



Program Specifications
Bachelor of Pharmacy
(PharmD-Clinical Pharmacy)
بكالوريوس الصيدلة (فارم دي - PharmD)
(صيدلة اكلينيكية)

Ministry Approval Date: 9/2019

Ministerial Decree:

Faculty Council Approval Date: 2/2021



Clinical Pharmacy Program Specifications

Bachelor of Pharmacy (PharmD-Clinical Pharmacy)

University: Mansoura University

Faculty: Faculty of Pharmacy

A- Basic Information

1. **Program title:** Bachelor of Pharmacy (Pharm D- Clinical Pharmacy)
2. **Program type:** Single
3. **Departments:**
 - Department of Medicinal Chemistry (PC)
 - Department of Pharmaceutical Organic Chemistry (PC)
 - Department of Pharmaceutical Analytical Chemistry (PC)
 - Department of Biochemistry (PB)
 - Department of Pharmaceutics (PT)
 - Department of Pharmacognosy (PG)
 - Department of Microbiology and Immunology (PM)
 - Department of Pharmacology & Toxicology (PO)
 - Department of Pharmacy Practice (PP)
4. **Duration of the program:** 5 years + one academic year of training internship
5. **Language of study:** English
5. **Program Coordinator:** The program's director
6. **External evaluator:**

Date of program specification approval

8. **Program approval date:** / / 2020



B- Professional Information

1: Program Aims:

Mansoura University awards Bachelor of Pharmacy (Pharm D-Clinical Pharmacy) degree following a five-year undergraduate Pharmacy program. This Pharmacy program provides students with the necessary knowledge and skills in basic, pharmaceutical, medical, social, behavioural, health, environmental sciences, clinical pharmacy and pharmacy practice and management; aiming to graduate competent general practitioner pharmacists; capable of working effectively in different settings, including community pharmacies, hospitals, forensic and biomedical laboratories, governmental health institutions, pharmaceutical industries, academia and research centres. **The program aims to:**

- 1.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled reduced risks of drug interactions.
- 1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.
- 1.3. Increase the competitiveness of program's graduates at the regional level through study and training programs.
- 1.4. Participate in community service, developing the environment, and providing a tangible economic return through rationalizing the use of medicines in hospitals.
- 1.5. Commit to achieving quality standards in pharmacy education through interactive education and interest in self-learning.



2. Graduates' Attributes:

Pharmacy graduates work in a multi-disciplinary profession to improve the quality of life of individuals and communities. Based on multi-national requirements, the pharmacy graduate must develop competencies of a learner, health caregiver and provider, professional, collaborator, manager, promoter, problem solver, educator and communicator, self-aware, leader, and innovator. Pharmacy graduates must acquire the necessary attributes related to various pharmacy aspects including drug-oriented and patient-oriented pharmacy disciplines to actively participate in pharmaceutical care. Pharmacy graduate must be able to:

- 2.1. Utilize in-depth understanding of fundamental knowledge to provide, counselling and drug information services to the community and patients about safe and proper use of medications in all forms
- 2.2. Participate with other health care professionals in improving health care services using evidence-based data and manage uncommon or highly complex situations.
- 2.3. Show capability of communication, time management, critical thinking, problem-solving, decision-making skills and inter-professional collaboration
- 2.4. Demonstrate professionalism, responsibility and accountability in compliance with legal and ethical rules in interactions with patients, other healthcare providers, communities and society
- 2.5. Apply pharmacy expertise to understand health needs and advance health and well-being of individual patients, communities and society.
- 2.6. Serve local and regional pharmacy service and all domains of pharmaceutical industry with highly qualified and trained professionals
- 2.7. Engage in life-long learning through continuous development with contemporary pharmacy practice knowledge, leadership, innovation and entrepreneurship skills
- 2.8. Optimize the use of all resources of the health-care System, including safety and efficacy of medication use systems, human resources, administrative affairs and artificial intelligence
- 2.9. Foster scientific research in clinical, biomedical and pharmaceutical sciences that meets and responds to the needs of society.
- 2.10. Express motivation, enthusiasm and strengthening the role of the pharmacist within the health system.



3. Competencies of the Pharmacy Graduates

Four **Competency Domains** are included in the competency-based National Academic Reference Standards for Pharmacy Education. These domains are designed to cover all essentials for practicing pharmacy profession including both drug-oriented and patient oriented disciplines. Each domain should be achieved through a number of **Competencies** which are overall broad statements that cover various areas of the graduate performance. A number of **Key Elements** are included in each competency. These key elements demonstrate how pharmacy graduate will reflect each competency in practice. The competency domains are the followings:

Domain 1: Fundamental Knowledge

Domain 2: Professional and Ethical Practice

Domain 3: Pharmaceutical Care

Domain 4: Personal Practice

4 - 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: Apply core knowledge and skills in relation to the evolving biomedical, pharmaceutical, clinical, social-behavioral and administrative sciences to evaluate, manufacture products, solve therapeutic problems, advance human health and provide patient-centered care. This competency will be developed via the following key elements:

➤ **Key Elements :**

1-1-1-Recognize in-depth and breadth knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences

1-1-2- Use appropriate pharmaceutical and medical terminology, abbreviations and symbols in pharmacy practice and recall scientific names of drugs.

1-1-3- Combine the principles of fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical raw materials and finished products



- 1-1-4-Explain drugs' mode of action, therapeutic effects and evaluate their appropriateness, effectiveness, and safety in individuals and populations, using knowledge from fundamental sciences.
- 1-1-5- Apply the principles and practice and critical understanding of fundamental sciences to solve problems related to human health and health systems
- 1-1-6- Access, retrieve, critically analyze and apply relevant scientific resources to make evidence-informed professional decisions.
- 1-1-7-Gather and critically analyze new information, including evidence-based information, that may be applicable to pharmaceutical industry and patient care.
- 1-1-8-Use health informatics to improve the quality of care, manage resources and optimize patient safety.
- 1-1-9-Perform pharmaceutical, compounding and patient-specific calculations, including pharmacokinetic and other therapeutic calculations.
- 1-1-10- Define the role of various Pharmacological agents in management of various disorder affecting gastro-intestinal, cardiovascular, respiratory, dermatological, pediatrics, oncology and critical patients.

Domain 2: Professional and Ethical Practice

2-1 Competency: Collaborate professionally with patients, intra- and inter- professional teams, to provide safe, effective and efficient health care, thus achieving the needs of the community and society at large. This competency will be developed via the following key elements:

➤ **Key Elements :**

- 2-1-1-Apply legal professional requirements to practice, including legislation, policies, by-laws, and standards for individuals and healthcare team
- 2-1-2-Apply the principles of professional codes of ethics, and protect the privacy and confidentiality of the patient and population diversity.
- 2-1-3-Establish and maintain appropriate professional boundaries and accept responsibility and accountability within healthcare team.



- 2-1-4-Define the fact that the practice of pharmacy is ethically consistent with goodbusiness, and quality of care precedes generating profit.
- 2-1-5-Develop procedures to ensure the return or proper disposal of recalled, expired and unusable products.
- 2-1-6-Prepare and compound non-sterile and sterile products and other extemporaneous preparations according to recognized guidelines and standards of practice.
- 2-1-7-Formulate Pharmaceutical care plans for management of several disorders with reference to their particulate health problems and special considerations.

2-2- Competency: Standardize pharmaceutical raw materials, formulate, manufacture, and develop pharmaceutical products and contribute to the inventory and stewardship of resources of medicines. This competency will be developed via the following key elements:

➤ **Key Elements:**

- 2-2-1- Identify, design, prepare, purify, standardize and quantify, of pharmaceutical materials and from different origins.
- 2-2-2- Apply GMP guidelines including principles of quality control, inventory, distribution and legal responsibility related to pharmaceutical industry of materials/ products of various origins in addition to possible incompatibilities.
- 2-2-3- Show the ability to use instruments and different kinds of simulation software within depth knowledge to design synthetic and analytical processes for raw materials and finished pharmaceutical products.
- 2-2-4- Implement quality control and quality assurance, calculations, biostatistical analysis, bioinformatics and assessment procedures of all the processes of pharmaceutical formulations and their applications for novel drug delivery systems, as per the need of industry and future prospects in pharmacy practice.



2-3- Competency: Apply approved policies, procedures and activities that support safe handling, transfer and disposition of biological and synthetic/natural pharmaceutical materials/products. This competency will be developed via the following key Elements:

➤ **Key Elements:**

- 2-3-1- Select, and apply appropriate methods and procedures and resources for handling and disposal of synthetic/natural materials, biological, radio-active, biotechnology- based items used in pharmacy.
- 2-3-2- Choose best practices and adhere to high ethical, legal and safety standards for management of biological and pharmaceutical materials/products.

2-4- Competency: Coordinate actively in decision-making within professional health team to assess patients in emergency situations including poisoning with xenobiotics, and cooperate effectively in forensic area. This competency will be developed via the following key elements:

➤ **Key Elements:**

- 2-4-1- Select proper procedures for handling and applications of poisons to discard any harm to public.
- 2-4-2- Demonstrate ability to use principles of first aid in the practice of pharmacy.
- 2-4-3- Contribute to decision making processes for recognized drug-related and pharmaceutical care problems.
- 2-4-4- Evaluate toxicity profiles of chemicals and other xenobiotics and investigate poisons in biological samples.
- 2-4-5- Recognize and take appropriate action when signs, symptoms and risk factors that relate to medical or health problems that fall into the scope of practice of other health professionals are encountered.
- 2-4-6- Define knowledge of and ability to use principles of physical assessment needed to save patient's life.
- 2-4-7- Evaluate pharmacological and non-pharmacological systemic approaches designed for



management of various disorders affecting on various body organs and patients with special consideration to their particular health issues.

2-5- Competency: Contribute in the advancement of pharmaceutical research and phases of clinical trials needed for approval of emerging medicinal agents. This competency will be developed via the following key elements:

➤ **Key Elements :**

- 2-5-1 Integrate regulatory strategy for authorization of emerging medicinal products according to national and international specifications.
- 2-5-2 Collect, interpret and assess relevant, necessary evidence-based information about a patient's health-related care needs.
- 2-5-3 Apply scientific principles of research and scholarly investigation and use systematic approaches in the search for best available evidence.
- 2-5-4 Plan and design various types of clinical studies to optimize procedures of experimental drug research in hospitals and various health care setting.

2-6- Competency: Conduct pharmacoeconomic studies and innovate promotion, sales, marketing, and business administration skills. This competency will be developed via the following key elements:

➤ **Key Elements:**

- 2-6-1-Implement the basic principles involved in managing financial, human resources and business administration in the pharmacy environment.
- 2-6-2-Practice guidelines of drug promotion, sales, marketing, accounting and outcomes of pharmacoeconomic analysis.
- 2-6-3- Apply pharmacoeconomic principles to optimize drug use and confirm achievement of intended therapeutics outcomes.



