Mansoura University

Faculty of Pharmacy

Clinical Pharmacy Program Specification

Clinical Pharmacy Program

Ministry Approval Date: 3008

6/11/2007

Program Administration Committee's Approval date: 9/6/2018

Faculty Council Approval Date: 20/6/2018

Program Specification
Bachelor of Pharmacy

Faculty:Pharmacy

A-Basic Information:

1	**Program Title:**	Bachelor of Pharmacy(Clinical Pharmacy)
2	**Program Type:**	Single
3	**Department(s):**	1. Pharmaceutics (PT) 2. Pharmacognosy (PG) 3. Pharmacy Practice(PP) 4. Pharmacology and Toxicology (PO) 5. Microbiology and Immunology (PM) 6. Pharmaceutical Analytical Chemistry (PC) 7. Pharmaceutical Organic Chemistry (PC) 8. Medicinal Chemistry (PC) 9. Biochemistry (PB)
4	**Coordinator:**	Clinical Pharmacy Program Co-ordinator
5	**External Evaluator(s):**	
6	**Approval Date**	

A-Professional Information:

1. **Program Aims:**

Mansoura University awards Bachelor of Pharmacy (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, behavioral, 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 centers.Graduates are talented to:

1.Fulfill the needs of the local and regional market, and bear responsibilities at work place, in compliance with the pharmacy laws and legislations, and with the ethical and professional rules and the community values.

2. Handle safely and prudently chemicals and pharmaceutical products and participate in systems for prescribing, dispensing, storing and distribution of medications.

3. Practice effectively the good manufacturing, good laboratory, and good safety principles to assure the quality of raw materials, procedures and pharmaceutical products.
4. Deliver patient care in hospital and community pharmacies; and promote rational, safe and effective use of medication in pharmacy practice settings.
5. Collaborate actively with other health care professionals in health education of the public, and in prevention and management of diseases, by providing drug information and preventive health care systems to the community.
6. Perform research at competitive level, using appropriate evidence-based methodologies, and in compliance with the academic standards.
7. Develop presentation, marketing, promotion, business administration and information technology skills.
8. Conduct effective communication, time management, critical thinking, problem solving, decision-making, team-working, performance appraisal and self-assessment.
9. Commit to educate and train the upcoming generation of pharmacists, and to assure and improve the quality of health care of the society.
10. Oblige to life-long learning for continuous professional improvement.

2. Intended Learning Outcomes (ILOs)

a. Knowledge and Understanding:

By the completion of this program the student should be able to:

a1 Recall the principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice.

a2 Define the physico-chemical properties of various natural and synthetic substances used in preparation of medicines and the properties of different pharmaceutical dosage forms.

a3 List the principles ofdifferent analytical techniques, using good laboratory practice (GLP) guidelines and validation procedures.

a4 Describe the theories of isolation, synthesis, purification, identification and standardization methods of chemicals and pharmaceutical compounds; as well as the fundamentals of drug design and development.

a5 Identify the structure-activity relationship of group of pharmaceutical compounds.

a6 Memorize the principles of operation of various instruments and techniques including manufacturing, packaging, labeling and storing processes in pharmaceutical industry.

a7Utilize and implement the basics of pharmacokinetics and biopharmaceutics and their application in therapeutic drug monitoring (TDM), dose modification and bioequivalence studies.

a8 Distinguish appropriate good manufacturing practice (GMP) and Quality Control (QC) criteria to aseptic and sterile production facilities and other pharmaceutical industry.

a9Describe properties of different pharmaceutical dosage forms including novel drug delivery systems and radiopharmaceuticals.

a10Describe the principles of clinical, community and hospital pharmacy, including I.V. admixtures, total parenteral nutrition (TPN) and drug distribution system.

a11Discuss the principles of immunology, public health, sources of infection, control of microbial contamination, sanitation, disinfection, sterilization methods and microbiological QC of pharmaceutical products.

a12Define the principles of body function in health and diseases states; as well as the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases; and their pharmacotherapeutic approaches.

a13Describe the role of new techniques, pharmaceutical trends and biotechnology in the discovery of new remedies.

a14Classify the pharmacological properties of drugs including mechanism of action, therapeutic uses, doses, biotransformation, contraindications, adverse drug reactions and drug interactions.

a15Summarize the principles of therapeutic, pharmacovigilance and the rational use of drugs.

