemical aspects of hematology and blood analysis – Urine analysis – Tumor markers - Recent diagnostic biomarkers. Handling, preservation, storage and analysis of biological samples will be discussed.
Pre-requisite: Biochemistry II

Electives:

02-06-08E01 Clinical nutrition (1+1)

The course provides students with the information needed to give patients the proper advice in nutrition counselling. It introduces the knowledge and understanding of the components of a nutritionally adequate diet, dietary reference intakes, and the diagnostic tests used to assess nutrition status. In addition, the course highlights the effects of disease states, clinical conditions, altered metabolism, as well as drugs and dietary supplements on nutrition status. The course also places a special emphasis on the effects of nutrition status on drug pharmacokinetics and pharmacodynamics, and the clinically significant interactions between drugs, dietary supplements and nutrients. Pediatric nutrition, the benefits of breastfeeding, food allergies, and nutritional restrictions for infants with inborn errors of metabolism are also included. The course additionally directs attention on dietary supplements that enhance athletic performance.

Pre-requisite: Clinical Biochemistry

02-06-08E02 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.

Pre-requisite: Clinical Biochemistry

Department of Pharmacy Practice (Code # 09):

02-06-09101 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, handling 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.

Pre-requisite: None

02-06-09102 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.

Pre-requisite: None

02-06-09203 Biostatistics and Evidence-based Medicine (1+1)
This course provides basic concepts of biostatistics and data analysis. It includes introduction to descriptive and inferential statistics, interpretation of estimates, confidence intervals and significance tests, elementary concepts of probability and sampling; binomial and normal distribution, basic concepts of hypothesis testing, estimation and confidence intervals, t-test and chi-square test, linear regression theory and the analysis of variance. Emphasis is placed on proper selection and application of statistical methods appropriate to clinical data. The course includes laboratory session demonstrating the use of software for statistic to apply tests discussed in the lecture. Application of the use of statistics to handle clinical data, and how to formulate clinical questions and make them answerable in a scientific way using statistics along with the proper study design will be discussed.
Pre-requisite: Mathematics

02-06-09304 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. The course will help students develop necessary written and oral communication and presentation skills to improve inter- and intra-professional collaboration and communication with patients with patients and other health care providers.
Pre-requisite: None

02-06-09305 Drug Information (1+1)
This course introduces the student to the concept and need of drug information, types of drug information resources (primary, secondary and tertiary literature), computerized and online drug information, literature evaluation and critical appraisal, retrieval of information. It also aims at providing the students with the professional skills required to effectively and accurately answer medication- related questions in a systematic and evidence-based approach.
Pre-requisite: None

02-06-09306 Community Pharmacy Practice (2+1)
The course provides students with competencies and knowledge for the provision of quality pharmaceutical care in a community pharmacy setting aiming at improving use of medicines and therapeutic outcomes. The course covers differentiation between minor and major ailments and responding to minor ailments with over-the-counter products. It also provides concepts of patient assessment, counselling, and monitoring in community pharmacy and in outpatient care settings and introduces students to pharmaceutical care services for chronic-diseased outpatients and to psychosocial aspects in patient care. In addition, the course provides the students with competencies to promote the public health role of pharmacist including health promotion and disease prevention activities.
Pre-requisite: Pharmacy Orientation

02-06-09407 Pharmacy Legislations and Professional Ethics (1+0)
The course introduces the pharmacy students to professional ethics and provides general principles and history of pharmacy ethics, general principles of medical ethics, conflicts of interests and its management, pharmacists relationship with society and family, ethics in disaster, medication error, research ethics and animal ethics. The course also gives a detailed

presentation of laws that govern and affect the practice of pharmacy, legal principles for non-controlled and controlled prescriptions, Over The Counter (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 are also discussed.
Pre-requisite: None

02-06-09408 Clinical Pharmacokinetics (2+1)
This course provides basic principles of pharmacokinetics and their application to the clinical setting. Single Intravenous bolus and oral kinetics, IV infusion, multiple IV bolus, short infusion and oral dosing, non-linear pharmacokinetics, pharmacokinetic models. Sources of variability in pharmacokinetics, dosage regimen and dosage adjustment in children, obese, elderly patients and chronic disease states. Therapeutic drug monitoring and pharmacogenomics approaches.
Pre-requisite: Biopharmaceutics and Pharmacokinetics

02-06-09508 Clinical Pharmacy I (2+1)
The course covers in details the definition and concepts of clinical pharmacy and pharmaceutical care, and qualification to become a clinical pharmacy. Patient history, medication reconciliation, therapeutic planning and drug-related problems, interpretation of clinical laboratory data and physical examination are discussed. The course also provides the student with knowledge concerning providing medication. Additionally, the course introduces the student to the principles of management and supportive care of oncological diseases, blood disorders and nutritional deficiencies. The course covers medication safety in different pharmacy practice settings and medication errors and the importance of pharmacovigilance in the collection, detection, assessment, monitoring and prevention of adverse effects. The tutorials are based on integrated case-based learning (ICBL) to provide the students with the skills and competencies necessary for effective delivery of medication therapy management.
Pre-requisite: Pharmacology and Pharmacotherapeutics III