Domain 3: Pharmaceutical Care

3-1- Competency: Gather evidence -based information from the patients and population's health records for advancement of healthcare system. This competency will be developed via the following key elements:

➤ **Key Elements :**

- 3-1-1 Modify a dosage regimen for a patient based on the physiological, genetic, biochemical and immunological changes brought about by disease or concomitant drug therapy.
- 3-1-2 Relate principles of public health and microbiology for monitoring and control of factors contributing in microbial contamination.
- 3-1-3 Record and regulate microbial growth and conduct laboratory tests for identification of infections/diseases.
- 3-1-4 Outline the characters, epidemiology, pathogenesis, laboratory diagnosis, and clinical features of infections/diseases and their treatment and prevention.
- 3-1-5- Point out the characters, epidemiology, pathogenesis, laboratory diagnosis, treatment and prevention of various disorders affecting various body disorders and various patients.

3-2- Competency: Provide education and counseling to support patients and community in making informed decisions about their care plan. This competency will be developed via the following key elements:

➤ **Key Elements:**

- 3-2-1 Integrate principles of medicinal chemistry and pharmacological aspects of drugs, as mode of action, therapeutic uses, proper dosage, unwanted effects and drug interactions.
- 3-2-2 Rationalize the use of medicines and medical devices by relating principles of clinical pharmacology and pharmacovigilance and using the necessary technical skills.
- 3-2-3 Integrate best available evidence for application of non-conventional therapy into pharmacy practice.
- 3-2-4 Recommend appropriate information about untoward and toxicity of medicinal agents and other xenobiotics including possible sources, signs, symptoms and treatment options.
- 3-2-5 Provide education and counseling to support the patients, and community in making



informed decisions about their care plan including OTC preparations and medical devices.

3-2-6 Establish public awareness on rational use of drugs, vaccination, drug abuse and misuse, and safe handling of hazardous products to minimize personal exposure and reducing environmental contamination.

3-2-7- Consult other healthcare professionals as appropriate and accordingly adjust the proposed patient care plan.

3-2-8- Perform, order and/or retrieve relevant laboratory tests and other diagnostic assessments.

3-2-9- Identify the occurrence of a medication incident, adverse drug event and respond effectively to alleviate harm and prevent reoccurrence.

3-2-10- Advise patients, doctors, nurses, and other prescribers about safe, effective and cheap medication therapy.

Domain 4: Personal Practice

4-1- Competency: Demonstrate leadership, time management, self-directed learning, self-reflection, team problem-solving, creativity and entrepreneurial skills, appropriate to their role. This competency will be developed via the following key elements:

➤ **Key Elements :**

4-1-1 Share decision-making activities with other with other pharmacy team members and non-pharmacy team members and apply effective time management skills.

4-1-2 Contribute to the creation of knowledge or practices in the field of pharmacy and participate independently and collaboratively in the delivery of health services.

4-1-3 Participate in development of entrepreneurial, creativity and marketing skills.

4-1-4 Plan strategies to fulfil workplace pharmaceutical needs.

4-2- Competency: Demonstrate appropriate verbal and non-verbal communication skills, including listening skills and proficiency in writing with individuals and communities. This competency will be developed via the following key elements:



➤ **Key Elements :**

4-2-1 Use clear language, pace, tone and non-verbal communication and writing skills when dealing with patients, other health team and communities.

4-2-2 Apply artificial technology whenever possible to present relevant information.

4-3- Competency: Show self-awareness and commit to life-long learning and continuous professional development. This competency will be developed via the following key elements:

➤ **Key Elements:**

4-3-1 Use effective strategies to manage and improve self-practice of pharmacy.

4-3-2 Apply principles of continuing professional development including assessing own learning needs and developing a plan to meet these needs.

3- Academic Reference Standards:

3-a: External Reference for standards:

The Faculty of Pharmacy-Mansoura University, adopts the National Academic Reference Standards in Pharmacy education, issued by National Authority for Quality Assurance and Accreditation of Education (NAQAAE) 2nd Edition in April 2017 (**Attachment # 1**).

3-b: Comparison of Program Aims and the program Learning Outcomes (PLOs) with the National Academic Reference Standards (NARS) (Attachment # 2).

3-c: Comparison of Program's aims to graduate attributes (Attachment #3).

3-d: Comparison of Program's graduate attributes to NARS's graduates attributes (Attachment #4).



4- Curriculum Structure and Contents:

4-a Program duration: 5 years + one academic year of training internship.

4-b Program structure:

4.b.i- No of study hours per 5 year:182 credit hours

4.b.ii- No. of credit hours:

- University Requirements: 6 ;not included in calculating cGPA
- Faculty Requirements: 176 including:
 - Compulsory courses: 168
 - Elective Courses: 8

4.b.ii- No. of credit hours per week: Lectures: 124; Lab./Exercise: 58;total: 182

Level	Semester	Lectures Credit hour	Practical Credit hour	Total credit hour per semester	Total credit hour per level
1	1	11	4	15	32
	2	12	5	17	
2	3	12	5	17	34
	4	12	5	17	
3	5	12	6	18	35
	6	12	5	17	
4	7	13	6	19	40
	8	14	7	21	
5	9	14	7	21	41
	10	12	8	20	
Total		124	58	182	182

4.b.iv- Primary field training: 100 hours in summer period after level (3)

4.b.v- Advanced field training: One academic year of training internship.

The curriculum structure was drafted under the guidelines of NARS (2017), Courses are distributed into basic, pharmaceutical, medical and other sciences guided by NARS. The detailed distribution of the courses into the different sciences is included (**Attachment # 5**).



5- Program's Courses:

To obtain a bachelor's degree in pharmacy (PharmD-Clinical Pharmacy), the student is required to study 182 credit hours. The Faculty has issued a study plan, where courses are distributed over five levels of 10 regular semesters, in addition to one academic year of internship. A detailed distribution of the courses, along with their credit hours, prerequisites, exam marks and exam time is included (**Attachment # 6**). All the courses included within the program's structure contribute to achieving the intended PLOs, matrix of the courses with the PLOs is included (**Attachment # 7**).

Curriculum Contents:

Course's description are included (**Attachment # 8**); and course's specifications are available at both the Scientific Departments and the Quality Assurance and Accreditation Unit.

6- Teaching and Learning method

1. Self-learning
2. Interactive teaching
- Computer aided learning:
 - 3-a On line learning through my mans "Mansoura university "as recorded – video lectures
 - 3-b Inter active discussion through My Mans
4. Team – based learning
(group discussion)
5. Problem – based learning
6. Case study
7. Presentation
8. Practical work and tutorials
9. Assignments and activities
10. Simulation based learning
11. Role play
12. Research projects
13. Portfolio
14. Experiential education strategy



7- Student Assessment:

Different assessment methods are used within this program including both summative and formative assessments:

1- Summative assessment

1. Written examinations
 2. Practical assessments
 3. Oral presentation.
 4. Course work assessments.
- The final grade of the course consists of the sum of the semester work + practical (if present) + written + oral (if present) examination as shown in the study plan tables.
 - The minimum pass rate in any course is 60% of the total grades of this course.
 - The student will not be successful in any course unless he or she get 30% of the final written exam score.
 - Semesters work exam is held by the end of the 6th week of the semester
 - Practical exams are held by the end of the 11th week
 - Final written and oral exams are held by the end of the 12th week of the semester
 - Each course is assigned a total of 100 points (marks)
 - Performance of a student is measured by the **Grade Point Average (GPA)** value he/she scores in an individual course.

2- Formative assessments include:

• Case study	• Problem solving	• Evaluation research projects
• Evaluation of recent research paper discussion in journal club		



The percentage of final scores and estimates is as shown in the following table.

Evaluation system

Percentage	Symbol	Number of Points	Grade
95 and above	A+	4	Excellent
90 for less than 95	A	3.85	
85 for less than 90	A-	3.7	
82.5 for less than 85	B+	3.3	very good
77.5 for less than 82.5	B	3	
75 for less than 77.5	B-	2.7	
72.5 for less than 75	C+	2.3	Good
67.5 for less than 72.5	C	2	
65 for less than 67.5	C-	1.7	
62.5 for less than 65	D+	1.3	Acceptable
60 for less than 62.5	D	1	
Less than 60	F	0.00	Fail
Withdrawal - W	W	-	Withdrawal
Incomplete - I *	I*	-	Incomplete
Absent - Abs E **	Abs E**	-	Absent



The student's GPA and cGPA are calculated as follows:

- A - The value of points for each course is multiplied by the number of credit hours for this course to get the number of points for each course in the semester.
- B - Points are collected for all the courses in which the student scored in one semester.
- C- The total points of all courses shall be divided by the total credit hours registered for the student per semester for the purpose of obtaining the semester rate as follows:

The semester rate (GPA) =

$$\frac{\text{Total points of all courses per semester}}{\text{Total credit hours registered per semester}}$$

The cumulative GPA is calculated as follows:

Cumulative Grade Point Average (cGPA) =

$$\frac{\text{The sum of points for all courses for all semesters}}{\text{Total credit hours registered for all semesters}}$$

8- Programme Admission Requirements

- The Faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (SCU).
- Nominated students must hold the Egyptian General Secondary Education Certificate (GSEC) (Science Section), or an equivalent certificate accepted by the SCU.
- Foreign students are nominated for admission to the faculty according to the general regulations of the Ministry of Higher Education (MHE).
- Students from other governmental Egyptian Universities or foreign scientific institutes recognized by the Supreme Council of Universities must fulfill the Faculty of Pharmacy admission requirements before being transferred at our Faculty. Courses completed at another Pharmacy Institution are evaluated for equivalency.
- Full-time study is required by all students.



9- Regulations for progression and Bachelor of Pharmacy (PharmD-Clinical Pharmacy) program completion:

- The Faculty adopts the pharm D credit hour system in this program.
- Student registers the courses in each semester with the guidance of his/her academic advisor, taking into consideration the prerequisite of each course.
- Student is allowed to register a total of 12 - 22 credit hours in each semester; while the academic load during summer semester is 6 – 10 credit hours.
- Students must attend not less than 75 % of the lectures and laboratory sessions. Otherwise, they would not be able to attend the final exam and complete the course.
- Completion of the program requires that the student must successfully achieve:
 - 175 credit hours (167 Faculty Compulsory Courses; and 8 Elective Courses), and 6 University Requirements,
 - Acquiring 100 hours of field training in a pharmacy (community or hospital pharmacies).
 - Completion of one academic year of internship in pharmaceutical companies, pharmaceutical factories pharmaceutical research centers, hospitals, pharmacies,...
 - Passes the graduation project.
- Student transferred from other institutions must study at our university at least 60% of graduation requirements.
- Grading of the University Requirements courses; (Information technology, Human rights and Corruption Fighting, Psychology, Communication and presentation skills, Entrepreneurship), the field training, or the academic year of internship are not included in the GPA or cumulative GPA (cGPA).
- Minimum cGPA of 1 is a must for successful graduation.