a16List the bases of nutrition, phytotherapy, complementary and alternative medicines and quality control of herbal drugs.

a17Discuss the toxic profile of various drugs and other xenobiotics including sources, identification, symptoms, management and control and first aid measures.

a18Use the methods of statistical analysis and pharmaceutical calculations.

a19Illustrate the principles of drug information, drug promotion and pharmacoeconomics and the principles of sales, marketing, business administration, accounting and management including financial and human resources.

a20State the regulatory affairs, pharmacy laws and ethics of pharmacy profession and health care.

a21Define the proper pharmaceutical and medical terminology, abbreviations and symbols in health reports and pharmacy practice.

a22Recognize principle guidelines for treatment and management of various disorders associated with gastrointestinal, cardiovascular, respiratory systems, dermatological and pediatric diseases and oncology.

b. Intellectual Skills:

By the completion of this program the student should be able to:

b1Apply principles of pharmaceutical knowledge in formulation of safe and effective medicines and dealing with new drug delivery systems.

b2Recommend good manufacturing practice (GMP), good laboratory practice (GLP), good clinical practice (GCP) and good safety practice (GSP) guidelines in pharmaceutical technology, pharmaceutical research and pharmacy practice.

b3Determine suitable qualitative and quantitative analytical and biological methods of analysisand QC of drugs as raw material, in dosage forms and in biological fluids.

b4Predict possible incompatibilities and other prescription-related problems that may occur during drug dispensing.

b5Design appropriate methods for isolation, synthesis, purification, identification and standardization of various natural compounds, chemicals and pharmaceutical compounds.

b6Apply the principles of bioinformatics and computer-aided tools and molecular modeling programs in the design of new molecular entities.

b7Specify clinical pharmacy practice requirements in prescribing drugs and handling of biopharmaceutical and other biotechnology products.

b8Develop appropriate methods for infection control and promote public health awareness.

b9Appraise the pharmacotherapeutic principles in the proper selection and use of drugs in various disease conditions.

b10Adjust dosage and dose regimen of medication based on pharmacokinetic principles.

b11Assess possible drug interactions, adverse drug reactions and other drug-related problems, as essential issues in clinical pharmacy practice.

b12Promote cost/effective pharmacotherapy by applying principles of drug information and pharmacoeconomics.

b13Interpret experimental data and published literatures, based on relevant chemical, pharmaceutical, statistical principles.

b14Evaluate evidence-based information needed in pharmacy practice decisions.

b15Estimate social health hazards and drug abuse, misuse and exposure to toxic agents.

b16 Predict the physical and chemical properties and biological activity of organic compounds based on molecular structure.

b17 Formulate a systemic approach for the laboratory diagnosis of common clinical conditions and for identification of causative agents and organisms.

b18 Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.

b19 Analyze herbal drugs for the purpose of determination of adulteration to control quality of produced pharmaceutical agents.

b20 Design a systemic approach for pharmacological and non-pharmacologicalmanagement of gastrointestinal, cardiovascular, respiratory, dermatological, pediatrics' diseases and oncology.

c. Professional and Practical Skills:

By the completion of this program the student should be able to:

c1 Utilize the proper pharmaceutical and medical terminologies, to communicate with other health care professionals.

c2 Handle and dispose hazardous chemicals, biological and pharmaceutical preparations safely.

c3 Employ proper and safe dispensing, dispersing, labeling, distribution and storing of medicines, natural and syntheticchemicals and pharmaceutical preparation.

c4 Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins.

c5 Prescribe medications based on proper understanding of etiology and pathophysiology of diseases, and drug chemistry.

c6 Monitor and control microbial infections, and carry out laboratory tests for diagnosis of various diseases.

c7 Assess toxicity profiles of different xenobiotics and detect toxins in various biological samples.

c8 Manage pharmaceutical instruments and equipment safely and efficiently and solve commonly encountered problems in pharmaceutical manufacturing processes.

c9 Persuade public awareness on rational use of drugs and social health hazards of drug abuse and misuse.

c10 Counsel patients when dispensing OTC and prescription drugs to ensure safe and proper use of medicines.

c11 Conduct experimental and research studies and present, analyze and interpret the results.

c12 Employ proper documentation and drug filing system

c13Assess risks concerning drug-drug interaction, adverse reaction and incompatibilities in different pharmaceutical preparations.

