SINAI UNIVERSITY

FACULTY OF PHARMACY
SU

Program Specification Pharm D

وحدة ضمان الجودة

كلية الصيدلة فرع العريش

SU QUALITY ASSURANCE CENTER

Sinai University

Faculty of Pharmacy

PROGRAM SPECIFICATION
BACHELOR OF PHARMACY
(PHARM D)

تم الاعتماد بمجلس الكلية رقم 142 بتاريخ 2023/8/30

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Index

University : Sinai University

Faculty : Faculty of Pharmacy

Program Specification

(A) Basic Information:

1) Program Title :

Degree of Bachelor of Pharmacy

2) Program Type :

Single [√] Double [ ] Multiple [ ]

3) Department (s) :

Pharmaceutical Chemistry	PC	1- قسم الكيمياء الصيدلية
Pharmacognosy	PG	2- قسم العقاقير
Pharmaceutics	PT	3- قسم الصيدلانيات
Microbiology and Immunology	PM	4- قسم الميكروبيولوجي والمناعة
Pharmacology and Toxicology	PO	5- قسم الأدوية والسموم
Biochemistry	PB	6- قسم الكيمياء الحيوية
Pharmacy Practice	PP	7- قسم الممارسة الصيدلية

Program Coordinator : Prof. Hesham Ali Salem

Internal Reviewer : Dr. Abo El-Hagag Abd El-Gawad

External Reviewer : Prof. Aliaa Mohammed Kamal

Prof. Camilia George Michel

Prof .Gamal Mohammed ElMaghrabi

Date of Program Approval : Faculty council No 142 (30/8/2023)

(B) Professional Information:

1. Program Aim:

The program aims to graduate a pharmacist qualified to work in community pharmacies, hospitals, forensic medicine, medical laboratories, pharmaceutical factories and companies, drug control laboratories, nutrition services and work in the field of media, marketing, research and universities. This program also supports the role of pharmacists as a member in several health teams.

Graduates Attributes:

Pharmacy graduates must be able to:

a) Providing appropriate health care to the patient inside and outside hospitals by educating and advising individuals and communities to improve treatment outcomes and reduce disease incidence.

b) Exercises the profession with its responsibilities and authorities, respecting its laws and ethics, and respecting the rights of patients.

c) Using evidence-based data to deliver contemporary pharmaceuticals and pharmaceutical services

d) Perform various qualitative and quantitative analytical methods to assure the quality of raw materials and pharmaceutical products.

e) Apply integrated evidence-based pharmaceutical and clinical information in evaluating the appropriateness, effectiveness, and safety of various compounds, medications and therapeutic related decisions.

f) Apply the principles of scientific research.

g) Share collaboratively in the therapeutic decision-making as a member of an inter-professional health care team.

h) Practice effective communication, leadership, management and entrepreneurship skills.

i) Acts as a lifelong learner with the goal of sustainable professional development and demonstrates ability in performance assessment and self-assessment skills.

j) Achieving quality standards in pharmacy education through interactive education and attention to self-learning.

2. Program learning outcomes:

On successful completion of the program, graduates will acquire the following key competencies in the following domains:

DOMAIN 1 - FUNDAMENTAL KNOWLEDGE

1-1- COMPETENCY

Integrate knowledge from basic and applied pharmaceutical and clinical sciences to standardize materials, formulate and manufacture products, and deliver population and patient-centered care.

KEY ELEMENTS

1.C1.1. Recognize in-depth knowledge of basic science, pharmaceutical, biomedical, social, behavioural, administrative, and clinical sciences.

1.C1.2. Communicate efficiently and effectively with the health care team using appropriate pharmaceutical and medical terms, abbreviations, and symbols..

1. C1.3. Utilize information from basic science to handle, identify, extract, design, prepare, analyse, and assure quality of synthetic/natural pharmaceutical raw materials and finished products.

1.C1.4. Integrate knowledge from fundamental pharmaceutical and medical sciences to explain the drug mechanism of action and assess the efficacy and safety in patient and community.

1.C1.5. Retrieve basic scientific drug information from different resources to solve problems related to human health and health systems.

1.C1.6. Articulate and interpret information from different scientific literature to improve professional decision-making skills.

1.C1.7. Gather and critically analyze new information, including evidence-based information, that may be applicable to the pharmaceutical industry and patient care.

DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE

2-1- COMPETENCY

Work collaboratively as a member of an inter-professional health care team to improve the quality of life of individuals and communities, and respect patients' rights.

KEY ELEMENTS

2. C1.1 Carry out your responsibilities as a pharmacist in a professional manner that is consistent with the profession's ethical norms.

2. C1.2. Maintain the necessary interprofessional partnerships to provide high-quality pharmacy care to individual patients.

2.C1.3. Recognize self-professional limitations and accept criticism and guidance from other health care colleagues, and acceptance of the condition of referral to other members of healthcare team.

2. C1.4. Treat others with sensitivity, empathy, respect and dignity

2. C1.5. Maintain patient confidentiality and respect patients' rights.

2. C1.6. Recognize patient variances based on age and health literacy.

2. C1.7. Determine which therapies will best fulfil the patient's therapeutic needs in collaboration with patients and other health care experts.

2. C1.8. Recognize when a patient's problem is beyond the area of pharmacy practice and send them to other health care providers as needed.

2-2- COMPETENCY

Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.

KEY ELEMENTS

2.C2.1. Recognize the Design, synthesis, purification, isolation, analysis, and standardization of synthetic and natural pharmaceutical materials and products.

2.C2.2. Employ international guidelines of GMP, QC and QA in pharmaceutical manufacturing, analyzing, drug distribution and storage taking in consideration incompatibility problems.

2.C2.3. Show the ability to use tools, instruments and different software to properly select approaches for synthesis and analysis and production of raw materials and finished pharmaceutical products.

2.C2.4. Demonstrate the ability to perform pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics concepts and their applications in innovative drug delivery systems, dose adjustment bioequivalence research, and pharmacy practice.

2-3- COMPETENCY

Handle and dispose biologicals and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.

KEY ELEMENTS

2.C3.1. Handle and dispose of chemicals, solvents, biological specimens, natural wastes, biotechnology products, radiopharmaceuticals, and other hazardous items in a safe and environmentally responsible manner.

2.C3.2. Use GLP guidelines to ensure that pharmaceutical materials and products are handled and disposed of safely.

2-4- COMPETENCY

Actively share professional decisions and proper actions to save patient's life in emergency situations including poisoning with various xenobiotics, and effectively work in forensic fields.

KEY ELEMENTS

2.C4.1. Guarantee the safe and effective use of medicines and poisons to avoid any harm to public.

2.C4.2. Demonstrate knowledge and understanding of the first-aid procedures necessary to save the patient's life.

2.C4.3. Identify and manage any drug-related and pharmaceutical.

2.C4.4. Evaluate toxicity profiles of chemicals and other xenobiotics and investigate poisons in biological samples.

2-5- COMPETENCY

Contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products.

KEY ELEMENTS

2.C5.1. Demonstrate an understanding and accomplish of the requirements of the regulatory framework to authorize a medicinal product including the quality, safety, and efficacy requirements.

2.C5.2. Collect, interpret, and assess, necessary evidence-based, information related to pharmaceutical industries and patient's health care needs.

2.C5.3. Participate in a research team to plan and carryout research studies using suitable methodologies.

2-6- COMPETENCY

Perform pharmacoeconomic analysis and develop promotion, sales, marketing, and business administration skills.

KEY ELEMENTS

2. C6.1. Implement business administration and management principles to ensure the efficient utilization of financial and human resources.

2. C6.2. Recognize fundamentals of drug promotion, sales, marketing, accounting, and outcomes of pharmacoeconomic analysis.

DOMAIN 3: PHARMACEUTICAL CARE

3-1- COMPETENCY

Apply the principles of body functions to participate in improving health careservices using evidence-based data.

KEY ELEMENTS

3.C1.1. Apply the foundations of human physiology and genetics to control various disorders and diseases to improve health care services.

3. C1.2. Suggest appropriate infection control techniques using public health and pharmaceutical microbiology principles.

3. C1.3. Record and regulate microbial growth and conduct laboratory tests to identify of infections /diseases.

3. C1.4. Select the appropriate medication therapy for a given disease based on its etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases.

3-2- COMPETENCY

Provide counselling and education services to patients and communities about safe and rational use of medicines and medical devices.

KEY ELEMENTS

3. C2.1. Apply drug information data to advice and educate patients about mechanisms of action, therapeutic uses, dosage, contraindications, and adverse drug interaction and drug interactions.

3. C2.2. Rationalize the use of medicines and medical devices by relating the principles of clinical pharmacology, clinical nutrition and Pharmacovigilance

3. C2.3. Integrate best available evidence for application of non-conventional therapy into pharmacy practice such as phytotherapy, aromatherapy and nutraceuticals.

3. C2.4. Educate patients and community about toxic profiles of drugs and other toxic substances, including signs, symptoms and sources and how to use those for risk management.

3. C2.5. Increase public awareness about the safe use of over the counter (OTC) and prescription pharmaceuticals, both natural and synthetic, as well as medical devices.

3. C2.6. Establish public awareness on rational use of drugs, drug abuse and misuse.

DOMAIN 4: PERSONAL PRACTICE

4-1- COMPETENCY

Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.