10- Evaluation of Program Learning Outcomes

Evaluator	Tool	Sample
1- Senior students	Questionnaires	Random Sample
2- Graduates	Questionnaires	Random Sample
3- Stakeholders	Interviews	Cluster random sample
4-External Evaluator(s) (External Examiner(s))	Templates and checklists for validation of the specifications	Selected experts
5- Other		

Program Coordinator:

Signature:

Faculty Council Approval: / /2020



(Attachment # 1).

National Academic Reference Standards For Pharmacy Education

(2nd Edition, April 2017).

1- Attributes of the Pharmacy Graduates

Pharmacy graduates work in a multi-disciplinary profession to improve the quality of life of individuals and communities. Based on multi-national requirements, the pharmacy graduate must develop competencies of a learner, health caregiver and provider, professional, collaborator, manager, promoter, problem solver, educator and communicator, self-aware, leader, and innovator. Pharmacy graduates must acquire the necessary attributes related to various pharmacy aspects including drug-oriented and patient-oriented pharmacy disciplines to actively participate in pharmaceutical care. Pharmacy graduate must be able to:

1. Educate and counsel individuals and communities to participate in optimizing therapeutic outcomes and minimizing the incidence of illness of individuals and populations.
2. Practice and perform responsibilities and authorities legally, professionally, and ethically respecting patients' rights.
3. Utilize evidence-based data to deliver contemporary pharmaceutical products and pharmacy services.
4. Assure the quality of pharmaceutical materials and products.
5. Apply integrated evidence-based pharmaceutical and clinical information in assessing the appropriateness, effectiveness, and safety of medications.
6. Contribute effectively in planning and conducting research using appropriate methodologies.
7. Work collaboratively and share therapeutic decision-making as a member of an inter-professional health care team.
8. Demonstrate effective communication, leadership, business administration, and entrepreneurial skills.
9. Work as a life-long learner for continuous professional improvement and demonstrate capabilities of performance appraisal and self-assessment.



2- Competencies of the Pharmacy Graduates

Four **Competency Domains** are included in these competency-based National Academic Reference Standards for Pharmacy Education. These domains are designed to cover all essentials for practicing pharmacy profession including both drug-oriented and patient oriented disciplines. Each domain should be achieved through a number of **Competencies** ranging from one to six, with a total of twelve competencies for all domains. These competencies are overall broad statements that cover various areas of the graduate performance. A number of **Key Elements** ranging from two to seven are included in each competency, with a total of forty two key elements for all competencies. These key elements demonstrate how pharmacy graduate will reflect each competency in practice. The competency domains are the followings:

Domain 1 : Fundamental Knowledge

Domain 2: Professional and Ethical Practice

Domain 3: Pharmaceutical Care

Domain 4: Personal Practice

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 -1-1 - Demonstrate understanding of knowledge of 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 -1-3- Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/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 -1-5- Retrieve information from fundamental sciences to solve therapeutic problems.



1-1-6- Utilize scientific literature, and collect and interpret information to enhance professional decision.

1-1-7- Identify and critically analyze newly emerging issues influencing pharmaceutical industry and patient health 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 :**

2-1 -1 Perform responsibilities and authorities in compliance with the legal and professional structure and role of all members of the health care professional team.

2-1 -2 Adopt ethics of health care and pharmacy profession respecting patients' rights and valuing people 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.

2-2- COMPETENCY: Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.

➤ **Key Elements :**

2-2-1 Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/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.

2-2-3 Recognize the principles of various tools and instruments, and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.

2-2-4 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.



2-3- COMPETENCY: Handle and dispose biologicals and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.

➤ **Key Elements :**

- 2-3-1 Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical field.
- 2-3-2 Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.

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 :**

- 2-4-1 Ensure safe handling/use of poisons to avoid their harm to individuals and communities.
- 2-4-2 Demonstrate understanding of the first aid measures needed to save patient's life.
- 2-4-3 Take actions to solve any identified medicine-related and pharmaceutical care problems.
- 2-4-4 Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.

2-5- COMPETENCY: Contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products.

➤ **Key Elements :**

- 2-5-1 Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.
- 2-5-2 Retrieve, interpret, and critically evaluate evidence-based information needed in pharmacy profession.
- 2-5-3 Contribute in planning and conducting research studies using appropriate methodologies.



2-6- COMPETENCY: Perform pharmaco-economic analysis and develop promotion, sales, marketing, and business administration skills.

➤ **Key Elements :**

2-6-1 Apply the principles of business administration and management to ensure rational use of financial and human resources.

2-6-2 Utilize the principles of drug promotion, sales, marketing, accounting, and pharmaco-economic 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 :**

3-1 -1 Apply the principles of body function and basis of genomics in health and disease states to manage different diseases.

3-1 -2 Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.

3-1 -3 Monitor and control microbial growth and carry out laboratory tests for identification of infections/diseases.

3-1 -4 Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmaco-therapeutic approaches.

3-2- COMPETENCY: Provide counseling and education services to patients and communities about safe and rational use of medicines and medical devices.

➤ **Key Elements :**

3-2-1 Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions.

3-2-2 Apply the principles of clinical pharmacology and pharmacovigilance for the rational use of medicines and medical devices.



3-2-3 Provide evidence-based information about safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.

3-2-4 Provide information about toxic profiles of drugs and other xenobiotics including sources, identification, symptoms, and management control.

3-2-5 Educate and counsel patients, other health care professionals, and communities about safe and proper use of medicines including OTC preparations and medical devices.

3-2-6 Maintain public awareness on social health hazards of drug misuse and abuse.

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 :**

4-1 -1 Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.

4-1 -2 Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.

4-1 -3 Demonstrate creativity and apply entrepreneurial skills within a simulated entrepreneurial activity.

4-2- COMPETENCY: Effectively communicate verbally, non-verbally and in writing with individuals and communities.

➤ **Key Elements:**

4-2-1 Demonstrate effective communication skills verbally, non-verbally, and in writing with professional health care team, patients, and communities.

4-2-2 Use contemporary technologies and media to demonstrate effective presentation skills.

4-3- COMPETENCY: Express self-awareness and be a life-long learner for continuous professional improvement.

➤ **Key Elements:**

4-3-1 Perform self-assessment to enhance professional and personal competencies.

4-3-2 Practice independent learning needed for continuous professional development.



Attachment # 2

Comparison of Clinical Pharmacy's Program's Graduates Attributes to NARS's Graduate Attributes

Clinical Pharmacy's Program's Graduates Attributes	NARS's Graduate Attributes
2.1. Utilize in-depth understanding of fundamental knowledge to provide, counselling and drug information services to the community and patients about safe and proper use of medications in all forms	1.1 Educate and counsel individuals and communities to participate in optimizing therapeutic outcomes and minimizing the incidence of illness of individuals and populations.
2.2. Participate with other health care professionals in improving health care services using evidence-based data and manage uncommon or highly complex situations.	1.2 Practice and perform responsibilities and authorities legally, professionally, and ethically respecting patients' rights.
2.3. Show capability of communication, time management, critical thinking, problem-solving, decision-making skills and interprofessional collaboration	1.3 Utilize evidence-based data to deliver contemporary pharmaceutical products and pharmacy services.
2.4. Demonstrate professionalism, responsibility and accountability in compliance with legal and ethical rules in interactions with patients, other healthcare providers, communities and society	1.4 Assure the quality of pharmaceutical materials and products.
2.5. Apply pharmacy expertise to understand health needs and advance health and well-being of individual patients, communities and society.	1.5 Apply integrated evidence-based pharmaceutical and clinical information in assessing the appropriateness, effectiveness, and safety of medications.
2.6. Serve local and regional pharmacy service and all domains of pharmaceutical industry with highly qualified and trained professionals	1.6 Contribute effectively in planning and conducting research using appropriate methodologies.
2.7. Engage in life-long learning through continuous development with contemporary pharmacy practice knowledge, leadership, innovation and entrepreneurship skills	1.7 Work collaboratively and share therapeutic decision-making as a member of an inter-professional health care team.
2.8. Optimize the use of all resources of the health-care System, including safety and efficacy of medication use systems, human resources, administrative affairs and artificial intelligence	1.8 Demonstrate effective communication, leadership, business administration, and entrepreneurial skills.
2.9. Foster scientific research in clinical, biomedical and pharmaceutical sciences that meets and responds to the needs of society.	1.9. Work as a life-long learner for continuous professional improvement and demonstrate capabilities of performance appraisal and self-assessment.
2.10. Express motivation, enthusiasm and strengthening the role of the pharmacist within the health system.	



Attachment # 3

Comparison of Clinical Pharmacy's Program's Aims to Clinical Pharmacy's Program's Graduates Attributes

Clinical Pharmacy's Program's Aims	Clinical Pharmacy's Program's Graduates Attributes
<p>1.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled reduced risks of drug interactions.</p>	<p>2.1. Utilize in-depth understanding of fundamental knowledge to provide, counselling and drug information services to the community and patients about safe and proper use of medications in all forms</p>
<p>1.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled reduced risks of drug interactions.</p>	<p>2.2. Participate with other health care professionals in improving health care services using evidence-based data and manage uncommon or highly complex situations.</p>
<p>1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.</p>	<p>2.3. Show capability of communication, time management, critical thinking, problem-solving, decision-making skills and inter-professional collaboration</p>



<p>1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.</p>	<p>2.4. Demonstrate professionalism, responsibility and accountability in compliance with legal and ethical rules in interactions with patients, other healthcare providers, communities and society</p>
<p>.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled reduced risks of drug interactions.</p> <p>1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.</p>	<p>2.5. Apply pharmacy expertise to understand health needs and advance health and well-being of individual patients, communities and society.</p>
<p>1.3. Increase the competitiveness of program's graduates at the regional level through study and training programs.</p>	<p>2.6. Serve local and regional pharmacy service and all domains of pharmaceutical industry with highly qualified and trained professionals</p>
<p>1.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled reduced risks of drug interactions.</p>	<p>2.7. Engage in life-long learning through continuous development with contemporary pharmacy practice knowledge, leadership, innovation and entrepreneurship skills</p>



<p>1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.</p> <p>1.3. Increase the competitiveness of program's graduates at the regional level through study and training programs.</p> <p>1.4. Participate in community service, developing the environment, and providing a tangible economic return through rationalizing the use of medicines in hospitals.</p> <p>1.5. Commit to achieving quality standards in pharmacy education through interactive education and interest in self-learning.</p>	
<p>1.4. Participate in community service, developing the environment, and providing a tangible economic return through rationalizing the use of medicines in hospitals.</p>	<p>2.8. Optimize the use of all resources of the health-care System, including safety and efficacy of medication use systems, human resources, administrative affairs and artificial intelligence</p>
<p>1.4. Participate in community service, developing the environment, and providing a tangible economic return through rationalizing the use of medicines in hospitals.</p> <p>1.5. Commit to achieving quality standards in pharmacy education through interactive education and interest in self-learning.</p>	<p>2.9. Foster scientific research in clinical, biomedical and pharmaceutical sciences that meets and responds to the needs of society.</p>
<p>1.1. Focus on the role of the role of pharmacist in providing appropriate health care to the patient inside and outside hospitals by following up his individualized drug system for him after studying the principles of clinical drug kinetics and their applications in treatment in various disease cases and finding appropriate treatment regimens in cooperation with the physician, with resultant improvement in the health care services offered for the patients and a paralleled</p>	<p>2.10. Express motivation, enthusiasm and strengthening the role of the pharmacist within the health system.</p>



reduced risks of drug interactions.