c14Employ different qualitative and quantitative chemical and biological methods for quality control (QC) and assay of raw materials as well as sterility of pharmaceutical preparations.

c15Analyze the economic principles, and estimate costs and profits in a given process.

c16Utilize legal and ethical guidelines to ensure correct and safe supply of medical products to the general public.

c17Apply the concepts of clinical pharmacy and pharmaceutical care in different pharmacy practice settings.

c18Apply the rules and regulations governing the practice of pharmacy.

c19 c8 Explain behavior and relationships between individuals and their family/ partners, immediate social groups and society on large scale

c20 Formulate pharmaceutical care plans for patients suffering from different disorders with reference to their particular health issues and special considerations.

d. General and Transferable Skills:

By the completion of this program the student should be able to:

d1Communicate clearly by verbal and written means with patients and other health care professionals.

d2Retrieve and critically evaluate pharmaceutical information and clinical laboratory data from different sources to improve professional competencies.

d3Interact effectively in team working.

d4Exploit calculations and statistical methods as well as information technology (IT) tools.

d5Practice independent learning needed for continuous professional development.

d6Adopt professional ethical, legal and safety guidelines in pharmacy practice.

d7Develop management, financial, sales and marketing skills.

d8Present information clearly in written, electronic and oral forms.

d9Promote critical thinking, problem-solving, decision-making, and time managing capabilities.

d10Support patient, pharmaceutical and health care.

d11Plan strategies to fulfill workplace pharmaceutical needs.

3-Academic Standards

3a-External References for Standards (Benchmarks)

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) in Jan 2009. (Attachment # 1).

3b-Comparison of provision to External References

A. Comparison of Program Aims and the Intended Learning Outcomes (ILOs) with the National Academic Reference Standards (NARS)(Attachment # 2).

B. Matrix ofthe courses with the Program ILOs (Attachment # 3).

4-Curriculum Structure and Contents

4a	Program duration	5 years					
4b	Program structure	195 Hours					
4b.i	No. of hrs per week:	Lectures	139	Lab./Exercise	56	Total	161
4b.ii	Practical/Field Training:	100 hours of clinical training in hospital settings and specialized Mansoura University Centers 200 hours summer training in pharmaceutical settings; including pharmacies and pharmaceutical companies					

Clinical Pharmacy Program complies with NARS's guidelines NARS (2009) in its curriculum. Comparison between the curriculum structure of Clinical Pharmacy Program, and the structure of a Pharmacy Curriculum allocated by the NARS is included (Attachment # 4)

5- Programme Courses:

To obtain a bachelor's degree in pharmacy (Clinical Pharmacy), the student is required to study 195 credit hours. The Faculty has issued a study plan, where courses are distributed over ten semesters (five levels). The following two tables illustrate the distribution of credit hours and courses on the different requirements and academic levels. A detailed distribution of the courses, along with their credit hours, prerequisites, exam marks and exam time is included (Attachment # 5)

	Credit Hours
University Requirements	9
Faculty Compulsory courses	182
Faculty Elective Courses	6
Practical/Field Training: (300 hours)	100 hours of clinical training in hospital settings and specialized Mansoura University Centers under academic supervision 200 hours summer training in pharmaceutical settings; including pharmacies and pharmaceutical companies approved by Faculty's Council Under supervision of Staff Members
Total	195 credit hours

Level	Semester	Lectures	Practical	Total
1	1	13	6	17
	2	14	5	19
2	3	14	5	19
	4	12	6	18
3	5	14	5	19
	6	14	6	20
4	7	15	5	20
	8	15	6	21
5	9	14	7	21
	10	14	7	21
Total		139	56	195

Curriculum Contents:

- Courses' Description are included (Attachment # 6), and course's specification are reviewed and approved by Faculty of Pharmacy's Council and are available at both program administration and Quality Assurance Unit – Faculty of Pharmacy – Mansoura University.
- Clinical training schedule are announced per semester after approval of the higher committee of the program and is offered for level 4 students. Clinical training is held after coordination with the specialized medical centers and hospitals, Mansoura University.
- Students are arranged into small groups (10-15 students and each groups has 2 supervisors from Faculty of Pharmacy and Faculty of Medicine Mansoura University.
- Partners in clinical training include but not limited to: Mansoura General University Hospital, Mansoura Oncology Center, Emergency Hospital, Pediatrics Hospitals, Nephrology and Urology Center, Gastroenterology Hospital - Mansoura University and Mansoura New General Hospital.