KEY ELEMENTS

4. C1.1. Recognize the structure of a multi-professional team to evaluate team performance as well as team members and apply effective time management skills.

4. C1.2. Collect information and analyze data, identify problems and present solutions, participate independently and collaboratively with other team members.

4. C1.3 Use the knowledge and basis of entrepreneurship to creatively plan and conduct projects that simulate entrepreneurial environment.

4-2- COMPETENCY

Effectively communicate verbally, non-verbally and in writing with individuals and communities.

KEY ELEMENTS

4.C2.1. Demonstrate oral and written communications skills with patients, other health care professionals and communities.

4.C2.2. Use new information technologies to develop presentation skills.

4-3- COMPETENCY

Express self-awareness and be a life-long learner for continuous professional improvement.

KEY ELEMENTS

4.C3.1. Perform self-assessment to identify learning and development needs to enhance professional and personal competencies.

4.C3.2. Promote continuous learning to develop professional skills.

3. Academic Standards of Program Specification:

The faculty adopts the Academic Standards of the National Authority for Quality Assurance and Accreditation of Education (NAQAAE), Competency-Based NARS 2017, in a faculty council no. (117) on 17 / 11 / 2020.

Matrix1: Comparisons of Graduates Attributes with the National Academic Reference Standard, 2017

Attributes of the graduates (NARS, 2017)	Program Graduates Attributes
1. Educate and counsel individuals and communities to participate in optimizing Therapeutic outcomes and minimizing the incidence of illness of individuals and populations.	**a.** Providing appropriate health care to the patient inside and outside hospitals by educating and advising individuals and communities to improve treatment outcomes and reduce disease incidence.
2. Practice and perform responsibilities and authorities legally, professionally, and ethically respecting patients' rights.	**b.** Exercises the profession with its responsibilities and authorities, respecting its laws and ethics, and respecting the rights of patients.
3. Utilize evidence-based data to deliver contemporary pharmaceutical products and pharmacy services.	**c.** Using evidence-based data to deliver contemporary pharmaceuticals and pharmaceutical services
4. Assure the quality of pharmaceutical materials and products.	**d.** Perform various qualitative and quantitative analytical methods to assure the quality of raw materials and pharmaceutical products.
5. Apply integrated evidence-based pharmaceutical and clinical information in assessing the appropriateness, effectiveness, and safety of medications.	**e.** Apply integrated evidence-based pharmaceutical and clinical information in evaluating the appropriateness, effectiveness, and safety of various compounds, medications and therapeutic related decisions.
6. Contribute effectively in planning and conducting research using appropriate methodologies.	**f.** Apply the principles of scientific research.
7. Work collaboratively and share Therapeutic decision-making as a member of an interprofessional health care team.	**g.** Share collaboratively in the therapeutic decision-making as a member of an inter-professional health care team.

Attributes of the graduates (NARS, 2017)	Program Graduates Attributes
8. Demonstrate effective communication, leadership, business administration, and entrepreneurial skills.	**h.** Practice effective communication, leadership, management and entrepreneurship skills.
9. Work as a life-long learner for continuous professional improvement and demonstrate capabilities of performance appraisal and self-assessment.	**i.** Acts as a lifelong learner with the goal of sustainable professional development and demonstrates ability in performance assessment and self-assessment skills. **j.** Achieving quality standards in pharmacy education through interactive education and attention to self-learning.

Matrix 2: Comparison between the Program key elements and the National Academic Reference Standards, NARS 2017 key elements.

DOMAIN 1- FUNDAMENTAL KNOWLEDGE	
1-1- COMPETENCY **Integrate knowledge from basic and applied pharmaceutical and clinical sciences to standardize materials, formulate and manufacture products, and deliver population and patient-centered care.**	
Key elements, NARS 2017	Program key elements
1-1-1- Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	**1.C1.1.** Recognize in-depth knowledge of basic science, pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.
1-1-2- Utilize the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.	**1.C1.2.** Communicate efficiently and effectively with the health care team using appropriate pharmaceutical and medical terms, abbreviations, and symbols.
1-1-3- Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.	**1.C1.3.** Utilize information from basic science to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical raw materials and finished products.
1-1-4- Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.	**1.C1.4.** Integrate knowledge from fundamental pharmaceutical and medical sciences to explain the drug mechanism of action and assess the efficacy and safety in patient and community.
1-1-5- Retrieve information from fundamental sciences to solve therapeutic problems.	**1.C1.5** Retrieve basic scientific drug information from different resources to solve problems related to human health and health systems.
1-1-6- Utilize scientific literature and collect and interpret information to enhance professional decision.	**1.C1.6.** Articulate and interpret information from different scientific literature to improve professional decision-making skills.
1-1-7- Identify and critically analyze newly emerging issues influencing pharmaceutical industry and patient health care.	**1.C1.7.** Gather and critically analyze new information, including evidence-based information, that may be applicable to the pharmaceutical industry and patient care.

DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE	
2-1- COMPETENCY **Work collaboratively as a member of an inter-professional health care team to improve the quality of life of individuals and communities, and respect patients' rights.**	
Key elements, NARS 2017	Program key elements
2-1-1 Perform responsibilities and authorities in compliance with the legal and professional structure and role of all members of the health care professional team.	**2.C1.1.** Apply professional and legal requirements, including legislation, policies, and internal regulations while practicing the profession with the healthcare team.
2-1-2 Adopt ethics of health care and pharmacy profession respecting patients' rights and valuing people diversity.	**2.C1.2.** Apply the principles of professional codes of ethics, preserving patients' rights and respecting population diversity.
2-1-3 Recognize own personal and professional limitations and accept the conditions of referral to or guidance from other members of the health care team.	**2.C1.3.** Recognize self-professional limitations and accept criticism and guidance from other health care colleagues.
2-2- COMPETENCY **Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.**	
2-2-1 Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	**2.C2.1.** Design, identification, synthesis, purification, isolation, analysis, and standardization of synthetic and natural pharmaceutical materials.
2-2-2 Apply the basic requirements of quality management system in developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/ products considering various incompatibilities.	**2.C2.2.** Employ international guidelines of GMP, QC and QA in pharmaceutical manufacturing, analyzing, drug distribution and storage taking in consideration incompatibility problems.

2-2-3 Recognize the principles of various tools and instruments, and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.	**2. C2.3.** Show the ability to use tools, instruments and different software to properly select approaches for synthesis and analysis of raw materials and finished pharmaceutical products.
2-2-4 Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and bio-pharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.	**2.C2.4.** Demonstrate the ability to perform pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics concepts and their applications in innovative drug delivery systems, dose adjustment bioequivalence research, and pharmacy practice.
2-3- COMPETENCY **Handle and dispose biologicals and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.**	
2-3-1 Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical field.	**2. C3.1.** Handle and dispose of chemicals, solvents, biological specimens, natural wastes, biotechnology products, radiopharmaceuticals, and other hazardous items in a safe and environmentally responsible manner.
2-3-2 Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.	**2. C3.2.** Use GLP guidelines to ensure that pharmaceutical materials and products are handled and disposed of safely.
2-4- COMPETENCY **Actively share professional decisions and proper actions to save patient's life in emergency situations including poisoning with various xenobiotics, and effectively work in forensic fields.**	
2-4-1 Ensure safe handling/use of poisons to avoid their harm to individuals and communities.	**2.C4.1.** Identify the safe and effective use of medicines and poisons to avoid any harm to public.
2-4-2 Demonstrate understanding of the first aid measures needed to save patient's life.	**2.C4.2.** Demonstrate knowledge and understanding of the first-aid procedures necessary to save the patient's life.

2-4-3 Take actions to solve any identified medicine-related and pharmaceutical care problems.	**2.C4.3.** Identify and manage any drug-related and pharmaceutical care problems.
2-4-4 Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.	**2.C4.4.** Evaluate toxicity profiles of chemicals and other xenobiotics and investigate poisons in biological samples.
2-5- COMPETENCY **Contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products.**	
2-5-1 Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.	**2. C5.1.** Demonstrate an understanding of the requirements of the regulatory framework to authorize a medicinal product including the quality, safety, and efficacy requirements.
2-5-2 Retrieve, interpret, and critically evaluate evidence-based information needed in pharmacy profession.	**2. C5.2** Collect, interpret, and assess relevant, necessary evidence-based information about a patient's health-related care needs.
2-5-3 Contribute in planning and conducting research studies using appropriate methodologies.	**2. C5.3.** Participate in a research team to plan and carryout research studies using suitable methodologies.
2-6- COMPETENCY **Perform pharmacoeconomic analysis and develop promotion, sales, marketing, and business administration skills.**	
2-6-1 Apply the principles of business administration and management to ensure rational use of financial and human resources.	**2. C6.1.** Implement business administration and management principles to ensure the efficient utilization of financial and human resources.
2-6-2 Utilize the principles of drug promotion, sales, marketing, accounting, and pharmacoeconomic analysis.	**2.C6.2.** Recognize fundamentals of drug promotion, sales, marketing, accounting, and outcomes of pharmacoeconomic analysis.
DOMAIN 3: PHARMACEUTICAL CARE	
3-1- COMPETENCY **Apply the principles of body functions to participate in improving health care services using evidence-based data.**	
Key elements, NARS 2017	Program key elements
3-1-1 Apply the principles of body function and basis of genomics in	**3. C1.1.** Apply the foundations of human physiology and genetics to control various