02-06-09509 Hospital Pharmacy (1+1)
The course aims to introduces students to hospital pharmacy organization, structure, management and related activities on both technical and administrative levels in accordance with national and international established guidelines. Administrative services include: the pharmacy, the pharmacy and therapeutic committee and policy making, the hospital formulary, medication purchasing, distribution and dispensing systems. The pharmaceutical (technical) services include: preparation of Intravenous (IV) admixtures, total parenteral nutrition (TPN) fluids, renal dialysis fluids, dispensing and safe handling of radiopharmaceuticals, cytotoxic drugs, and medical gases.
Pre-requisite: Pharmacology and Pharmacotherapeutics III

02-06-09510 Pharmaceutical Management, Marketing & Pharmacoeconomics (2+0)
This course introduces students to the principles of pharmacy business management including ethical drug promotion, rational use of financial and human resources. It also provides students with an understanding of the major components of drug management and supply system, namely drug selection, procurement, distribution and use. Concerning 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 behaviour, segmentation, market research, product management, pricing, promotion, sales force management and competitive analysis. The basic concepts of pharmacoeconomic and health economics, learning basic terms of health economics and understand key principles are introduced. 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.

Pre-requisite: None

02-06-09511 Drug interaction (1+1)

The course is shared between 2 departments: Department of Pharmacology and Toxicology and Department of Pharmacy Practice. This course provides knowledge and skills enabling the pharmacy students to develop professional competencies in the recognition of the pharmacological aspects of drug-drug interactions and their clinical significance as well as the application of that knowledge to minimize the risk and outcome of interactions. The course familiarizes students with the major types of drug interactions (pharmaceutical, pharmacokinetic, pharmacodynamic and pharmacogentic interactions) in the clinical setting, in addition to drug-food, drug-herb and drug-disease interactions. It also covers drug-alcohol and drug-smoking interactions. Interaction of CNS drug including anticonvulsant and anti-depressant drugs, cardiovascular drugs including digitalis and antihypertensive drugs, anticoagulants, anti-infectives, anti-histaminics, immune-based therapies, hormones, hypoglycemic agents, and antineoplastic agents will be discussed. Students will be expected to determine whether a given interaction is clinically insignificant or required pharmacist intervention, make scientific recommendations for management of drug interactions.

Pre-requisite: Pharmacology and Pharmacotherapeutics III

02-06-09512 Clinical Pharmacy II (1+1)

The course provides the student with the appropriate knowledge and principles of pharmacotherapeutics and management of the common disease states (e.g. cardiovascular diseases, gastrointestinal diseases, respiratory diseases, endocrine diseases, obstetrics and gynecology, rheumatic diseases, renal diseases, CNS diseases). Therapy management services and principles of special care populations (geriatric, pediatric, renal and hepatic patients, obesity and pregnancy and lactation) are discussed. The tutorials are based on integrated case-based learning (ICBL) to provide the students with the skills and competencies necessary for effective delivery of medication therapy management.

Pre-requisite: Clinical Pharmacy I

02-06-09513 Clinical research, Pharmacoepidemiology & Pharmacovigilance (1+1)

This course introduces the student to the basic principles of clinical research, design of research studies, types of research studies, clinical trials, statistical presentation of research data and ethical guidelines in drug research. This course addresses a range of study designs and analytic techniques for observational studies on the utilization, safety, and effectiveness of pharmaceuticals. Students will develop an understanding of how to plan, implement, analyze, and criticize pharmaco-epidemiological studies. This course also provides the

student's with understanding of pharmacovigilance importance, concept, processes, systems, global safety standards and regulations and reporting systems.
Pre-requisite: Biostatistics and Evidence-based Medicine

Electives:

02-06-09E01 Health informatics (1+1)
This course is introduction to health informatics and big data management in health care systems. It includes documentation systems for health data and the role of the Electronic Health Record (EHR) and other clinical informatics applications in healthcare organizations. The structure and function of healthcare system in Egypt is analysed. Emphasis is given to clinically transformative technologies and software, database mining, security and recovery, analysis, design, data management, networks and data communication, information systems architecture, and system standards in healthcare.
Pre-requisite: Information Technology

02-06-09E02 Logistics and Supply Chain Management in Healthcare (1+1)
The course provides basic concepts of logistics (activities within a single organization) as well as supply chains (networks of companies that work together). The course focuses on activities such as buying, inventory management, distribution, new product development, finance, and customer service as well as design, planning, execution, control, and monitoring of supply chain activities with the objective of building a competitive infrastructure, synchronizing supply with demand and measuring performance in health care institutions.
Pre-requisite: None