- 1.2. Graduate a distinguished pharmacist who is qualified to work in public and private pharmacies, pharmaceutical companies, drug control laboratories, food analysis, and work in the field of media, marketing, research and universities.
- 1.3. Increase the competitiveness of program's graduates at the regional level through study and training programs.
- 1.4. Participate in community service, developing the environment, and providing a tangible economic return through rationalizing the use of medicines in hospitals.
- 1.5. Commit to achieving quality standards in pharmacy education through interactive education and interest in self-learning.



Attachment # 4

Matrix of Comparison of Clinical Pharmacy-Mansoura University's Program Intended Learning Outcomes (PLOs) with NARS's PLOs

NARS's PLOs	Clinical Pharmacy Program's PLOs
<u>DOMAIN 1- FUNDAMENTAL KNOWLEDGE</u>	
1. <u>COMPETENCY</u>	<u>1-COMPETENCY</u>
1.1. Integrate knowledge from basic and applied pharmaceutical and clinical sciences to standardize materials, formulate and manufacture products, and deliver population and patient-centered care	1.3. Apply core knowledge and skills in relation to the evolving biomedical, pharmaceutical, clinical, social-behavioral and administrative sciences to evaluate, manufacture products, solve therapeutic problems, advance human health and provide patient-centered care.
<u>KEY ELEMENTS</u>	<u>KEY ELEMENTS</u>
1-1-1- Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.	1-1-1- Recognize in-depth and breadth knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.
1-1-2- Utilize the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.	1-1-2- Use appropriate pharmaceutical and medical terminology, abbreviations and symbols in pharmacy practice and recall scientific names of drugs.
1-1-3- Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.	1-1-3- Combine the principles of fundamental sciences 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.	1-1-4- Explain drugs' mode of action, therapeutic effects and evaluate their appropriateness, effectiveness, and safety in individuals and populations, using knowledge from fundamental sciences.
1-1-5- Retrieve information from fundamental sciences to solve therapeutic problems.	1-1-5- Apply the principles and practice and critical understanding of fundamental sciences 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.	1-1-7- Access, retrieve, critically analyze and apply relevant scientific resources to make evidence-informed professional decisions.



1-1-8- Identify and critically analyze newly emerging issues influencing pharmaceutical industry and patient health care.	1-1-7-Gather and critically analyze new information, including evidence-based information, that may be applicable to pharmaceutical industry and patient care.
	1-1-8-Use health informatics to improve the quality of care, manage resources and optimize patient safety.
	1-1-9-Perform pharmaceutical, compounding and patient-specific calculations, including pharmacokinetic and other therapeutic calculations.
	1-1-10- Define the role of various pharmacological agents in management of various disorder affecting gastro-intestinal, cardiovascular, respiratory, dermatological, pediatrics, oncology and critical patients.

DOMAIN 2: PROFESSIONAL AND ETHICAL PRACTICE

2-1- COMPETENCY	2-1- COMPETENCY
2.1. 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.	2.1. Collaborate professionally with patients, intra- and inter-professional teams, to provide safe, effective and efficient health care, thus achieving the needs of the community and society at large
<u>KEY ELEMENTS</u>	<u>KEY ELEMENTS</u>
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.	2-1-1-Apply legal professional requirements to practice, including legislation, policies, by-laws, and standards for individuals and healthcare team
2-1-2 Adopt ethics of health care and pharmacy profession respecting patients' rights and valuing people diversity.	2-1-2- Apply the principles of professional codes of ethics, and protect the privacy and confidentiality of the patient and 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.	2-1-3- Establish and maintain appropriate professional boundaries and accept responsibility and accountability within healthcare team.
	2-1-4- Defend the fact that the practice of pharmacy is ethically consistent with good business, and quality of care precedes generating profit.
	2-1-5-Develop procedures to ensure the return or proper disposal of recalled, expired and unusable products.



	2-1-6-Prepare and compound non-sterile and sterile products and other extemporaneous preparations according to recognized guidelines and standards of practice.
	2.1.7. Formulate Pharmaceutical care plans for management of several disorders with reference to their particulate health problems and special considerations.
2-2- COMPETENCY	2-2- COMPETENCY
Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines.	Standardize pharmaceutical raw materials, formulate, manufacture, and develop pharmaceutical products and contribute to the inventory and stewardship of resources of medicines.
KEY ELEMENTS	KEY ELEMENTS
2-2-1 Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.	2-2-1- Identify, design, prepare, purify, standardize and quantify, of pharmaceutical materials and from different origins.
2-2-2 Apply the basic requirements of quality management system in developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/ products considering various incompatibilities.	2-2-2- Apply GMP guidelines including principles of quality control, inventory, distribution and legal responsibility related to pharmaceutical industry of materials/ products of various origins in addition to possible incompatibilities.
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.	2-2-3-Show the ability to use instruments and different kinds of simulation software with in depth knowledge to design synthetic and analytical processes for 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.	2-2-4-Implement quality control and quality assurance, calculations, biostatistical analysis, bioinformatics and assessment procedures of all the processes of pharmaceutical formulations and their applications for novel drug delivery systems, as per the need of industry and future prospects in pharmacy practice.
2-3- COMPETENCY	2-3- COMPETENCY
Handle and dispose biological and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations.	Apply approved policies, procedures and activities that support safe handling, transfer and disposition of biological and synthetic/natural pharmaceutical materials/products.



KEY ELEMENTS	KEY ELEMENTS
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.	2-3-1- Select, and apply appropriate methods and procedures and resources for handling and disposal of synthetic/natural materials, biological, radio-active. biotechnology-based items used in pharmacy.
2-3-2 Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products	2-3-2- choose best practices and adhere to high ethical, legal and safety standards for management of biological and pharmaceutical materials/products.
2-4- COMPETENCY	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.	Coordinate actively in decision-making within professional health team to assess patients in emergency situations including poisoning with xenobiotics, and cooperate effectively in forensic area.
KEY ELEMENTS	KEY ELEMENTS
2-4-1 Ensure safe handling/use of poisons to avoid their harm to individuals and communities.	2-4-1- Select proper procedures for handling and applications of poisons to discard any harm to public.
2-4-2 Demonstrate understanding of the first aid measures needed to save patient's life	2-4-2-Demonstrate ability to use principles of first aid in the practice of pharmacy
2-4-3 Take actions to solve any identified medicine-related and pharmaceutical care problems.	2-4-3-Contribute to decision making processes for recognized drug-related and pharmaceutical care problems.
2-4-4 Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.	2-4-4-Evaluate toxicity profiles of chemicals and other xenobiotics and investigate poisons in biological samples.
	2-4-5-Recognize and take appropriate action when signs, symptoms and risk factors that relate to medical or health problems that fall into the scope of practice of other health professionals are encountered.
	2-4-6-Define knowledge of and ability to use principles of physical assessment needed to save patient's life.
	2-4-7-Evaluate pharmacological and non-pharmacological systemic approaches designed for management of various disorders affecting on various body organs and patients with special consideration to their particular health issues.



2-5- COMPETENCY	2-5- COMPETENCY
Contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products.	Contribute in the advancement of pharmaceutical research and phases of clinical trials needed for approval of emerging medicinal agents
KEY ELEMENTS	KEY ELEMENTS
2-5-1 Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.	2-5-1 Integrate regulatory strategy for authorization of emerging medicinal products according to national and international specifications.
2-5-2 Retrieve, interpret, and critically evaluate evidence-based information needed in pharmacy profession.	2-5-2 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.	2-5-3 Apply scientific principles of research and scholarly investigation and use systematic approaches in the search for best available evidence.
	2-5-4-Plan and design various types of clinical studies to optimize procedures of experimental drug research in hospitals and various health care setting
2-6- COMPETENCY	2-6- COMPETENCY
Perform pharmaco-economic analysis and develop promotion, sales, marketing, and business administration skills.	Conduct pharmaco-economic studies and innovate promotion, sales, marketing, and business administration skills.
KEY ELEMENTS	KEY ELEMENTS
2-6-1 Apply the principles of business administration and management to ensure rational use of financial and human resources	2-6-1 implement the basic principles involved in managing financial, human resources and business administration in the pharmacy environment.
2-6-2 Utilize the principles of drug promotion, sales, marketing, accounting, and pharmaco-economic analysis.	2-6-2 Practice guidelines of drug promotion, sales, marketing, accounting and outcomes of pharmaco-economic analysis.
	2-6-3 Apply pharmaco-economic principles to optimize drug use and confirm achievement of intended therapeutics outcomes.



DOMAIN 3: PHARMACEUTICAL CARE

3-1- COMPETENCY	3-1- COMPETENCY
Apply the principles of body functions to participate in improving health care services using evidence-based data.	Gather evidence -based information from the patients and population’s health records for advancement of healthcare system.
KEY ELEMENTS	KEY ELEMENTS
3-1-1 Apply the principles of body function and basis of genomics in health and disease states to manage different diseases.	3-1-1 Modify a dosage regimen for a patient based on the physiological, genetic, biochemical and immunological changes brought about by disease or concomitant drug therapy.
3-1-2 Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.	3-1-2 Relate principles of public health and microbiology for monitoring and control of factors contributing in microbial contamination.
3-1-3 Monitor and control microbial growth and carry out laboratory tests for identification of infections/diseases.	3-1-3 Record and regulate microbial growth and conduct laboratory tests for identification of infections/diseases.
3-1-4 Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches.	3-1-4 Outline the characters, epidemiology, pathogenesis, laboratory diagnosis, and clinical features of infections/diseases and their treatment and prevention.
	3-1-5-Point out the characters, epidemiology, pathogenesis, laboratory diagnosis, treatment and prevention of of various disorders affecting various body disorders and various patients.
3-2- COMPETENCY	3-2- COMPETENCY
Provide counseling and education services to patients and communities about safe and rational use of medicines and medical devices.	Provide education and counselling to support patients and community in making informed decisions about their care plan.
KEY ELEMENTS	KEY ELEMENTS
3-2-1 Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions.	3-2-1 Integrate principles of medicinal chemistry and pharmacological aspects of drugs, as mode of action, therapeutic uses, proper dosage, unwanted effects and drug interactions.
3-2-2 Apply the principles of clinical pharmacology and pharmacovigilance for the rational use of medicines and medical devices.	3-2-2 Rationalize the use of medicines and medical devices by relating principles of clinical pharmacology and pharmacovigilance and using the necessary technical skills.