health and disease states to manage different diseases.	disorders and diseases to improve health care services.
3-1-2 Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.	**3. C1.2.** Suggest appropriate infection control techniques using public health and pharmaceutical microbiology principles.
3-1-3 Monitor and control microbial growth and carry out laboratory tests for identification of infections/ diseases.	**3. C1.3.** Record and regulate microbial growth and conduct laboratory tests to identify of infections /diseases.
3-1-4 Relate etiology, epidemiology, pathophysiology laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches.	**3.C1.4.** Select the appropriate medication therapy for a given disease based on its etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/ diseases.
3-2- COMPETENCY **Provide counseling and education services to patients and communities about safe and rational use of medicines and medical devices.**	
3-2-1 Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions.	**3. C2.1.** Apply drug information data to advice and educate patients about mechanisms of action, therapeutic uses, dosage, contraindications, and adverse drug interaction and drug interactions.
3-2-2 Apply the principles of clinical pharmacolog and pharmacovigilance to ensure safe use of medications and medical devices.	**3.C2.2.** Rationalize the use of medicines and medical devices by relating the principles of clinical pharmacology, clinical nutrition and Pharmacovigilance
3-2-3 Provide evidence-based patient-centered recommendations for safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.	**3. C2.3.** Integrate best available evidence for application of non-conventional therapy into pharmacy practice such as phytotherapy, aromatherapy and nutraceuticals.
3-2-4 Provide information about toxic profiles of drugs and other xenobiotics including sources,	**3. C2.4.** Educate patients and community about toxic profiles of drugs and other toxic substances,

identification, symptoms, and management control.	including signs, symptoms and sources and how to use those for risk management.
3-2-5 Educate and counsel patients, other health care professionals, and communities about the safe and proper use of medicines, including over-the-counter medications and medical devices.	**3. C2.5.** Increase public awareness about the safe use of over the counter (OTC) and prescription pharmaceuticals, both natural and synthetic, as well as medical devices.
3-2-6 Maintain public awareness on social health hazards of drug misuse and abuse.	**3. C2.6.** Establish public awareness on rational use of drugs, drug abuse and misuse.
DOMAIN 4: PERSONAL PRACTICE	
4-1- COMPETENCY **Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.**	
Key elements, NARS 2017	Program key elements
4-1-1 Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	**4. .C1.1** Recognize the structure of a multi-professional team to evaluate team performance as well as team members and apply effective time management skills.
4-1-2 Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.	**4. C1.2** Collect information and analyze data, identify problems and present solutions, participate independently and collaboratively with other team members.
4-1-3 Demonstrate creativity and apply entrepreneurial skills within a simulated entrepreneurial activity.	**4. C1.3** Use the knowledge and basis of entrepreneurship to creatively plan and conduct projects that simulate entrepreneurial environment.
4-2- COMPETENCY **Effectively communicate verbally, non-verbally and in writing with individuals and communities.**	
4-2-1 Demonstrate effective communication skills verbally, non-verbally, and in writing with professional health care team, patients, and communities.	**4.C2.1** Demonstrate oral and written communications skills with patients, other health care professionals and communities.
4-2-2 Use contemporary technologies and media to	**4. C2.2** Use new information technologies to develop presentation skills.

demonstrate effective presentation skills.	
4-3- COMPETENCY **Express self-awareness and be a life-long learner for continuous professional improvement.**	
4-3-1 Perform self-assessment to enhance professional and personal competencies.	**4.C3.1** Perform self-assessment to identify learning and development needs to enhance professional and personal competencies.
4-3-2 Practice independent learning needed for continuous professional development.	**4.C3.2** Promote continuous learning to develop professional skills

4. Program Structure and contents:

a- Program duration:

The duration of study in the program is five academic years (five levels over ten semesters) according to the credit hour system, and one year of advanced training (5 + 1). In addition to the number of 100 hours of actual field training in private and government pharmacies and hospital pharmacies, under the supervision of a faculty staff member, it takes place during the summer vacations for the years of study after the end of the third level and before starting the internship year.

b- Program structure:

- No. of credit hours:
  - Compulsory 165
  - Elective 8
  - University Requirements 5
  - Total 178
- Field training

Field training is divided into 2 phases:

1. Preliminary training (Summer training):

(100 training hours) begins with the end of the third level before the start of the internship year, in community & governmental pharmacies and hospital pharmacies, under the supervision of a faculty staff member.

2. Advanced training & research project:

The student must complete the internship year (an academic year meaning 9 months), after completing the academic years, with training in human and veterinary pharmaceutical companies and factories - companies and factories 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 follow-up centers and organizations - pharmaceutical and medical research centers, bioavailability and clinical studies - media and drug marketing ... etc., in addition to private and governmental hospitals and pharmacies. Those who wish to specialize in the academic field (teaching and research) can spend a training period in colleges of pharmacy and research centers.

- The internship training during the 6th year must include one clinical training course.
- According to the detailed regulations for the Internship Year Training Program, this includes passing a graduation project in one of the disciplines offered for registration as a requirement for graduation.

c- Program Levels (in credit-hours system):

Semester (1) / First year : Required to pass (18) units distributed as follows:

Compulsory: (15) Cr. Hs Elective: 0 University Requirement: 3

Semester (2) / First year : Required to pass (19) units distributed as follows:

Compulsory: (19) Cr. Hs Elective: 0 University Requirement: 0

Semester (3) / Second year : Required to pass (18) units distributed as follows:

Compulsory: (16) Cr. Hs Elective: 0 University Requirement: 2

Semester (4) / Second year : Required to pass (17) units distributed as follows:

Compulsory: (17) Cr. Hs Elective: 0 University Requirement: 0

Semester (5) / Third year : Required to pass (18) units distributed as follows:

Compulsory: (18) Cr. Hs Elective: 0 University Requirement: 0

Semester (6) / Third year : Required to pass (17) units distributed as follows:

Compulsory: (17) Cr. Hs Elective: 0 University Requirement: 0

Semester (7) / Fourth year : Required to pass (17) units distributed as follows:

Compulsory: (15) Cr. Hs Elective: 2 University Requirement: 0

Semester (8) / Fourth year : Required to pass (18) units distributed as follows:

Compulsory: (16) Cr. Hs Elective: 2 University Requirement: 0

Semester (9) / Fifth year : Required to pass (19) units distributed as follows:

Compulsory: (17) Cr. Hs Elective: 2 University Requirement: 0

Semester (10) / Fifth year : Required to pass (17) units distributed as follows:

Compulsory: (15) Cr. Hs Elective: 2 University Requirement: 0

d- Program Courses:

The student must successfully study 178 credit hours, including 165 credit hours compulsory courses, 8 credit hours elective courses, and 5 credit hours university requirements. The student must complete summer training and internship year under the supervision of the faculty.

Level 1

Semester (1)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Pharmaceutical Analytical Chemistry I	**PC 101**	**2**	**1**	**3**	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.2, 2.C2.3, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2.
Pharmaceutical Organic Chemistry I	**PC 102**	**2**	**1**	**3**	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C.3.1, 2.C.3.2, 4.C1.1, 4.C.1.2
Pharmacy Orientation	**PT 101**	**1**	**-**	**1**	1.C1.1, 4.C2.1
English	**LNG 1001**	**1**	**2**	**3**	4.C1.1, 4.C2.1 , 4.C2.2
Medicinal Plants	**PG 101**	**2**	**1**	**3**	1.C1.1, 1.C1.3, 1.C1.5, 2.C2.1, 2.C2.3, 2.C3.1, 4.C1.1, 4.C1.2
Information Technology	**INT 1001**	**2**	**1**	**3**	1.C1.1, 1.C1.2, 1.C13, 2.C1.1, 4.C1.1
Mathematics	**MS 101**	**1**	**---**	**1**	1.C1.1, 4.C1.2
Human Rights and Fighting Corruption	**HUR 1001**	**1**	**---**	**1**	1.C1.1, 2.C4.1, 2.C6.1, 3.C2.1, 4.C1.1
Total		**12**	**6**	**18**	

Semester (2)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Pharmaceutical Analytical Chemistry II	PC 203	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.2, 2.C2.3, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2.
Pharmaceutical Organic Chemistry II	PC 204	2	1	3	1.C1.1, 1.C1.3, 2.C2.1, 2.C2.3, 2.C3.1, 4.C1.2, 4.C2.2
Cell Biology	MD 201	1	1	2	1.C1.1, 1.C1.2, 3.C.1.1, 4.C1.2, 4.C1.3, 4.C2.1
Medical Terminology	MD 202	1	-	1	1.C1.1, 4. C2.1, 4.C2.2, 4.C3.1
Anatomy& Histology	MD 203	2	1	3	1. C1.1, 4.C2.1, 4.C2.2, 4.C3.1.
Physical Pharmacy	PT 202	2	1	3	1.C1.1, 1.C1.3, 2.C1.1, 2.C1.2, 2.C3.1, 4.C1.1, 4.C1.2, 4.C1.3, 4.C2.1
Pharmacognosy I	PG 202	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.3, 2.C3.1, 3.C2.1, 3.C2.5, 3.C2.6, 4.C1.1, 4.C1.2, 4.C1.3
Psychology	MD 204	1	-	1	1.C1.1, 2.C1.1, 2.C1.4, 2.C5.1, 2.C6.1, 3.C2.6 4.C1.1, 4.C1.2 4.C2.1, 4.C3.1.
Total		13	6	19	