Non-Pharmacy Courses:

Mandatory Courses
02-06-00101 Information Technology (1+1)
This course tends to provide students of all university's faculties with a brief introduction to the world of computers and the concept of information technology including number systems and data representation, computer system components: hardware and 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, spread sheet programs such as Excel and presentation programs. It gives students a practical experience on developing projects related to the specialty of each faculty.
Pre-requisite: None

02-06-00102 Mathematics (1+1)
The course deals with functions and graphs, limits and continuity, differentiation, exponential, logarithmic, and trigonometric functions, integration, basic differential equations, functions of several variables and problems related to them, probability and random variables, and hypothesis testing.
Pre-requisite: None

02-06-00103 Human Rights and Fighting Corruption (1+0)
This course covers the following topics: human rights in the criminal law, the right of a person to change his nationality or renounce one of his nationalities, international covenants relating to the protection of human rights, the relationship of globalization and development with

economic, social and cultural rights, economic, social and cultural rights of human beings, human rights in Islamic law, Women's rights in the labour law and social insurance law, human rights in litigation.
Pre-requisite: None

02-06-00204 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 in 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.
Pre-requisite: None

02-06-00505 Innovation and Entrepreneurship (1+1)
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.
Pre-requisite: None

University Elective Courses
02-06-00-E01 Mankind and The Environment الإنسان والبيئة (2+0)
The course deals with environmental issues, their concept and their relationship to humans and environmental systems. The course discusses environmental pollution (air pollution, water pollution, soil pollution). The student also studies the types of waste and their impact on the environment as well as economy and environmental legislation.
Pre-requisite: None

02-06-00-E02 Nutrition and Health التغذية والصحة (2+0)
This course aims to introduce students to the basics of healthy nutrition, the different food groups and the correct foundations for planning healthy meals and the diseases resulting from not eating the right amount or the right quality of food, while introducing the student to the nutritional and social causes of the most important nutritional diseases prevalent in Egyptian society such as obesity, anemia, thinness and related diseases such as diabetes, heart disease, high blood pressure and gout, and how to adjust the food to suit the human health and nutritional status.
Pre-requisite: None

02-06-00-E03 Prevention in the field of dentistry الوقاية في مجال طب الأسنان (2+0)
The course deals with methods of preventing oral and dental diseases that ordinary people can follow as well as other methods that the dentist can apply to limit the spread and control of oral and dental diseases. The course also reviews methods that can be used at the community level to combat the spread of oral and dental diseases and also provides the

student with a picture of mode transmission of diseases in dental clinics and laboratories and the ways that the dentist and patients should make sure of their presence to ensure control of disease transmission. The course also enumerates the machines and devices that must be available in the clinic to avoid transmission of infection.
Pre-requisite: None

02-06-00-E04 Education and prevention of viral hepatitis التثقيف والوقاية من الالتهاب الكبدي الفيروسي (2+0)
The course aims to introduce the student to viral hepatitis to prevent the spreading of this disease. The course explains the medical and social aspects of hepatitis in a simple way that enables the student at the end of the course to get acquainted with the methods of infection, disease mode of transmission, treatment, methods of disease prevention, and the social and health care method for patients with viral hepatitis.
Pre-requisite: None

02-06-00-E05 Artistic creativity الإبداع الفني (2+0)
The course aims to develop creative thinking methods in terms of developing ways to improve the student's fluency and uniqueness through learning the visual arts, aesthetics of form, color theories and audible arts in terms of music taste and upgrading the level of sense and auditory perception to advance the general taste of society and raise the efficiency of self-skills and human capabilities of the graduate. The course helps the students to keep up with all what is new in modern developments to meet the needs of the labor market in light of the era of globalization and the competencies of the twenty-first century.
Pre-requisite: None

02-06-00-E06 Small and medium agricultural projects المشروعات الزراعية الصغيرة والمتوسطة (2+0)
This course aims to introduce the learner to investment opportunities in agricultural activities at the level of small and medium enterprises to create a generation of entrepreneurs in the agricultural production sector. This course includes the importance of self-employment and intellectual creativity, the rate of employment in the field of agriculture and the creation of new job opportunities, the presentation of small and medium agricultural projects and its implementation, the definition of founding procedures and legal procedures, the definition of financing and investment opportunities, feasibility studies and marketing.
Pre-requisite: None

02-06-00-E07 Industrial Safety أمن صناعي (2+0)
Introduction - Elements and sources of industrial safety and health hazards - the basics and rules of industrial health safety - legislation for industrial equipment and facilities - methods for preventing and avoiding industrial accidents and fires - review of industrial health and safety procedures - raising the level of safety and assessing performance.
Pre-requisite: None