<p>3-2-3 Provide evidence-based information about safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.</p>	<p>3-2-3 Integrate best available evidence for application of non-conventional therapy into pharmacy practice.</p>
<p>3-2-4 Provide information about toxic profiles of drugs and other xenobiotics including sources, identification, symptoms, and management control.</p>	<p>3-2-4 Recommend appropriate information about untoward and toxicity of medicinal agents and other xenobiotics including possible sources, signs, symptoms and treatment options.</p>
<p>3-2-5 Educate and counsel patients, other health care professionals, and communities about safe and proper use of medicines including OTC preparations and medical devices.</p>	<p>3-2-5 Provide education and counseling to support the patients, and community in making informed decisions about their care plan including OTC preparations and medical devices.</p>
<p>3-2-6 Maintain public awareness on social health hazards of drug misuse and abuse.</p>	<p>3-2-6 Establish public awareness on rational use of drugs, vaccination, drug abuse and misuse, and safe handling of hazardous products to minimize personal exposure and reducing environmental contamination.</p>
	<p>3-2-7-consult other healthcare professionals as appropriate and accordingly adjust the proposed patient care plan.</p>
	<p>3-2-8-Perform, order and/or retrieve relevant laboratory tests and other diagnostic assessments.</p>
	<p>3-2-9-Identify the occurrence of a medication incident, adverse drug event and respond effectively to alleviate harm and prevent reoccurrence.</p>
	<p>3-2-10-Advise patients, doctors, nurses, and other prescribers about safe , effective and cheap medication therapy</p>



DOMAIN 4: PERSONAL PRACTICE

4-1- COMPETENCY	4-1- COMPETENCY
Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills.	Demonstrate leadership, time management, self-directed learning, self-reflection, team problem-solving, creativity and entrepreneurial skills, appropriate to their role.
KEY ELEMENTS	KEY ELEMENTS
4-1-1 Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.	4-1-1 Share decision-making activities with other with other pharmacy team members and non-pharmacy 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.	4-1-2 Contribute to the creation of knowledge or practices in the field of pharmacy and participate independently and collaboratively in the delivery of health services.
4-1-3 Demonstrate creativity and apply entrepreneurial skills within a simulated entrepreneurial activity.	4-1-3 Participate in development of entrepreneurial, creativity and marketing skills.
	4-1-4 Plan strategies to fulfil workplace pharmaceutical needs.
4-2- COMPETENCY	4-2- COMPETENCY
Effectively communicate verbally, non-verbally and in writing with individuals and communities.	Demonstrate appropriate verbal and non-verbal communication skills, including listening skills and proficiency in writing with individuals and communities.
KEY ELEMENTS	KEY ELEMENTS
4-2-1 Demonstrate effective communication skills verbally, non-verbally, and in writing with professional health care team, patients, and communities.	4-2-1 Use clear language, pace, tone and non-verbal communication and writing skills when dealing with patients, other health team and communities.
4-2-2 Use contemporary technologies and media to demonstrate effective presentation skills.	4-2-2 Apply artificial technology whenever possible to present relevant information.
4-3- COMPETENCY	4-3- COMPETENCY
Express self-awareness and be a life-long learner for continuous profession improvement	Show self-awareness and commit to life-long learning and continuous professional development.
KEY ELEMENTS	KEY ELEMENTS
4-3-1 Perform self-assessment to enhance professional and personal competencies.	4-3-1 Use effective strategies to manage and improve self-practice of pharmacy.
4-3-2 Practice independent learning needed for continuous professional development.	4-3-2 Apply principles of continuing professional development including assessing own learning needs and developing a plan to meet these needs.



Attachment # 5

Categories Courses Distribution

Attachment # 4

Comparison between NARS curriculum structure and Clinical Pharmacy, Curriculum structure.

NARS		Clinical Pharmacy Program Faculty of Pharmacy		
Sciences	Subjects	Sciences	Subjects	No of credits
Basic 10 – 15 %	Physical, organic and analytical chemistry, biology, biophysics, computer science, mathematics	12.09 %	1. Pharmaceutical analytical -I	3
			2. Pharmaceutical organic -I	3
			3. Medicinal plants	3
			4. Cell biology	2
			5. Pharmaceutical analytical -II	3
			6. Pharmaceutical Organic -II	3
			7. Pharmaceutical Organic -III	3
			8. Information Technology	2
			8 courses	22/182
Pharmaceutical 35 – 40 %	Pharmacy orientation, medical & pharmaceutical terminology, pharmaceuticals, physical pharmacy, industrial pharmacy, pharmaceutical Techenology, Biopharmaceutics, pharmacokinetics, pharmaceutical chemistry,	30.22 %	1. Pharmacognosy -I	3
			2. Physical pharmacy	3
			3. Pharmacy orientation	1
			4. Pharmacognosy -II	3
			5. Phytochemistry -I	3
			6. Instrumental Analysis	3
			7. Pharmaceutical dosage forms-I	3
			8. Pharmaceutical dosage forms-II	3
			9. Pharmaceutical dosage forms-III	3
			10. Phytochemistry -II	3
			11. Pharmaceutical Technology	3
			12. Biopharmaceutics and pharmacokinetics	3



	pharmacognosy, pharmaceutical microbiology, molecular biology, pharmaceutical biotechnology, Quality Assurance and Quality Control, instrumental analysis, biological drug assay		13. Advanced Drug Delivery Systems 14. Biotechnology 15. Pharmaceutical Microbiology & Antimicrobials 16. Medicinal chemistry-I 17. Medicinal chemistry-II 18. Quality Control and pharmaceutical Analysis 19. Phytotherapy 20. Medical Terminology	2 3 3 3 3 3 3 1
			20 course	55/182
Medical 20- 25 %	Anatomy, histology ,physiology, pathology, biochemistry parasitology, pharmacology, therapeutics, medical microbiology, immunology and virology.	<u>26.37</u> %	1. Anatomy & Histology 2. Physiology and pathophysiology 3. Parasitology and Virology 4. General Microbiology and Immunology 5. Pathology 6. Clinical biochemistry 7. Basic Pharmacology 8. Pharmacology-I 9. Pharmacology-II 10. Pharmacology-III 11. Clinical Toxicology 12. Medical Microbiology 13. Biochemistry-I 14. Biochemistry-II 15. Clinical nutrition 16. Clinical Pharmacokinetics 17. Advanced Pharmacotherapy and Therapeutics	2 3 3 3 3 2 3 3 3 3 3 3 3 3 2 3 3
			17 course	48 /182



Pharmacy practice 10-15 %	Pharmaceutical care and professional pharmacy, (clinical, hospital, community ... etc),completer and alternative medicine, drug and poison information , pharmacy laws and regulation.	<u>19.23%</u>	<ol style="list-style-type: none"> 1. Community Pharmacy Practice 2. Clinical Pharmacy Practice 3. Hospital Pharmacy 4. Pharmacotherapy of Oncological Diseases and Radiopharmacy 5. Pharmacotherapy of Dermatological, Reproductive and Musculoskeletal Diseases 6. Pharmacotherapy of Cardiovascular Diseases 7. Pharmacotherapy of Pediatric Diseases 8. Pharmacotherapy of Gastrointestinal Diseases 9. Pharmacotherapy of Respiratory Diseases 10. Pharmacotherapy of Critical Care Patients 11. Pharmacotherapy of Endocrine and Renal Disorders 12. Pharmacotherapy of Neuropsychiatric Diseases 13. Clinical Research and Pharmacovigilance 	<p>3 3 3 3 2 3 3 3 2 2 3 3 2</p>
			13 course	35/182
Health and Environmental 5-10%	Puplic health, Egyptian health system and its policies, biostatics, healthy life style, toxicology, forensic medicine, first aid and emergency medicine.	<u>2.19%</u>	<ol style="list-style-type: none"> 1. First Aid and Basic life Support 2. Public health and preventive medicine 	<p>2 2</p>
			2 courses	4/182



Behavioral and social 2-4 %	Psychology, communications, social and administrative pharmacy pharmacy ethics.	<u>2.75%</u>	<ol style="list-style-type: none"> 1. Human Rights and Corruption Fighting 2. Psychology 3. Communication and Presentation Skills 4. Mathematics & Biostatistics 5. Pharmaceutical Legislations and Practice Ethics 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
			5 courses	5/182
Pharmacy management 2-4%	Sales, marketing and drug promotion, pharmaceutical business administration, pharmacoeconomics.	<u>2.75%</u>	<ol style="list-style-type: none"> 1. Drug Marketing & Pharmacoeconomics 2. Entrepreneurship 3. Drug information 	<p>2</p> <p>1</p> <p>2</p>
			3courses	5/182
Discretionary Up to 8%	Professional and Non professional sciences	<u>4.39%</u>	<ol style="list-style-type: none"> 1. Elective Course 2. Elective Course 3. Elective Course 4. Elective Course 	<p>2</p> <p>2</p> <p>2</p> <p>2</p>
			4 courses	8/182
Training	Not less than 300 hr in a pharmaceutical location		<ul style="list-style-type: none"> • 100 Hours training in a pharmaceutical setting (Primary field training) • One academic year of training internship (Advanced field training) 	
				182 hours



Attachment # 6

Courses Distribution over the 5 Academic Years and 10 Semesters

Table (1) / Semester (1)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam. Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Pharmaceutical Analytical Chemistry I	PC 101	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Organic Chemistry I	PC 102	2	1	3	Registration	15	25	50	10	100	2
Pharmacy Orientation	PT 101	1	--	1	Registration	25	--	75	--	100	1
Medicinal Plants	PG 101	2	1	3	Registration	15	25	50	10	100	2
Medical Terminology	MD 101	1	--	1	Registration	25	--	75	--	100	1
Mathematics and Biostatistics	MS 101	1	---	1	Registration	25	--	75	--	100	1
University Requirements:											
Information Technology	<u>UR1</u>	1	1	2	Registration	15	25	60	---	100	1
Human Rights and Fighting Corruption	<u>UR2</u>	1	--	1	Registration	25	--	75	--	100	1
Total		11	4	15						600	

○ Lect. = Lecture

○ Pract./Tut. = Practical / Tutorial

○ Period. = Periodical

○ Wr. = Written

○ C.W. = Course Work

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



Table (2) / Semester (2)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Pharmaceutical Analytical Chemistry II	PC 203	2	1	3	Pharmaceutical Analytical Chemistry I	15	25	50	10	100	2
Pharmaceutical Organic Chemistry II	PC 204	2	1	3	Pharmaceutical Organic Chemistry-I	15	25	50	10	100	2
Cell Biology	PB 201	1	1	2	Registration	15	25	50	10	100	1
Anatomy & Histology	MD 202	2	0	2	Registration	25	-	75	-	100	2
Physical Pharmacy	PT 202	2	1	3	Registration	15	25	50	10	100	2
Pharmacognosy I	PG 202	2	1	3	Medicinal Plants	15	25	50	10	100	2
University Requirements:											
Psychology	UR3	1	-	1	Registration	25	--	75	--	100	1
Total		12	5	17						600	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./ Tut. = Practical / Tutorial

○ Wr. = Written

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



Table (3) / Semester (3)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Pharmaceutical Organic Chemistry-III	PC 305	2	1	3	Pharmaceutical Organic Chemistry-II	15	25	50	10	100	2
Biochemistry I	PB302	2	1	3	Registration	15	25	50	10	100	2
Pharmacognosy II	PG 303	2	1	3	Pharmacognosy-I	15	25	50	10	100	2
Pharmacy Legislation and practice ethics	PT 303	1	0	1	Registration	25	--	75	--	100	1
Physiology and pathophysiology	MD 303	2	1	3	Registration	15	25	60	--	100	2
Pharmaceutical dosage forms I	PT 304	2	1	3	Physical pharmacy	15	25	50	10	100	2
University Requirements:											
Communication and presentation Skills	UR4	1	0	1	Registration	25	--	75	---	100	1
Total		12	5	17						600	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./ Tut. = Practical / Tutorial

○ Wr. = Written

يمكن إضافة مقرر أو أكثر من متطلبات الجامعة للتخرج.