Level 2

Semester (3)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Pharmaceutical Analytical Chemistry III	PC 305	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.2, 2.C2.3, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2
Pharmaceutical Organic Chemistry III	PC 306	2	1	3	1.C1.1, 1.C.1.3, 4.C1.1, 4.C2.2
Pharmacognosy II	PG 303	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.3, 2.C3.1, 3.C2.1, 3.C2.5, 3.C2.6, 4.C1.1, 4.C1.2, 4.C1.3
Physiology and Pathophysiology	MD 305	2	1	3	1.C1.1, 1.C1.2, 3.C1.1, 3.C1.2, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Pharmaceutics I	PT 303	2	1	3	1.C1.1, 1.C1.3, 2.C2.2, 2.C3.1, 4.C1.1, 4.C2.1, 4.C3.1
Scientific Writing	NP 303	1	1	2	
Scientific Thinking	PHI 3001	1	-	1	4.C1.1, 4.C2.1 , 4.C2.2 , 4.C3.1 , 4.C3.2
Sinai History	HST 3001	1	--	1	1.C1.1, 2.C4.1, 2.C6.1, 3.C2.1, 4.C1.1
Total		12	6	18	

Semester (4)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Biochemistry I	PB 401	2	1	3	1.C1.1, 1.C1.2, 2.C2.3, 2.C3.1, 3.C1.1, 4.C1.1, 4.C1.2, 4.C1.3
General Microbiology and Immunology	PM 401	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 1.C1.5, 2.C3.1, 2.C3.2, 2.C4.1, 3.C1.1, 3.C1.2, 4.C1.1, 4.C2.1
Instrumental Analysis	PC 407	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 2.C2.1, 2.C2.2, 2.C2.3, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2.
Pathology	MD 406	1	1	2	1.C1.1, 1.C1.3, 1.C1.4, 3.C1.1, 3.C1.2, 4.C2.1, 4.C2.2
Pharmaceutics II	PT 404	2	1	3	1.C1.1, 1.C1.3, 2.C2.2, 2.C3.1, 4.C1.1, 4.C1.2, 4.C1.3, 4.C2.1
Presentation & Communication Skills	NP 404	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 2.C1.1, 2.C1.2, 4.C1.1, 4.C1.2, 4.C1.3
Biostatistics	PO 401	1	-	1	1.C1.1, 2.C5.1, 2.C5.2, 2.C5.3, 2. C6.1 2.C6.2, 3.C1.1, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2.
Total		11	6	17	

Level 3

Semester (5)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Biochemistry II	PB 502	2	1	3	1.C1.1, 1.C1.2, 3.C1.3, 4.C2.1
Pharmaceutical Microbiology	PM 502	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 2.C3.1, 2.C3.2, 2.C4.1, 3.C1.1, 3.C1.2, 3.C2.1, 4.C2.1, 4.C3.1
Phytochemistry	PG 504	2	1	3	1.C1.1, 1.C1.3, 2.C2.1, 2.C2.3, 4.C1.2, 4.C1.3, 4.C2.1, 4.C2.2
Pharmaceutics III	PT 505	2	1	3	1.C1.1, 1.C1.3, 2.C2.2, 2.C3.1, 4.C1.1, 4.C1.2, 4.C1.3, 4.C2.1
Medicinal Chemistry I	PC 508	2	1	3	1.C1.1, 1.C1.3, 2.C2.1, 2.C2.3, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2
Pharmacology I	PO 502	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 2.C4.1, 2.C4.3, 2.C5.1, 3.C2.1, 3.C2.2, 3.C2.5
Total		12	6	18	

Semester (6)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Parasitology	PM 603	2	1	3	1.C1.1, 1.C1.6, 1.C1.7, 2.C1.1, 3.C1.1, 3.C1.2, 3C1.3, 3.C1.4, 4.C2.1, 4.C2.2, 4.C3.1, 4.C3.2
Biopharmaceutics & Pharmacokinetics	PT 606	2	1	3	1.C1.1, 1.C1.4, 2.C2.4, 2.C4.1, 2.C4.3, 4.C1.1
Applied and Forensic Pharmacognosy	PG 605	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 2.C1.1, 2.C2.2, 2.C2.3, 4.C4.1, 4.C4.2
Pharmaceutics IV	PT 607	2	1	3	1.C1.1, 1.C1.3, 2.C2.2 2.C3.1, 4.C1.1, 4.C1.2, 4.C1.3, 4.C2.1
Pharmacology II	PO 603	2	1	3	1.C1.1, 1.C1.4, 2.C1.1, 2.C3.1, 2.C5.3, 3.C1.4, 3.C2.1 , 4.C1.1, 4.C1.2, 4.C.1.3 4.C.2.1
Medicinal Chemistry II	PC 609	2	1	3	1.C1.1, 1.C1.3, 1.C1.4, 2.C2.1, 2.C2.3, 2.C2.4, 2.C3.1, 2.C3.2, 4.C1.1, 4.C.1.2
Total		11	6	17	

Level 4

Semester (7)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Medical Microbiology	PM 704	2	1	3	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 1.C1.5, 1.C1.6, 1.C1.7, 2.C1.1, 2.C1.2, 2.C1.3 3.C1.1, 3.C1.2, 3.C1.3, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Pharmacology III	PO 704	2	1	3	1.C1.1, 1.C1.2, 1.C1.4, 2.C4.1, 2.C4.2, 3.C2.1, 3.C2.2, 4.C1.1, 4.C1.2
Drug Design	PC 710	1	1	2	1.C1.1, 1.C1.3, 1.C1.4, 1.C1.5, 2.C2.1, 2.C2.3, 2.C2.4
Clinical Biochemistry	PB 703	2	1	3	1.C1.1, 1.C1.2, 1.C1.4, 3.C1.1, 3.C1.4, 4.C1.2, 4.C1.3, 4.C2.1
Pharmaceutical Technology I	PT 708	2	1	3	1.C1.1, 1.C1.7, 2.C2.3, 4.C1.1 , 4.C1.2 , 4.C1.3 , 4.C2.1, 4.C3.1
Pharmaceutical Legislations & Professional Ethics	NP 705	1	-	1	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.5, 2.C1.1, 2.C5.1
Elective	PE---	1	1	2	1.C1.1, 2.C1.1, 3.C1.2, 3.C1.3, 3C1.4, 4.C1.1, 4.C2.1, 4.C2.2
Total		11	6	17	

Semester (8)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut	Total	
Clinical Pharmacokinetics	PP 801	2	1	3	1.C1.1, 1.C1.4, 1.C1.5, 2.C1.1, 2.C1.2, 2.C2.4, 2.C4.1, 2.C4.2, 3.C2.1, 3.C2.1, 4.C1.1, 4.C1.3, 4.C2.1, 4.C2.2
Drug Information	PO 805	1	1	2	1.C1.1, 1.C1.2, 1.C1.6, 1.C1.7, 2.C4.1, 2.C4.3, 3.C2.1, 3.C2.4, 3.C2.5, 4.C1.1, 4. C1.2, 4.C1.3, 4.C2.1, 4.C2.2, 4.C3.2
Toxicology & Forensic Chemistry	PO 806	2	1	3	1.C1.1, 1.C1.2, 1.C1.4 2.C3.1, 2.C3.2, 2.C4.1, 2.C4.2, 3.C2.1, 3.C2.4
Hospital Pharmacy	PP 802	1	1	2	1.C1.1, 2.C1.1, 2.C2.1, 3.C2.1, 4.C1.1
Pharmaceutical Technology II	PT 809	2	1	3	1.C1.1, 1.C1.3, 2.C2.2, 4.C1.1, 4.C1.2, 4.C1.3, 4.C3.1
Clinical Pharmacy and Pharmacotherapeutics I	PP 803	2	1	3	1.C1.5, 1.C1.6, 1.C1.7, 2.C4.2, 3.C1.4, 3.C2.1, 4.C1.1, 4.C1.2, 4.C2.1, 4.C3.1, 4.C3.2
Elective	PE ---	1	1	2	
Total		11	7	18	

Level 5

Semester (9)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut	Total	
Biotechnology	**PM 905**	**2**	**1**	**3**	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 1.C1.5, 1.C1.6, 1.C1.7, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Community Pharmacy Practice	**PP 904**	**2**	**1**	**3**	1.C1.1, 1.C1.2, , 2.C1.1 , 2.C4.1, 2.C4.3, 3.C2.1, 3.C2.2, 3.C2.4, 3.C2.5, 3.C2.6, 4.C2.1, 4.C2.2
Public Health	**PM 906**	**2**	**-**	**2**	1.C1.1, 1.C1.2, 1.C1.5, 1.C1.6, 1.C1.7, 2.C1.1, 2.C1.3, 2.C4.4, 3.C1.2, 3.C1.4, 3.C2.6, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Phytotherapy and Aromatherapy	**PG 906**	**2**	**--**	**2**	1.C1.1, 1.C1.2, 1.C1.5, 3.C2.1, 3.C.2.2, 3.C.2.3, 4.C1.1, 4.C1.2, 4.C.2.1, 4.C2.2
Good Manufacturing Practice	**PT 910**	**1**	**1**	**2**	1.C1.1, 1.C1.3, 2.C2.2, 2.C3.2, 2.C5.1, 4.C1.1 , 4.C1.2 , 4.C1.3 , 4.C2.1
Marketing & Pharmacoeconomics	**NP 906**	**2**	**--**	**2**	1.C1.1, 2.C6.1, 2.C6.2, 3.C2.2, 3.C2.5, 3.C2.6, 4.C1.1
Clinical Pharmacy and Pharmacotherapeutics II	**PP 905**	**2**	**1**	**3**	1.C1.1, 1.C1.2, 1.C1.4, 1.C1.5, 2.C1.1, 2.C1.2, 2.C1.3, 3.C1.1, 3.C2.1, 3.C2.2, 3.C2.6, 4.C1.2, 4.C1.3, 4.C3.1, 4.C3.2
Elective	**PE ---**	**1**	**1**	**2**	
Total		**14**	**5**	**19**	