6-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 high school general certificate (Scientific 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.

- 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 and internal regulations before being transferred to our Faculty.
- All Students must fulfill all requirements and comply with the rules of admission to the Faculty.
- Full-time study is mandatory for all students.
- 10% of the newly admitted students to level 1 at Faculty of Pharmacy are allowed to join the program so that the total number of the students joining the program in its different academic levels does not exceed 20% of the total number of students in the different academic levels in the regular program.
- The Program's administration board proposes the number of the yearly accepted students and the proposed number is officiated and approved by the Faculty of Pharmacy Council. A number of seats is reserved for students holding equivalent certificates, American Diplome (SAT) and British diplome (GRE) according to the regulation of Ministry of Higher Education.
- Students holding equivalent degrees are offered places based on the proportion applying holding each degree.
- Whenever the number of students exceeds the pre-approved numbers, criteria of selection are applied including:
  1- The score of high school general certificate
  2- Whenever students achieve the same score, marks in both biology and chemistry are added to the total score and students are arranged.
  3- Whenever students achieve the same score after inclusion of biology and chemistry, English marks are added to the score and students are arranged.
- For students who acquired an equivalent certificate issued from other foreign countries approved by the Ministry of Higher Education, an English exam is held to arrange the students according to their scores in English exam.
- Students holding SAT and GRE degrees are approved for admission after arranging them according to scores obtained in the certificate exam.
- STEM students are allowed to join the program as separate entity.

7-Regulations for progression and program completion

- The Faculty adopts the Credit Hour System in this program.
- Student registers the courses in each semester with the guidance and approval of his/her academic advisor, taking into consideration the prerequisite of each course and extent of academic progress of the students.
- Groups of students in academic supervision for each academic advisor range from (25-30 students).
- Each student is allowed to register a total of 12 to 22 credit hours in each semester; while the academic load during summer semester is 4 – 10 credit hours.
- Students who achieve CGPA less than 1 for successive 6 semesters or separate 10 semesters are exempted from the faculty after Faculty council approval. Students with such problems are given academic alerts regularly
- Students who exceed the aforementioned limits are allowed one final; chance to adjust their cGPA before being exempted after approval of the higher committee of the program.
- Students achieving GPA less than 1 are not allowed to register more than 12 credit hours of the previously studied courses.
- Students achieving GPA (1-1.5) are allowed to register 15 credit hours.
- Students in the fifth academic year are allowed to register an overload of credit hourss, not exceeding 4 credit hours divided on both graduation semesters after approval of his/her academic advisor and higher committee of the program and the student is required to successfully pass 149 credit hours to be qualified for overload registeration. The student is not allowed to register the second overload course unless he passes the first overload.
- Students must attend not less than 75 % of the lectures and lab. Sessions. Otherwise, they would not be able to attend the final exam and complete the course.
- Progression into a higher level requires that the student should successfully complete around 20 % of the total credit hours.

Academic Level	Number of credit hours exceeded
Level 1	36 credit hours
Level 2	37-73 credit hours
Level 3	74-112 credit hours
Level 4	113-153 credit hours
Level 5	Above 153 credit hours

- Completion of the program requires that the student must successfully complete 195 credit hours, in addition to acquiring 200 hours of summer training in a pharmaceutical establishment/setting or equivalent (community or hospital pharmacies, pharmaceutical firms or research institutes and universities) and 100 hours clinical training in s a specialized clinical training setting.
- Student transferred from other institutions must study at Mansoura University at least 60% of graduation requirements.
- Grading of the Human Rights course is not included in the cumulative GPA (cGPA).