Table (4) / Semester (4)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Basic Pharmacology	PO 301	2	1	3	Registration	15	25	50	10	100	2
General Microbiology and Immunology	PM 401	2	1	3	Registration	15	25	50	10	100	2
Instrumental Analysis	PC406	2	1	3	Pharmaceutical Analytical Chemistry II	15	25	50	10	100	2
Pathology	MD 404	2	--	2	Registration	25	---	75	---	100	2
Pharmaceutical Dosage Forms-II	PT 405	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Biochemistry II	PB 403	2	1	3	Biochemistry I	15	25	50	10	100	2
Total		12	5	17						600	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./Tut. = Practical / Tutorial

○ Wr. = Written



Table (5) / Semester (5)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./ Tut	Total		Period.. Activity/C .W.	Pract./ Tut.	Wr .	Oral		
Pharmacology –I	PO 502	2	1	3	Basic Pharmacology	15	25	50	10	100	2
Pharmaceutical Microbiology and Antimicrobials	PM 502	2	1	3	General Microbiology & Immunology	15	25	50	10	100	2
Parasitology & Virology	PM 503	2	1	3	Registration	15	25	50	10	100	2
Pharmaceutical Dosage Forms-III	PT 506	2	1	3	Physical Pharmacy	15	25	50	10	100	2
Phytochemistry-I	PG 504	2	1	3	Registration	15	25	50	10	100	2
Community Pharmacy Practice	PP 501	2	1	3	Pharmacology -I	15	25	50	10	100	2
Total		12	6	18						600	

○ *Lect.* = Lecture

○ *Period.* = Periodical

○ *C.W.* = Course Work

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

○ *Wr.* = Written



Table (6) / Semester (6)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Pharmacology-II	PO 603	2	1	3	Pharmacology I	15	25	50	10	100	2
Phytochemistry-II	PG 605	2	1	3	Phytochemistry-I	15	25	50	10	100	2
Pharmaceutical Technology	PT 607	2	1	3	Registration	15	25	50	10	100	2
Hospital Pharmacy	PP 602	2	1	3	Registration	15	25	50	10	100	2
Biopharmaceutics and Pharmacokinetics	PT 608	2	1	3	Pharmaceutical dosage forms III	15	25	50	10	100	2
First Aid and Basic Life Support	MD 605	2	0	2	Registration	15	--	75	10	100	2
Total		12	5	17						600	

○ *Lect.* = Lecture

○ *Period.* = Periodical

○ *C.W.* = Course Work

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

○ *Wr.* = Written



Table (7) / Semester (7)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C. W.	Pract./Tut.	Wr.	Oral		
Pharmacology-III	PO 704	2	1	3	Pharmacology-II	15	25	50	10	100	2
Medicinal Chemistry-I	PC 707	2	1	3	Pharmaceutical Organic Chemistry-II	15	25	50	10	100	2
Advanced Drug Delivery Systems	PT 709	2	-	2	Registration	25	---	75	---	100	2
Clinical Pharmacy Practice	PP 703	2	1	3	Registration	15	25	50	10	100	2
Medical Microbiology	PM 704	2	1	3	General Microbiology and Immunology	15	25	50	10	100	2
Phytotherapy	PG 706	2	1	3	Phytochemistry-II	15	25	50	10	100	2
Elective course	PE --	1	1	2	Registration	15	25	50	10	100	1
Total		13	6	19						700	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./ Tut. = Practical / Tutorial

○ Wr. = Written



Table (8) / Semester (8)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect .	Pract./ Tut	Total		Period.. Activity/ C.W.	Pract ./Tut .	Wr.	Oral		
Medicinal Chemistry-II	PC 808	2	1	3	Medicinal Chemistry I	15	25	50	10	100	2
Advanced Pharmacotherapy and Therapeutics	PO 805	2	1	3	Pharmacology III	15	25	50	10	100	2
Clinical Pharmacokinetics	PP 804	2	1	3	Biopharmaceutics and Pharmacokinetics	15	25	50	10	100	2
Pharmacotherapy of Critical Care Patients	PP 805	1	1	2	Pharmacology-III	15	25	50	10	100	1
Clinical Biochemistry	PB 804	2	1	3	Biochemistry-II	15	25	50	10	100	2
Public Health and Preventive Medicine	PM 805	2	--	2	Medical Microbiology	25	---	75	---	100	2
Quality Control and pharmaceutical analysis	PC 809	2	1	3	Pharmaceutical Analytical Chemistry-II	15	25	50	10	100	2
Elective Course	PE ---	1	1	2	Registration	15	25	50	10	100	1
Total		14	7	21						800	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./ Tut. = Practical / Tutorial

○ Wr. = Written



Table (9) / Semester (9)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Pharmacotherapy of Endocrine and Renal Disorders	PP 906	2	1	3	Pharmacology-I	15	25	50	10	100	2
Pharmacotherapy of Cardiovascular Diseases	PP 907	2	1	3	Pharmacology-II	15	25	50	10	100	2
Biotechnology	PM 906	2	1	3	Pharmaceutical Microbiology	15	25	50	10	100	2
Pharmacotherapy of Neuropsychiatric Diseases	PP 908	2	1	3	Pharmacology III	15	25	50	10	100	2
Clinical Nutrition	PB 905	1	1	2	Biochemistry-II	15	25	50	10	100	1
Drug Information	PO 905	1	1	2	Pharmacology-III	15	25	60	---	100	1
Drug Marketing & Pharmacoeconomics	NP 901	2	--	2	Registration	25	---	75	---	100	2
Elective Course	PE --	1	1	2	Registration	15	25	50	10	100	1
University Requirement											
Entrepreneurship	UR5	1	0	1	Registration	25	--	75	---	100	1
Total		14	7	21						800	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./ Tut. = Practical / Tutorial

○ Wr. = Written



Table (10) / Semester (10)

Course Title	Course Code	Credit Hours			Prerequisite	Examination Marks				Total Marks	Final Exam Hours
		Lect.	Pract./Tut	Total		Period.. Activity/C.W.	Pract./Tut.	Wr.	Oral		
Clinical Toxicology	PO 006	2	1	3	Pharmacology-III	15	25	50	10	100	2
Pharmacotherapy of Dermatological, Reproductive and Musculoskeletal Diseases	PP 009	1	1	2	Pharmacology II	15	25	50	10	100	1
Pharmacotherapy of Pediatric Diseases	PP 010	2	1	3	Pharmacology-III	15	25	50	10	100	2
Pharmacotherapy of Oncological Diseases and Radiopharmacy	PP 011	2	1	3	Pharmacology III	15	25	50	10	100	2
Pharmacotherapy of Gastrointestinal Diseases	PP 012	2	1	3	Pharmacology-II	15	25	50	10	100	2
Pharmacotherapy of Respiratory Diseases	PP 013	1	1	2	Pharmacology-II	15	25	50	10	100	1
Clinical Research and Pharmacovigilance	PP 014	1	1	2	Drug information	25	25	50	10	100	1
Elective Course	PE --	1	1	2	Registration	15	25	50	10	100	1
Total		12	8	20						800	

○ Lect. = Lecture

○ Period. = Periodical

○ C.W. = Course Work

○ Pract./Tut. = Practical / Tutorial

○ Wr. = Written



Attachment # 7

Matrix of comparison between PLOS and courses



Attachment #8

Course's Contents

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 cycloalkanes. Stereochemistry (Optical isomers, racemic modification, nomenclature of configurations). Alkenes, alkadienes and alkynes. Alkyl halides (nomenclature, preparation and chemical reactions (SN1, SN2, E1, E2). Arenes and aromatic compounds (Kekule structure, Huckel rule, Electrophilic aromatic substitution and orientation).

PC 204 Pharmaceutical Organic Chemistry II (2+1)

This course involves different classes of aliphatic and aromatic organic compounds: aryl halides, Alcohols, Phenols, ethers & epoxides, aldehydes, ketones, carboxylic acid & acid derivatives, sulphonic acids, and nitrogenous compounds.

PC 305 Pharmaceutical Organic Chemistry III (2+1)

This course involves: carbohydrates, amino acid & peptides, polynuclear and heterocyclic chemistry. In addition, it provides an introduction about the use of different spectroscopic tools, including UV, infrared (IR), nuclear magnetic resonance (NMR) and mass spectrometry (MS) for the structural elucidation of organic compounds.

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, Theories of reaction rate, activation energy and catalysis, Photochemistry, absorbed energy and quantum yield. Introduction to qualitative and quantitative inorganic chemistry, acid-base theory, titration curve and buffer solutions. Precipitometry factors affecting precipitate formation and pharmaceutical application.

PC 203 Pharmaceutical Analytical Chemistry II (2+1)

Complexometric titrations and oxidation-reduction titrations (electrical properties of redox systems, Nernst equation factors affecting oxidation potential, redox titration curves, pharmaceutical application on redox reaction), Electrochemistry (potentiometry, conductometry; and polarography).



PC406 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 809 Quality Control and pharmaceutical analysis (2+1)

Good Analytical Practice and Sampling: Introduction, Sampling of pharmaceuticals and related materials, type of sampling tools, sampling plans, documentation, validation of analytical methods according to ICH guidelines Q2 R1, compendial testing, validation of analytical methods, data elements required for assay validation, 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-exipient interactions and adduct formation; analytical techniques used to detect drug-exipient compatibility, mechanism of drug-exipient interactions, examples. Official methods of analysis applied to raw materials and end products

PC 707 Medicinal Chemistry I (2+1)

This course is tailored to assist the students to gain the drugs affecting the autonomic nervous system (ANS), drugs acting on the cardiovascular system (CVS). The course handles different classes of antibiotics and antimicrobials (natural and synthetic), beside other synthetic chemotherapeutic agents (including antivirals, antifungals and antiparasitics). Additionally, various anticancer therapies and related drugs are also covered.