Semester (10)

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		Lec.	Prac./Tut.	Total	
Quality Control of Pharmaceuticals	PC 011	2	1	3	1.C1.1, 1.C1.2, 2.C2.2, 2.C2.3, 4.C1.1, 4.C2.1, 4.C2.2, 4.C3.1
First Aid	MD 007	1	--	1	1.C1.1, 2.C4.2, 3.C1.1, 4.C1.1, 4.C2.1
Drug Interaction	PP 006	1	1	2	1.C1.4, 1.C1.5, 1.C1.6, 3.C2.1, 3.C2.5, 3.C2.6, 4.C1.3
Advanced Drug Delivery Systems	PT 011	1	1	2	1.C1.1 , 2.C2.4 , 2.C3.1, 4.C1.1, 4.C2.1 , 4.C3.1
Clinical Pharmacy and Pharmacotherapeutics III	PP 007	2	1	3	1.C1.5, 1.C1.6, 2.C4.2, 3.C1.4, 3.C2.1, 4.C1.1, 4.C1.2, 4.C2.1, 4.C3.1, 4.C3.2
Entrepreneurship	NP 007	1	1	2	1.C1.1, 1.C1.4, 1.C1.6, 2.C1.1, 2.C2.4, 2.C4.1, 2.C4.3, 3.C1.4, 3.C2.2, 4.C1.1
Clinical Research, Pharmacoepidemiology & Pharmacovigilance	PP 008	1	1	2	1.C1.1, 1.C1.4, 1.C1.6, 2.C1.1, 2.C2.4, 2.C4.1, 2.C4.3, 3.C1.4, 4.C1.1, 4.C1.3, 4.C2.2
Elective	PE ---	1	1	2	
Total		10	7	17	

Elective courses:

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

Course Title	Course Code	Credit Hours			Program Key Elements Covered
		L	P/T	Total	
Advanced Pharmaceutical Analysis - Spectroscopy	PC E12	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 1.C1.4, 1.C1.5, 2.C2.1, 2.C2.2, 2.C2.3, 2.C2.4, 2.C5.1, 4.C1.1, 4.C.1.2, 4.C2.1, 4.C3.1
Alternative Medicinal Therapies	PG E07	1	1	2	1.C1.1, 1.C1.2, 1.C1.4, 1.C1.5, 2.C1.1, 3.C2.1, 3.C2.3, 3.C2.5, 4.C1.2, 4.C2.2
Production and Manufacture of Medicinal Plants	PG E08	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C3.1, 4.C1.1
Chromatography and Separation Techniques	PG E09	1	1	2	1.C1.1, 1.C1.2, 1.C1.3, 2.C2.1, 2.C2.2, 2.C2.3, 2.C3.1,2.C3.2, 4.C1.1, 4.C1.2
Applied Industrial Pharmacy	PT E12	1	1	2	1.C1.1, 2.C2.2, 4.C1.1 , 4.C1.2
Cosmetic Preparations	PT E13	1	1	2	1.C1.1, 2.C2.1, 4.C1.3, 4.C2.1
Quality Assurances and GMP	PT E14	1	1	2	1.C1.1, 1.C1.3, 2.C2.2, 2.C3.2, 2.C5.1, 4.C1.1 , 4.C1.2 , 4.C1.3 , 4.C2.1
Biological Standardization	PO E07	1	1	2	1.C1.1, 2.C2.3, 3.C1.3, 4.C1.2
Veterinary Pharmacology	PO E08	1	1	2	1.C1.1, 2.C1.1, 3.C1.3, 4.C1.1, 4.C2.1
Gene Regulation and Epigenetics	PM E07	1	1	2	1.C1.1, 1.C1.4, 1.C1.5, 2.C5.1, 2.C5.2, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Antimicrobial Stewardship	PM E08	1	1	2	1.C1.1, 1.C1.4, 1.C1.5, 1.C1.6, 2.C.1.1, 2.C1.2, 2.C.4.1, 2.C.4.2, 3.C.1.3, 3.C.2.1, 3.C.2.4, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Infection Control	PM E09	1	1	2	1.C1.1, 1.C1.2, 1.C1.4, 1.C1.5, 1.C1.6, 1.C1.7, 2.C1.1, 2.C1.2, 2.C3.1, 2.C3.2, 3.C1.1, 3.C1.2, 4.C1.1, 4.C2.1, 4.C2.2
Bioinformatics	PM E10	1	1	2	1.C1.1, 1.C1.3, 1.C1.5, 1.C1.6, 2.C.2.3, 2.C.5.2, 2.C.5.3, 4.C1.1, 4.C1.2, 4.C2.1, 4.C2.2
Clinical Nutrition	PB E04	1	1	2	1.C1.1, 1.C1.2, 3.C1.4, 3.C2.2, 4.C1.3, 4.C2.1

Field training:

Training	Total contact hours	Program Key Elements Covered
Preliminary training	100 hr	1.C1.1 , 2.C1.1
Advanced training	6 rotations within one academic year	2.C1.1 , 2.C2.1 , 2.C4.1 , 2.C5.2 , 3.C1.4 , 3.C2.1 3.C2.3 , 3.C2.4 , 3.C2.5 3.C2.6 , 4.C1.1 4.C1.2 , 4.C2.1 , 4.C3.1 4.C3.2

Research project:

Total contact hours	Program Key Elements Covered
Within the 6 th academic year	1.C1.7 , 2.C5.3 , 4.C1.2 , 4.C2.2 4.C3.1 , 4.C3.2

5. Program Courses Contents:

Courses Offered or Supervised by the Department of

Required Courses

PC 101 Pharmaceutical Analytical Chemistry I (2+1)

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

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

PC 102 Pharmaceutical Organic Chemistry I (2+1)

The objective of this course is to provide students with the basic knowledge in pharmaceutical organic chemistry, which will serve as fundamentals for other courses offered during subsequent semesters. This course involves Electronic structure of atom, alkanes [nomenclature, synthesis and reactions (free radical reactions)], and cycloakanes. Stereochemistry (Optical isomers, racemic modification, nomenclature of configurations). Alkenes, alkadienes and alkynes. Alkyl halides (nomenclature, preparation and chemical reactions (S N 1, S N 2, E 1 , E 2). Arenes and aromatic compounds (Kekule structure, Huckel rule, Electrophilic aromatic substitution and orientation). The practical sessions of this course help students gain skills required to identify organic compounds of different classes.

PC 203 Pharmaceutical Analytical Chemistry II (2+1)

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

PC 204 Pharmaceutical Organic Chemistry II (2+1)

This course involves different classes of organic compounds: aryl halides, Alcohols, Phenols, ethers & epoxides, aldehydes, ketones, carboxylic acid & acid derivatives, sulphonic acids, and nitrogenous compounds. Carbohydrates, amino acids & peptides, The practical sessions of this course help students gain skills required

for identification of carbohydrates, separation, identification, and purification of organic mixtures.

PC 305 Pharmaceutical Analytical Chemistry III (1+1)

Redox titrations, theory, oxidation potentials, Nernest equation, titration curves, redox indicators, selected oxidants and reductants, applications of redox titrations. The course also covers applied pharmaceutical analysis such as water analysis (water hardness, analysis of chloride, chlorine, iron, oxidizable matter, in water.
Electrochemical methods, electrode potential, reference electrodes, indicator electrode, applications. Conductomertric titration: ionic conductance, definition of cell constant, conductance, applications. polarography: Ilkovic equation, dropping mercury electrodes, diffusion current, applications, derivatization polarography.

PC 306 Pharmaceutical Organic Chemistry III (2+1)

This course involves polynuclear and heterocyclic chemistry. In addition, it provides an introduction about the use of different spectroscopic tools, including UV, infrared (IR), nuclear magnetic resonance (NMR) and mass spectrometry (MS) for the structural elucidation of organic compounds.
The tutorial sessions of this course: students gain skills for solving problems of structural elucidation of organic compounds.

PC 407 Instrumental Analysis (2+1)

Spectroscopic methods of analysis which include uv/vis spectroscopy, principal, instrumentation, factors affecting absorption and applications in pharmaceutical analysis. Fluorimetric methods, principal instrumentation, factors affecting fluorescence intensity and applications in pharmaceutical analysis. Atomic spectroscopy; principal and instrumentation. Chromatographic methods for analytical chemistry which includes: TLC, gel chromatography, column chromatography, HPLC, UPLC, TLC, gas chromatography, capillary electrophoresis.

PC 508 Medicinal Chemistry I (2+1)

This course involves an Introduction to pharmaceutical and medicinal chemistry, endocrine-related drugs (diabetes, thyroid and calcium-regulating agents), steroidal hormones, antihistamines (H1, H2 blockers and anti-ulcer PPIs), different classes of antibiotics and antimicrobials (natural and synthetic), beside other synthetic chemotherapeutic agents (including antivirals, antifungals and antiparasitics). Additionally, various anticancer therapies and related drugs are also covered.