PC 808 Medicinal Chemistry II (2+ 1)

The course is tailored to assist the students to gain the drugs affecting central nervous system and neurodegenerative disorders. Moreover, endocrine-related drugs (Diabetes, thyroid and calcium-regulating agents), steroidal hormones, antihistamines (H1, H2 blockers and anti-ulcer PPIs), drugs controlling pain and inflammation (NSAIDs, local anesthetics and rheumatoid drugs) are also handled.



PB 201 Cell Biology (1+1)

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

PB 302 Biochemistry I (2+1)

Structure of proteins – Biologically active peptides – Protein turnover – Amino acids as precursors for biosynthesis of biomolecules (e.g. neurotransmitters –nucleotides,)- Structurally and physiologically important lipids – Lipoprotein metabolism – Carbohydrates and connective tissue – Enzymes (theories of enzyme action – enzyme kinetics – inhibition and regulation of enzyme activity – clinical correlations), oxidative stress and body defense mechanisms.

PB 403 Biochemistry II (2+1)

Mobilization of body stores of glycogen and fats -Metabolism and tissue utilization of glucose, amino acids, and fatty acids – Regulation of blood glucose level and clinical correlations – Feed/fast cycle – Nitrogen metabolism and nitrogen balance – Inborn errors of metabolism – Second messengers and signal transduction – Biochemistry of cancer - Biochemistry of aging – Food biochemistry (milk – probiotics) – ATP synthesis from reduced metabolites (electron transport chain – inhibitors – uncouplers) – Hemoglobin and myoglobin (structure – synthesis and metabolism).

PB 804 Clinical Biochemistry (2+1)

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

PB 905 Clinical Nutrition (1+1)

Measures of healthy life-style – Macronutrients and calculation of calories – Basal metabolic rate (BMR) - Recommended daily allowance (RDA) – Nutritional requirement for pediatrics and geriatrics - Vitamins and minerals (role in metabolism – clinical significance) – Gut microbiota and human health – Enteral and parenteral nutrition -



Dietary care for patients with obesity, diabetes mellitus, cardiovascular, renal and hepatic disorders – Dietary care for cancer patients - Dietary care for sports` men - Dietary care for pregnant and lactating women – Nutrigenomics.

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

PT303 Pharmaceutical Legislations and Practice 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.

PT304 Pharmaceutical Dosage Forms I (2+1)

This course is a study of the system of weights, measures, mathematical expertise and pharmaceutical calculations requisite to the compounding, dispensing, and utilization of drugs in pharmacy practice. It is also concerned with all 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 405 Pharmaceutical Dosage Forms II (2+1)

This course covers the structure and function of the skin, target area of treatment after topical application to skin, basic principles of diffusion through membranes and factors affecting percutaneous absorption, enhancement of skin penetration, 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 506 Pharmaceutical Dosage Forms III (2+1)

The course introduces the students to the kinetics of drug decomposition including rate and order of the reaction, determination of the half-life, expiry date and shelf-life by different methods, 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 607 Pharmaceutical Technology (2+1)

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

PT 608 Biopharmaceutics and Pharmacokinetics (2+1)

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



PT 709 Advanced Drug Delivery Systems (2+0)

A continued study of pharmaceutical dosage forms with emphasis on novel and targeted drug delivery systems. Discussions focusing on transforming proteins, genes, and other biotechnology driven compounds into therapeutic products including the role of molecular modeling and new drug therapies in fabricating rational drug delivery systems are included. The course covers targeted nanocarrier-based delivery Systems and other advanced therapy medicinal products such as gene therapy medicinal products (GTMPs), somatic cell therapy medicinal products (sCTMPs), and tissue-engineered products (TEPs). 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.

PG 101 Medicinal Plants (2+1)

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

PG 202 Pharmacognosy I (2+1)

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

PG 303 Pharmacognosy II (2+1)

Based on the Egyptian flora and other floras of wild and cultivated medicinal plants that are used in the pharmaceutical, cosmetic and food industries in the global & Egyptian market. The course introduces students to some botanical drugs of, fruits, subterreans, herbs, unorganized drugs of marine and animal origin. During the lectures and practical sessions, students learn to identify examples of these drugs in their entire and powdered



forms. Student will learn about the major constituents, folk uses, clinically proven uses, benefits, precautions of those medicinal plants. possible herbal-drug interactions of selected examples of these drugs.

PG 504 Phytochemistry I (2+1)

Based on complementary medicine and Egyptian medicinal plants that can be used as natural extracts, bioactive raw materials and phytochemical standards to serve the pharmaceuticals, cosmetics and food industries in Egypt. The course aims to gain the students the knowledge and experience those enable them to understand, describe and deal with the chemistry and Pharmaceutical uses of volatile oils, resins and resin combinations, carbohydrates, glycosides, and bitters of plant or animals as well as techniques for their, isolation, identification and determination from their respective sources. Clinical applications will be correlated with various clinical analyses.

PG 605 Phytochemistry II (2+1)

The course aims to enable students to demonstrate knowledge of basic concepts of chemistry and bioactivities of alkaloids, tannins and antioxidants as well as chromatographic techniques for their isolation and identification. The course emphasizes on drugs with valuable use in the Egyptian and worldwide markets, such as anti-cancer agents, drugs affecting CNS, drugs ameliorating liver diseases and anti-inflammatory agents. Finally, the course focuses on the structure activity relationships (SAR) of these natural products derived compounds and their pharmacophoric features. Clinical applications will be correlated with various clinical analyses.

PG 706 Phytotherapy (2+1)

The course aims to enable students to attain the systematic approach for herbal prescribing through a comparative study of both traditional and scientifically based uses of herbal drugs in the treatment of various clinical disorders. The course provides clinical pharmacy students with review of the available information on how botanicals may normalize an altered function. Approval by World Health Organization (WHO), German Federal Institute for Drugs and Medical Devices (Commission E) is the base for selection of the studied herbs. The herbal drugs treated in combined way relative to pharmacognosy, pharmacology and toxicology. Special concern is given to the possible mode of action of the herbal drugs based on experimental and clinical pharmacological studies. Also the student should understand the basis of complementary and alternative medicine with emphasis on herbal remedies, nutritional supplements, homeopathies, aromatherapy & their effect on maintaining optimum health and prevention of chronic diseases.



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

PM 502 Pharmaceutical Microbiology and Antimicrobials (2+1)

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

PM 503 Parasitology & Virology (2+1)

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



PM 704 Medical Microbiology (2+1)

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

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

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

PM 906 Biotechnology (2+1)

Introduction to biotechnology, fermentation technology, fermentation process and fermenters, Fermented products (Antibiotics, vitamins, amino acids, interferons, interleukins, monoclonal antibodies, vaccines and etc... Bioremediation, N₂ fixation, detection and monitoring of genetically engineered microorganisms. Genetic Engineering, PCR, Recombinant DNA Technology and Applications of recombinant DNA in the pharmaceutical and medical fields. Basics of Gene therapy and its applications in monogenic and polygenic disorders. Other modern techniques of environmental microbiology.

MD 101 Medical Terminology (1+0)

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



MD 202 Anatomy and Histology (2+0)

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

MD 303 Physiology and Pathophysiology (2+1)

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

MD 404 Pathology (2+0)

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

MD 605 First Aid and Basic Life Support (2+0)

After completing the course, the student should be able to know how to deal with medical emergency based on the different courses. It includes: introduction & accidents, first aid ABCs, medical emergencies, effect of temperature, transportation of an injured casualty & first aid kit, respiratory emergencies, fractures and dislocations, bleeding and surgical emergencies, burns and scalds, animal bites or stings and poisoning.



PO 301 Basic Pharmacology (2+1)

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

PO 502 Pharmacology I (2+1)

This course integrates principles of pharmacology with conceptual knowledge of physiology and pathophysiology to disease processes regarding the autonomic, neuromuscular, autacoids and cardiovascular systems.

PO 603 Pharmacology II (2+1)

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

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.

PO 805 Advanced Pharmacotherapy and Therapeutics (2+1)

The student should on completion of the course should be able to: identify selected diseases based on knowledge of given symptoms and laboratory values, state investigations that are of value for the diagnosis and monitoring of drug therapy in selected disease areas, choose and justify appropriate drug and treatment duration to a given patient with regard to current recommendations and patient-related factors, choose and justify appropriate dose, dosing interval and pharmaceutical form for a given patient with regard to age, organ functions and drug pharmacokinetics, pharmacodynamics and toxicity, evaluate abnormalities in common laboratory values and explain related to physiology, drug treatment and / or disease, extract information from medical records, identify, evaluate and respond to basic drug-related problems from



patient records and to motivate action, choose appropriate non-pharmacological treatment with regard to the given patient and current recommendations

PO 905 Drug information (1+1)

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

PO 006 Clinical Toxicology (2+1)

To ensure that the students have the necessary knowledge & skills, as well as comprehensive understanding of the basics of toxicology enabling them to have detailed knowledge and to develop professional competence in the recognition, solving, and discussion of different toxicological cases. It includes: basics and concepts of toxicology including the mechanism of toxicity, target organ and treatment of toxicity. Toxic groups including heavy metals, toxic gases, animal, plant and marine poisons, pesticides and radiation hazards are covered. Environmental, occupational, reproductive and genetic toxicology as well as drug abuse are included. Postmortem sampling for detection of poisons, methods of detection, interpretation of results and writing of a report are also covered.

PP 501 Community Pharmacy Practice (2+1)

This course includes the study of the clinical situations that can be handled by the pharmacist in the community pharmacy (referral or using OTC medications) including upper respiratory tract, gastrointestinal, and musculoskeletal symptoms, skin, eyes, and ears, and childhood symptoms.

PP 602 Hospital Pharmacy (2+1)

Organization and structure of a hospital pharmacy, hospital pharmacy facilities and services (inpatient and outpatient services), transfer of care, patient's medication record, and rational medication use, hospital formulary, pharmacy and therapeutic committee, I.V. admixtures and incompatibilities, parenteral nutrition, handling of cytotoxic drugs, therapeutic drug monitoring, patient counseling and safety, and risk management.



PP 703 Clinical Pharmacy Practice (2+1)

This course includes the definition and concepts of clinical pharmacy and pharmaceutical care, case history and case presentation, medication history taking, clinical problem solving, and therapeutic planning, clinical rounding and assessment of patient compliance. Principles of special care populations (geriatric, pediatric, pregnancy, and lactation). Drug-related problems and drug interactions. Interpretation of clinical laboratory data and physical examination.