PC 609 Medicinal Chemistry II (2+1)

The course is tailored to assist the students to gain the drugs affecting the autonomic nervous system (ANS), drugs acting on the cardiovascular system (CVS), CNS.

neurodegenerative disorders. Moreover, drugs controlling pain and inflammation (NSAIDs, local anaesthetics and narcotics) are also handled.

PC 710 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).

PC 011 Quality Control of Pharmaceuticals (2+1)

I-Quality control & quality assurance of pharmaceuticals.

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

III-Documentation

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

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

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

Elective Courses

PC E12 Advanced Pharmaceutical Analysis – Spectroscopy (1+1)

Applications of instrumental methods of analysis (ultraviolet and infrared spectroscopy; NMR; mass spectrometry; atomic absorption spectroscopy, GC-MS, X-ray spectroscopy) to pharmaceutical compounds.

Courses Offered or Supervised by the Department of Pharmacognosy (PG)

Required Courses

PG 101 Medicinal Plants (2+1)

The aim of the course is to provide students with knowledge necessary to identify and prepare a crude drug from the farm to the firm. Students should acquire knowledge concerning dusting powders, plant cytology, physiology and medicinal leafy plants (according to their WHO monographs) 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 and will discuss and address the variability in occurrence of pharmacologically active substances in certain official medicinal.

PG 202 Pharmacognosy I (2+1)

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

PG 303 Pharmacognosy II (2+1)

After completion of the course the student should have the knowledge and skills that enable him to differentiate between different organs of plants through their monographs. The course comprises the study and identification of different drugs (fruits,herbs, subterranean organs, unorganized drugs in addition to drugs of marine and

animal origin) , including identification of their active constituents and adulterants, describe micro- and macro-morphological characteristics, benefits and precautions of their medicinal uses., side effects and contraindications and to have an overview over their Phytopharmaceuticals available on the market specially the Egyptian market.

PG 504 Phytochemistry (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, carbohydrates and glycosides, alkaloids, tannins and antioxidants of plant, fungi or animal origin, as well as different techniques used for their preparation, identification and determination. Also, the students should become aware of different plant constituents and their pharmacological actions and medicinal uses. The course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features.

PG 605 Applied & Forensic Pharmacognosy (1+1)

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

The course also includes an overview on forensic Pharmacognosy including plants and their natural products that constitute health hazards, or intended for criminal uses to produce, abortion, loss of mental control, hallucination, heart arrest. Also it includes the study of drug dependents, narcotics, analgesics psych energetics, euphoric. mycotoxin as a serious threat to general health and safety of community, contamination of food material with poisonous fungi.

PG 906 Phytotherapy and Aromatherapy (2+0)

Upon successful completion of this course, the students should be able to know guidelines for prescribing herbal medicinal drugs on the basis of the pharmacological properties of these drugs including therapeutic uses, mechanism of action, dosage, adverse reactions, contraindications & drug interactions. The course also allows students understand pharmacotherapeutic principles applied to the treatment of different diseases, pharmacovigilance and rational use of drugs. Also the student should understand the basis of complementary and alternative medicine with emphasis on

herbal remedies, nutritional supplements, homeopathies, aromatherapy & their effect on maintaining optimum health and prevention of chronic diseases. It includes studying of medicinal plants portfolios in relation to Phytopharmaceuticals in Egyptian Market.

Elective Courses

PG E07 Alternative Medicinal Therapies (1+1)

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 the pharmacist to help clients make an informed choice and counsel them on the selection of useful and safe products.

PG E08 Productions and Manufacture of Medicinal Plants (1+1)

Commercial production of medicinal plants, cultivation, collection, drying, preservation, extraction, quality control, and final packing of entire or powdered forms or extracts.

PG E09 Chromatography and Separation Techniques (1+1)

Introduction and 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.

Courses Offered or Supervised by the Department of Pharmaceutics (PT)

Required Courses

PT 101 Pharmacy Orientation (1+0)

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

PT 202 Physical Pharmacy (2+1)

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

PT 303 Pharmaceutics I (2+1)

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

PT 404 Pharmaceutics II (2+1)

This course covers the structure and function of the skin, target area of treatment after topical application to skin, basic principles of diffusion through membranes and factors affecting percutaneous absorption, enhancement of skin penetration, transdermal drug delivery systems (TDDS). It also
describes the principles and techniques involved in the formulation and manufacturing of traditional dermatological semisolid dosage forms (creams, ointments, gels and pastes) and cosmetic products

PT 505 Pharmaceutics III (2+1)

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

PT 606 Biopharmaceutics and Pharmacokinetics (2+1)

This course aims to provide students with an understanding of the relation between the physicochemical properties of the drug and its fate in the body. The course explores the principles of biopharmaceutics and strategies for enhancing drug delivery and bioavailability. Integration of knowledge gained from other courses is emphasized to design and assure the quality of drug products. Students will also be introduced to

the principles of pharmacokinetics (absorption, distribution, metabolism and elimination). The concepts of bioequivalence, biowaivers and in vitro-in vivo correlations (IVIVC's) will be discussed along with different models of drug disposition. The course prepares students for their evolving role in utilizing pharmacokinetics to guide formulation, dosage-regimen design and optimizing drug usage.

PT 607 Pharmaceutics IV (2+1)

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

PT 708 Pharmaceutical Technology I (2+1)

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

PT 809 Pharmaceutical Technology II (2+1)

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

PT 910 Good Manufacturing Practice (1+1)

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

PT 011 Advanced Drug Delivery Systems (1+1)

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

MS 102 Mathematics (1+0)

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

Elective Courses

PT E12 Applied Industrial Pharmacy (1+1)

Good manufacturing practice regulations and quality assurance with emphasis on process validation and sampling techniques.

PT E13 Cosmetic Preparations (1+1)

The principles and methods used in the design, preparation and quality criteria for different categories of cosmetic products.

PT E14 Quality Assurances and GMP (1+1)

The Course Covers the Principles of Quality assurance documentation environment monitoring and control of raw materials, packaging systems quality testing laboratory quality control and instruments good laboratory practice and skills good industrial practice good manufacturing practice quality determination using statistics quality assurance in registration and licensing of pharmaceutical products.

Courses Offered or Supervised by the Department of Microbiology and Immunology (PM)

Required Courses

PM 401 General Microbiology and Immunology (2+1)

The course provides students with a combination of laboratory and theoretical experience exploring the general aspects of microbiology. It includes knowledge of microorganisms, their morphology, diversity, cell structure and function, cultural characteristics, growth, metabolism, role of microorganisms in infectious diseases and microbial pathogenesis. It also clarifies different mechanisms of transport across bacterial cell membrane, metabolic pathways and physiology of bacteria. The course also covers the principles of genetic characters including DNA and RNA structures, replication, different forms of mutation and mutagenic agents. Furthermore, it explores the basic concepts of microbial growth, cultivation and reproduction.

Moreover the course introduces the modern concepts of medical immunology, with an emphasis onhost-pathogen relationship, non-specific and specific immunity and mechanisms of protective immunity. In addition, it explores molecular and cellular immunology concepts, including humoral immunity, antigen and antibody structure, function and their interaction. The course will also discuss different effector mechanisms, the complement system, together with cell mediated immunity. Active and passive immunization, types of hypersensitivity,in vitro antigen-antibody reactions, immuno-deficiency disorders, organ transplantation, autoimmunity and auto-immune disease will also be explained.

PM 502 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. The course also includes sterilization methods, sterilization indicators, sterility testing, concept and design of aseptic area, methods to determine the microbiological quality of pharmaceuticals as well as validation methods of the sterilization processes. Furthermore, the course includes antibiotics, their classification and mechanism of action, antiviral and antifungal agents, new antibiotic categories and new approaches to overcome bacterial resistance and measures taken to reduce and control antibiotics clinical abuse.

Moreover, the course explains different groups of antimicrobials together with their mechanism of action and resistance of microbes to biocides. Microbiological

evaluation of antiseptics, disinfectants and preservatives are also among the topics discussed.

PM 603 Parasitology (2 +1)

This course will focus on parasitic infections of humans with knowledge concerning biological, epidemiological and ecological aspects of parasites causing diseases to humans. It is also concerned with different parasitological related diseases in Egypt causing serious health problems.

The course will discuss medical helminthology, protozoology and entomology with emphasis on their morphological features, life cycle, pathogenesis, clinical manifestations, different diagnostic techniques, the most recent lines of treatment and prevention with control strategies for each parasitic infection.

PM 704 Medical Microbiology (2+1)

The course aims at studying microorganisms causing infectious disease in human beings. The course will explore various infectious diseases, their etiology and clinical manifestation, routes of transmission, treatment and techniques in detection and identification of pathogenic microorganisms caused by Gram positive cocci and bacilli, Gram negative cocci and bacilli and mycobacteria of major significance to public health. The other part of the course will provide students with the essential knowledge to be able to recognize viral pathogens, their epidemiology, mechanisms of pathogenesis, clinical picture, methods of laboratory diagnosis, treatment, prevention and control measures of RNA, DNA and retro viral infections in humans.