PP 804 Clinical Pharmacokinetics (2+1)

Introduction to clinical pharmacokinetics and its applications, pharmacokinetics, non-compartmental pharmacokinetics and moment analysis. Drug distribution and drug clearance mechanisms, IV infusion kinetics and kinetics following extra-vascular dosing, metabolite kinetics, multiple dose kinetics, non-linear pharmacokinetics, dosage regimen design, dosage individualization of drugs of narrow therapeutic index especially in patients with compromised renal and hepatic function.

PP 805 Pharmacotherapy of critical care patients (1+1)

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

PP 906 Pharmacotherapy of endocrine & renal disorders (2+1)

This course includes the Pathophysiology, causes, clinical presentation, diagnosis and application of pharmaceutical care plans in different endocrinologic disorders (Diabetes, thyroid disorder, Cushing's syndrome,...) and different renal disorders and related fluid and electrolyte disturbances (acute and chronic renal failure, uremic syndrome, kidney stones, ..). The course develops the students' ability to design, monitor, refine safe and cost-effective treatment plans and provide appropriate information to patient, caregivers, and health professionals.

PP 907 Pharmacotherapy of Cardiovascular diseases (2+1)

Main diseases affecting the cardiovascular system, symptoms, prognosis, pharmacological and non-pharmacological management, patient counseling and monitoring of dyslipidaemias, hypertension, coronary artery disease, acute coronary syndromes, heart failure, dysrhythmias, thromboembolic disorders, and stroke.



PP 908 Pharmacotherapy of neuropsychiatry diseases (2+1)

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

PP 009 Pharmacotherapy of dermatological, reproductive and musculoskeletal diseases (1+1)

Skin structure and function, primary and secondary lesions. Most popular skin diseases: infective and non-infective types and their differentiation. Sexually transmitted diseases, male infertility, and women health. Musculoskeletal disorders are also included.

PP 010 Pharmacotherapy of Pediatric diseases (2+1)

Nutritional requirements in neonates and infants, nutritional disorders, neonatology, infectious diseases in pediatrics, congenital heart diseases, endocrine, neurological, hematologic, renal, and respiratory disorders, pediatric emergencies.

PP 011 Pharmacotherapy of oncological diseases and radio pharmacy (2+1)

Cancer etiology, risk factors, cancer staging and grading, diagnosis, prognosis, optimizing chemotherapeutic regimens, different types of tumors (solid and hematologic) and their management, toxicities of chemotherapy, supportive treatment, pharmaceutical care and patient's support measures. This course also includes studying radioactive isotopes which process medical applications and precautions of their usage.

PP 012 Pharmacotherapy of Gastrointestinal diseases (2+1)

Hepatic disorders including viral hepatitis, pancreatitis, gastrointestinal bleeding, peptic ulcer, gastro-esophageal reflux disease, inflammatory bowel diseases and irritable bowel syndrome as well as gastrointestinal symptoms including nausea, vomiting, constipation, and diarrhea.

PP 013 Pharmacotherapy of Respiratory diseases (1+1)

Epidemiology, aetiology, pathophysiology, clinical manifestation, investigations, treatment, monitoring, and patient counseling of bronchial asthma, chronic obstructive pulmonary disease, pulmonary hypertension, cystic fibrosis, upper and lower respiratory tract infections, and drug-induced respiratory **problems**.



PP 014 Clinical Research 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 also provides the student's with understanding of pharmacovigilance importance, concept, processes, systems, global safety standards and regulations and reporting systems.

MS 101 Mathematics and biostatistics (1+0)

This course provides an essential guide to the mathematical, biostatistics and data analysis concepts, techniques, and calculations. 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, random variables and hypothesis testing, , estimation and confidence intervals, t-test and chi-square test, linear regression theory and the analysis of variance.

UR1 Information Technology (1+1)

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

UR2 Human Rights and Fighting Corruption (1+0)

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

UR3 Psychology (1+0)

This course provides an overview of the basic concepts in psychology. Topics may include human information processing, learning and memory, motivation, development, language acquisition, social psychology, and personality.



UR4 Communication and presentation skills (1+ 0)

This course will help the students to develop necessary written and oral communication and presentation skills to improve inter- and intra-professional collaboration and communication with patients and other health care providers. The course will also deal with the underlying attitudes, which form an interpersonal skill. It focuses on concept and meaning of communication; verbal and non verbal communication (body and vocal language); active listening skills; communication styles and presentation skills. Communication skills in diverse pharmacy practice setting will be discussed. The course describes elements of successful presentations, types and methods of presentations, how to prepare a presentation, selection and use of the media, how to develop a personal style of presentation, how to deal with speaking anxiety and how to capture an audience's attention .

UR5 Entrepreneurship (1+0)

This course outlines the process of designing, launching and running a new business, which is often initially a small business. The people who create these businesses are called entrepreneurs. Entrepreneurship has been described as the "capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit. While definitions of entrepreneurship typically focus on the launching and running of businesses, due to the high risks involved in launching a start-up, a significant proportion of start-up businesses have to close due to "lack of funding, bad business decisions, an economic crisis, lack of market demand, or a combination of all of these

NP901 Drug marketing & pharmacoeconomics (2+0)

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

PC E01 Drug Design (1+1)

Structure activity relationships, quantum mechanical approaches, molecular connectivity, pharmacophore generation, and molecular modification by isosteric replacement. Natural products leading to new pharmaceuticals, mathematical treatment serving prediction, defining sites and targets, molecular modeling, prodrugs and drug latention.

PC E02 Advanced Pharmaceutical Analysis - Spectroscopy (1+1)

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

PC E03 Therapeutic Drug Monitoring (1+1)

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

PC E04 Complementary therapies (1+1)

The course covers Complementary medicine with an overview of different domains of mind- body interventions, alternative medical systems. This course will also encompass the studying of the nutraceuticals as types of biologically based therapies. Including dietary supplements, vitamins and minerals, functional foods and medical foods. The course will also include aromatherapy: definition, effective application and safety guidelines.

PC E05 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 manifestaions and applications. High pressure liquid chromatography, gas liquid chromatography and their appllication.

PG E06 Biotechnology of medicinal plants (1+1)

The objective of the course is to give students new knowledge and widening of the knowledge acquired in other course by handling of classical and modern plant biotechnology processes, including breeding of healthy plants, plants with improved characteristics and plants for biomolecule production. Understanding of biotechnological processes has also applicative value in pharmaceutical and food industry, in agriculture and in ecology.



PT E07 Applied industrial pharmacy (1+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 E08 Good manufacturing practices (1+1)

Concepts, objectives and applicability, general provisions, organization, building and facilities, materials, equipment's, production and process controls, packing and labeling, control, distribution, laboratory controls, records and reports, returned and salvaged drug products, repacking and inspections.

PT E09 Cosmetic Preparations (1+1)

Definition, classification, anti-dandruff preparations, fragrance preparations, nail lacquers, skin care products (emollients and tanning), antiperspirants and deodorants preparations, shampoo, dentifrices preparations, eye, make-up preparations, acne preparations, hair dyes preparations, rouge preparations, lipstick preparations and quality control tests and evaluation of cosmetic preparations.

PT E10 Advanced pharmaceutical technology (1+1)

This course is designed to provide students with various important aspects of quality assurance, cGMP, quality audit, and process validation; including regulatory and quality compliance as applied to pharmaceutical industries. The students will also be provided with in-depth knowledge in the organization and operation of the major departments of pharmaceutical companies, as well as ways of dealing with regulatory and compliance issues. The course will provide advanced information on drug discovery & development process, including INDA, NDA & ANDA, drug master file & therapeutic equivalent codes. Other essential topics such as production & operational management, production planning & control shall be covered. In addition, various in-process quality control tests needed to assess some sterile and non-sterile products shall also be discussed. The course will also include pilot plant and scale up techniques, design, construction and operation of clean rooms as well as recent advances in packaging techniques for various pharmaceutical dosage forms, including stability & regulatory aspects of packaging.



PT E11 Medical devices (1+1)

The course presents the foundation to the students to understand the development and commercialization of safe and effective medical devices and in vitro diagnostic devices (IVDs). Students learn to research, design, develop, regulate, test, and market new devices and biologics. Experienced and aspiring medical device professionals will gain insight into the technological, ethical, regulatory, and business aspects of the highly regulated medical device industry.

PM E12 Infection control and antimicrobial stewardship (1+1)

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

PM E13 Bioinformatics (1+1)

The course introduces bioinformatics concepts and practice. Topics include: biological databases, sequence alignment, gene and protein structure prediction, molecular phylogenetics, genomics and proteomics. Students will gain practical experience with bioinformatics tools and develop basic skills in the collection and presentation of bioinformatics data, as well as the rudiments of programming in a scripting language.

PO E14 Biological Standardization (1+1)

Introduction to concepts of screening and bioassay in the course of drug discovery. Testing drug activities belonging to various drug classes of which: central and autonomic nervous systems, cardiovascular system, hormones, analgesics, anti-inflammatory, anticancer drugs, etc..

PO E15 Geriatric pharmacotherapy (1+1)

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



PO E16 Pharmacogenetics of drug metabolism and transport (1+1)

This course will introduce the student to the study of how an individual's genetic inheritance affects the body's response to drugs. This course will examine factors that affect drug response including genetics, as well as, additional factors such as environment, diet, age, and concurrent drug therapy and health status. Methods important to pharmacogenomics research will be presented. The student will be able to discuss basic principles of genetic medicine and personalized medicine, describe the mechanisms by which genetic variation impacts drug metabolism and transport, describe how this may impact clinical response and outcomes and describe the methodology used for standard genotyping assays and the evolving role of pharmacogenomics in drug discovery and development.

PP E17 Interprofessional skills (1+1)

The students are introduced to interprofessional practice and the roles of the different healthcare professionals that make up an interprofessional team. Understand and respect the roles, responsibilities and scope of practice of one's own profession and of other healthcare professions through a role play experience and open dialogue. Communicate role expectations of each healthcare profession within the context of interprofessional team functioning. Recognize the impact of teamwork on patient-centred practice. Appraise the attributes of effective interprofessional team functioning and their impact on effective healthcare delivery using a case-based approach.

PP E18 Advanced Pharmacoeconomics (1+1)

The Advanced course provides a more in-depth review of the principles for those who aspire to a greater knowledge in how pharmacoeconomic studies are conducted, interpreted and used to make policy and clinical decisions. The student will be able to discuss advanced concepts in cost-effectiveness and cost-utility analyses, draw decision trees and perform the calculations involved in decision analysis, discuss Markov Modeling, probabilistic modeling, multiple criteria decision analysis, creating and interpreting cost-effectiveness graphs, meta-analysis in pharmacoeconomic modeling, mixed treatment comparisons and to describe how to create, read and assess pharmacoeconomic studies.



Attachment #9

Bachelor of Pharmacy (PharmD-Clinical Pharmacy) Bylaw