PM 905 Biotechnology (2+1)

The course aims to provide students with the basics of biotechnology, its scope and applications through studying fermentation technology, upstream, downstream, and scaling up and down processes together with the use of molecular techniques for production of recombinant products and other major biotechnological products. The course also explores biotransformation, bioremediation, bioleaching, bioinsecticides, biosurfactants and biopolymer production. In addition, different up-to-date molecular techniques and tools currently applied in molecular biology are explained. An insight to stem cells and their principles and uses are also explored together with different types of medically important RNAs. Students are also exposed to the basics of gene therapy and their application in medicine.

PM 906 Public Health (2+0)

This course aims at understanding all scientific disciplines required for health education and health promotion directed to the community. It also explains how epidemiology acts as the bases of public health actions. Detailed scientific information and practice programs will be provided for control of communicable and non-communicable diseases, improving mental, social, environmental, occupational,

geriatric and family health, the use of sufficient and balanced food and nutrition, supplying safe drinking water, treating and disposing wastes as well as proper intervention during disasters.

Elective Courses

PM E07 Gene Regulation and Epigenetics (1+1)

The course will provide students with knowledge on the concept of epigenetics and control of gene regulation and expression. The course will also include knowledge on how changes in organisms can occur due to modification of gene expression. It will also highlight the effect of epigenetics on the response of individuals to diseases, explore DNA methylation processes, histone modifications, chromatin remodeling, non-coding RNAs and the factors that control and regulate these molecular processes.

PM E08 Antimicrobial Stewardship (1+1)

Factors affecting choice of antimicrobial agent, types of antimicrobial compounds, types of antibiotics and synthetic antimicrobial agents, clinical uses of antimicrobial drugs, manufacturing of antibiotics and other synthetic antimicrobial agents, principle methods of assaying antibiotics, mechanism of action of antibiotics, bacterial resistance to antibiotics, disinfection policy, evaluation of non-antibiotic antimicrobial agents and mode of action of non antibiotic antimicrobial agent.

PM E09 Infection Control (1+1)

This course includes infection prevention and practices to control the spread of infectious diseases. The course will discuss the chain of infection, transmission of infectious diseases, outbreak management, community and personal protection policies as well as strategies taken to prevent the spread of infection among healthcare workers, patients as well as community members.

PM E10 Bioinformatics (1+1)

The course focuses on current bioinformatics tools and databases, and application of bioinformatics in genomics and molecular biology

Courses Offered or Supervised by the Department of Pharmacology and Toxicology (PO)

Required Courses

PO 401 Biostatistics (1+0)

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

PO 502 Pharmacology I (2+1)

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

PO 603 Pharmacology-II (2+1)

This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding autacoids and drugs acting on central nervous system, gastro-intestinal tract, pulmonary systems and hematologic disorders. Antihyperlipidemic drugs are also included.

PO 704 Pharmacology-III (2+1)

This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology disease processes regarding drugs acting on endocrine system. Chemotherapeutic drugs including antimicrobials, anticancer and immunosuppressant are within the scope of the course. Stem cell therapy is also included. The anti-inflammatory, analgesics as well as gout treatments are also included.

PO 805 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.

PO 806 Toxicology & Forensic Chemistry (2+1)

This course provides basics and concepts of toxicology including the carcinogenicity, 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.

MD 202 Medical Terminology (1+0)

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

MD 203 Anatomy& Histology (2+1)

Histology:

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

Anatomy:

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

MD 204 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.

MD 305 Physiology and Pathophysiology (2+1)

Physiology

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

Pathophysiology

Introduction to pathophysiology, cell injury, inflammation, autonomic nervous system, and endocrine disorders, fluid and electrolyte imbalance, vascular and haematological and urinary disorders.

MD 406 Pathology (1+1)

The main aim of Pathology course is to provide the second year student with knowledge and skills for common diseases affecting body organs and system (pancreatic disorders, pulmonary and digestive systems and CNS 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.

MD 007 First Aid (1+0)

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

Elective Courses

PO E07 Biological Standardization (1+1)

Assays of hormones, sera, vaccines, toxins, antitoxins, antibiotics and vitamins.

PO E08 Veterinary Pharmacology (1+1)

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.

Courses Offered or Supervised by the Department of Biochemistry (PB)

Required Courses

MD 201 Cell Biology (1+1)

Department of Microbiology & Immunology

Cell theory and cell structure, structure and function of cell wall and plasma membrane, cell components (centrioles, chloroplasts, cytoskeleton, endoplasmic reticulum, lysosomes, Golgi apparatus, mitochondria, ribosomes), structure of the nucleus.

Department of Biochemistry

Cell growth, proliferation and regulation of cell number, apoptosis and cancer, exocytosis and endocytosis, transport of biological molecules across membranes, membrane function and signal transduction, cell signaling, quorum sensing.

PB 401 Biochemistry I (2+1)

- amino acids
- protein structure, biologically important peptides, protein folding and misfolding
- globular proteins: structure and function of hemoglobin/ myoglobin, types of hemoglobin
- fibrous proteins: structure, types, synthesis and degradation of collagen and elastin, collagenopathies
- Enzymes: nomenclature, properties, mechanism of action, factors affecting velocity, kinetics, inhibition, regulation, enzymes used in clinical diagnosis

- Bioenergetics and oxidative phosphorylation: free energy, electron transport chain, oxidative phosphorylation, reactive oxygen species
- DNA structure and replication:
  - Central dogma of molecular biology (gene to protein)
  - DNA structure
  - Prokaryotic DNA replication
  - Eukaryotic DNA replication / telomeres and telomerase
  - Eukaryotic DNA organization
  - RNA structure and synthesis
  - Eukaryotic transcription and post-transcriptional modification of RNA
  - Codons and the genetic code
- Carbohydrate structure and digestion
- Lipid structure and digestion
- Free radicals and antioxidants

PB 502 Biochemistry II (2+1)

- Metabolism of carbohydrates
- Metabolism of lipids and lipoprotein
- Nitrogen metabolism
- Conversion of amino acids to specialized products:
  - Catecholamines, histamine, serotonin, creatine, melanin
  - Inborn errors of metabolism
- Metabolic effects of insulin and glucagon
- Feed/ fast cycle.

PB 703 Clinical Biochemistry (2+1)

- Diabetes mellitus
- Obesity
- Hyperlipidemia
- Myocardial infarction / atherosclerosis / hypertension
- Porphyrin metabolism
- Liver diseases (hepatitis, fatty liver, cirrhosis) and liver function tests
- Hemoglobinopathies / hematology and complete blood picture
- Fluid and electrolyte balance
- Investigation of renal function
- Diagnosis and management of acid-base disorders
- Hormones actions, functions and imbalances
- Gastrointestinal diseases, tests and diagnosis
- DNA repair / chemical DNA mutagens / tumor markers
- Disorders of purine metabolism / gout
- Biochemistry of Cancer
- Bone and mineral metabolism
- Biochemistry in the elderly
- Functional food and nutraceuticals

Elective Courses

PB E04 Clinical Nutrition (1+1)

The course focuses on the kinds and amounts of macronutrients (carbohydrates, fat, and proteins) and micronutrients (vitamins and minerals) that are needed to maintain optimal health and prevent chronic disease in adults.

Courses Offered or Supervised by the Department of Pharmacy Practice (PP)

Required Courses

PP 801 Clinical Pharmacokinetics (2+1)

This course provides pharmacy students with the basic knowledge required to provide clinical pharmacokinetics service in clinical settings. It includes introduction to the sources of variability in pharmacokinetics that necessitates dosage adjustment like pharmacogenetics, age, obesity, organ failure and disease states. It also provides pharmacy students with the necessary knowledge and skills required to perform therapeutic drug monitoring for a list of narrow therapeutics index drugs and manage their toxicity. This includes interpretation of plasma drug levels based on concentration related efficacy and toxicity, utilization of pharmacokinetic principles and use of suitable pharmacokinetic equations based on the pharmacokinetic model and route of administration, to adjust drug dose, when necessary, in order to achieve target therapeutic levels.

PP 802 Hospital Pharmacy (1+1)

The course aims to introduce 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 drugs and poison information services, clinical pharmacokinetics service, centralized intravenous additive service (preparation of
Intravenous (IV) admixtures, total parenteral nutrition (TPN) fluids, renal dialysis fluids), ward pharmacy services and nuclear pharmacy.

PP 803 Clinical Pharmacy & Pharmacotherapeutics I (2+1)

The course aims to provide students with the knowledge and skills required for provision of pharmaceutical care in different clinical settings. It includes introduction to the concepts of clinical pharmacy and pharmaceutical care, Medication Therapy Management services, principles of special care populations (geriatric, pediatric, renal and hepatic patients, obesity &pregnancy& lactation) and qualification to become a clinical pharmacist. It also includes several skills required by clinical pharmacists like patient history taking, medication reconciliation, therapeutic planning, identification of drug-related problems, interpretation of clinical laboratory data and physical

examination. The course also introduces the student to the principles of management and supportive care of oncological diseases, blood disorders and nutritional deficiencies.

PP 904 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

PP 905 Clinical Pharmacy & Pharmacotherapeutics II (2+1)

The course introduces the student to the principles of pharmacotherapeutics & management of cardiovascular, gastrointestinal, respiratory and endocrine disorders.

PP 006 Drug Interaction (1+1)

The course is shared between 2 departments; Pharmacology & Pharmacy Practice The course is designed to familiarize students with the major types of drug interactions (Pharmacokinetic, pharmacodynamic and pharmacogentic interactions) in the clinical setting. It provides the knowledge and skills enabling students to develop professional competencies in the recognition and discussion of the pharmacological aspects of interaction of drugs belonging to various pharmacological classes with drugs, chemicals, herbs, food and disease. It also enables them to evaluation the clinical significance of drug interactions and make rational recommendations to manage them to minimize their risk.

PP 007 Clinical Pharmacy & Pharmacotherapeutics III (2+1)

The course introduces the student to the principles of pharmacotherapeutics & management of Infectious, rheumatic, obstetrics and gynecological, renal, CNS disorders.

PP 008 Clinical Research, Pharmacoepidemiology and Pharmacovigilance (1+1)

This course introduces the student to the basic principles of clinical research, design of research studies, types of research studies, clinical trials, statistical presentation of research data and ethical guidelines in drug research. This course addresses a range of study designs and analytic techniques for observational

studies on the utilization, safety, and effectiveness of pharmaceuticals. Students will develop an understanding of how to plan, implement, analyse, and criticize pharmacoepidemiological studies. This course also provides the students with understanding of pharmacovigilance importance, concept, processes, systems, global safety standards and regulations and reporting systems.

NP 101 Information Technology (2+1)

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

NP 102 Human Rights and Fighting Corruption (1 + 0)

يغطي هذا المقرر الموضوعات التالية: حقوق الإنسان في القانون الجنائى، حق الإنسان فى تغيير جنسيته أو التخلى عن إحدى جنسياته، المواثيق الدولية المتعلقة بحماية حقوق الإنسان، علاقة العولمة والتنمية بالحقوق الاقتصادية والاجتماعية والثقافية، الحقوق الاقتصادية والاجتماعية والثقافية للإنسان، حقوق الإنسان فى الشريعة الإسلامية، حقوق المرأة فى قانونى العمل والتأمين الاجتماعى، حقوق الإنسان فى التقاضى، الحقوق المدنية والسياسية للإنسان.

NP 303 Scientific Writing (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.

NP 404 Presentation and Communication skills (1+1)

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 and other health care providers

NP 705 Pharmaceutical Legislations, Regulatory Affairs and Professional Ethics (1+0)

A detailed presentation of law that governs and affects the practice of pharmacy, legal principles for non-controlled and controlled prescriptions, OTC drug requirements, opening new pharmacies, opening medical stores, opening factories, opening scientific

offices, medicine registration, pharmacies and medicine stores management. Pharmacist duties and responsibilities, pharmacist-patient relationship, patient's rights and ethical principles and moral rules.
Professional ethics provides general principles and history of pharmacy ethics, general principles of medical ethics, conflicts of interests and its management, pharmacists' relationship with society and family, ethics in disaster, medication error, research ethics and animal ethics.

NP 906 Marketing & Pharmacoeconomics (2 + 0)

Pharmacoeconomics

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

Marketing

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

NP 007 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 entrepreneurship.

6. Program Admission Requirements:

1- Those who apply to join the program must fulfil all the conditions set by the Supreme Council of Egyptian Universities.
2- Transfer students, enrolled in a similar program in one of the Faculties of Pharmacy in Egyptian or foreign universities, may be accepted provided that the student fulfils the requirements for admission to the faculty, and the courses he studied in the faculty from which he was transferred are counted according to the rules determined by the faculty council.
3- Students must hold the Egyptian high school certificate, Science Section or an equivalent certificate accepted by the Supreme Council of Egyptian Universities.
4- Students are nominated for admission to the faculty according to the rules of the Supreme Council of Private Universities.
5- Foreign students are nominated for admission to the faculty according to the general regulations of the Ministry of Higher Education.
6- Students must fulfil all requirements and comply with the rules of the faculty.
7- Full-time study is required by all students.

○ Registration:

The College assigns each group of students an academic adviser from the faculty members who carries out the care and guidance tasks and is responsible for the student in the scientific, social and psychological affairs and guidance in all matters relating to his university life and helps students in the selection of courses from the list of courses offered by the college in each semester.

Each student must personally register the courses he / she wishes to study in each semester, with the need to choose the courses and the number of credit hours in consultation and agreement with the academic advisor. To be enrolled, the student must have successfully passed the registration requirement.

The College Council may, in cases of extreme necessity, register some courses in line with its requirements that the student has not successfully passed if the student's available study load is less than 12 credit hours,

provided that a declaration is written by the student's parent. His success in this course will only be approved after passing the requirement for which he was allowed to register in parallel.

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

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

- **Academic load:**

The academic load is the number of credit hours that the student registers in one semester.

- The academic load in each semester should not be less than 12 credit hours and not more than 20 credit hours, and the academic load in case of academic difficulty should not exceed 12 credit hours.
- Academic load during the summer semester is a maximum of 9 credit hours.
- The academic load can be increased in the last two semesters by three hours more than the allowed load (only once) after approval of the faculty council.

7. Regulations for Program Course Completion:

A Bachelor of Pharmacy (PharmD) degree according to the credit hour system requires:

First: Study and pass 178 credit hours distributed over ten semesters, including the compulsory faculty requirements, 173 credit hours (including 8 credit hours of elective faculty courses), in addition to the compulsory university requirements, which are 5 credit hours and the cumulative average should not be less than two.

Second: Pass a first field training period with a total of 100 actual training hours in private and government pharmacies and hospital pharmacies approved by the faculty council, under the supervision of a faculty member. Summer training takes place during summer vacations after the end of the third level and to complete the year of excellence (academic year - 9 months) after completing the years of study, according to the detailed regulations for the Internship Year Training Program, which includes passing a graduation project in one of the disciplines offered for registration.

Third: Passing the university's requirements for graduation, provided that it does not include the student's semester or CGPA calculation.

8. Methods and rules of Student's Assessment:

a- Assessment methods:

Methods of assessment include:

- Written examination.
- Oral examination.
- Practical examination.
- Other activity: (research papers, course assignments, presentations and reports).

b- Marks Distribution

- The total grade is out of 100%.
- In order to pass a course the student must obtain a minimum of 60% of the total grade and a minimum of 30% of the final written exam.
- The grades of the Faculty courses are distributed according to the following table:

Type of course	Periodical /Activity	Practical	Written	Oral	Total
Course includes a practical and oral exam	15	25	50	10	100
Course includes a practical and no oral exam	15	25	60	--	100
Course has no practical or oral exams	20	--	80	--	100

c- Grading System:

The following Table illustrates the grading system adopted in the faculty:

Grade	Definition	Percentage	Grade points
A+	Excellent	≥ 95%	4.0
A		90 – < 95%	3.8
A-		85 - < 90%	3.6
B+	Very good	80 - < 85%	3.3
B		75 - < 80%	3.0
C+	Good	70 - < 75%	2.7
C		65 - < 70%	2.4
D	Satisfactory	60 - < 65%	2.0
F	Fail	< 60%	0
W	-	Withdraw	
I	-	Incomplete	
Absent	-	Absent	

Registration symbols that do not carry grade points or credit:

- **W** : withdrawal prior to deadline indicates a student has officially withdrawn from a course.
- **I** : Students who have satisfactory attendance in the courses but cannot attend the final written/oral exams due to an accepted excuse by the

faculty council, they can enter the final written/oral exams of the courses in the second week of the following semester and their full grade is calculated.

- **Absent**: If the student in the above case cannot enter the final written/oral exams in the second week of the following semester, he should reregister in the course and his full grade is calculated.
- **S** : represents achievement that is satisfactory
- **U** : represents achievement that is unsatisfactory
- **T** : Transfer, indicates credit transferred from another institution.

d- Calculation of semester GPA (GPA) and cumulative GPA (cGPA):

- The grade value of each course (the points shown in the previous table) is multiplied by the number of credit hours for this course to obtain the number of points for each course in the semester.
- Points are collected for all the courses in which the student is registered in one semester.
- The total points of all courses are divided by the total credit hours registered for the student in one semester to obtain the semester average as follows:

$$\text{Semester GPA (GPA)} = \frac{\sum \text{Points of all courses in one semester}}{\sum \text{Cr.Hrs in one semester}}$$

$$\text{Cumulative GPA (cGPA)} = \frac{\sum \text{Points of all courses in all semester}}{\sum \text{Cr.Hrs in all semester}}$$

e- Failure in courses:

- Student who fails to attend the final written exam.
- Student who fails to achieve 30% of the marks in the final written exam.
- Student who fails to achieve 60% of the total course marks.

9. Evaluation of Program Learning Outcomes and Competencies:

Evaluator	Tool	Sample	% Contribution in Total Marks of Program Evaluation
5 th Year Students	Questionnaires and Periodic Meetings	Questionnaires (20%)	25%
Alumni	Questionnaires and Periodic Meetings	Questionnaires (20%)	25%
Stakeholders (Employers)	Questionnaires and Periodic Meetings	One meeting / year	25%
External Evaluator	Reviewing of the specifications of the program and the courses according to the bylaw	At least one reviewer professor in the specialty	25%

Program Coordinator
Prof. Hesham Ali Salem
Dean of Faculty of Pharmacy
Sinai University

Head of Quality Assurance Unit
Dr. Abo El-Hagag Abd El-Gawad
Faculty of Pharmacy
Sinai University

Faculty Dean
Prof. Hesham Ali Salem
Dean of Faculty of Pharmacy
Sinai University