8. Student assessment:

- Methods of assessments include semester, final written oral and practical examination. Research paper, course assignments, presentation are examples of self learning tools adopted to promote quality of learning and to implement unconventional learning tolls besides library exercise and practical work.
- Midterm exam is held after the 6th week of each semester
- Practical exams are at the 12th week
- Final written and oral exams are held from week 13-15 of the semester
- Each course is assigned a total of 100 points (marks); 73 courses besides human right course

Courses	No. of courses	Percentage	Midterm exam marks	Practical exam marks	Oral exam marks	Written exam marks	Total marks
Courses with midterm, practical, oral and written exams	52	71.00%	10	25	15	50	100
Courses with midterm, oral and written exams	5	7.0%	10	--	15	75	100
Courses with midterm and written exams	11	15 %	10	--	--	90	100
Courses with midterm, practical and written exams	5	7.0%	10	25		65	100
	73	100%					

- Performance of a student is measured by the **Grade point average (GPA) value** he/she scores in an individual course, [redacted]
- Student assessment methods help to evaluate the ILOs of each course as follows:

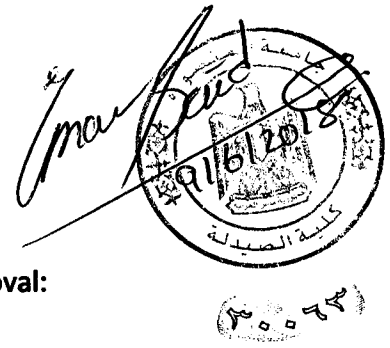
Exam	Skills assessed
Written exams (Midterm and Final)	• knowledge, understanding, • intellectual skills, and • professional skills
Oral exams	• knowledge, understanding, • intellectual skills, • professional skills and • general transferable sills
Practical exams	• practical skills

10- Evaluation of Program Intended Learning Outcomes:

1- **Annual review of the Program's report**
2- **Feedback of stakeholders**
3- **Feedback of clinical trainers and participants from other participants in teaching staff from other faculties**
4- **Feedback of students and graduates**
5- **Reports of reviews of internal and external evaluators.**
6- **Reports of annual review boards and committees.**

Program Coordinator

Signature



Faculty Council Approval:

Attachment 1

National Academic Reference Standards for Pharmaceutical Education (NARS Pharmacy – January 2009)

1. Attributes of the Graduates

Pharmacy graduates work in a multi-disciplinary profession and must acquire the necessary attributes in various pharmacy aspects for pursuing their career. They should demonstrate comprehensive knowledge, clear understanding and outstanding skills as follows:

1.1. Handle chemicals and pharmaceutical products effectively and safely with respect to relevant laws and legislations.

1.2. Capable of formulating, preparing pharmaceutical products from different sources and participating in systems for dispensing, storage and distribution of medications.

1.3. Perform various qualitative and quantitative analytical techniques and fulfill criteria of GLP and GPMP to assure the quality of raw materials, procedures and pharmaceutical products.

1.4. Provide information and education services to community and patients about rational use of medications and medical devices.

1.5. Comprehend principles of pathophysiology of diseases and participate with other health care professionals in improving health care services using evidence-based data.

1.6. Plan, design and conduct research using appropriate methodologies.

1.7. Develop presentation, promotion, marketing, business administration, numeric and computation skills.

1.8. Demonstrate capability of communication skills, time management, critical thinking, problem-solving, decision-making and team working.

1.9. Perform responsibilities in compliance with legal, ethical and professional rules.

1.10. Able to be a life-long learner for continuous improvement of professional knowledge and skills...

2. Knowledge and Understanding:

The pharmacy graduate must demonstrate comprehensive knowledge and clear understanding of the core information associated with the profession as follows:

2.1. Principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice.

2.2. Physico-chemical properties of various substances used in preparation of medicines including inactive and active ingredients as well as biotechnology and radio-labeled products.

2.3. Principles of different analytical techniques using GLP guidelines and validation procedures.

2.4. Principles of isolation, synthesis, purification, identification, and standardization methods of pharmaceutical compounds.

2.5. Principles of drug design, development and synthesis.

2.6. Properties of different pharmaceutical dosage forms including novel drug delivery systems.

2.7. Principles of various instruments and techniques including sampling, manufacturing, packaging, labeling, storing and distribution processes in pharmaceutical industry.

2.8. Principles of pharmacokinetics and biopharmaceutics with applications in therapeutic drug monitoring, dose modification and bioequivalence studies.

2.9. Principles of hospital pharmacy including I.V. admixtures, TPN and drug distribution system.

2.10. Principles of public health issues including sources and control of microbial contamination as well as sanitation, disinfection, sterilization methods and microbiological QC of pharmaceutical products.

2.11. Principles of body function in health and disease states as well as basis of genomic and different biochemical pathways regarding their correlation with different diseases.

2.12. Etiology, epidemiology, laboratory diagnosis and clinical features of different diseases and their pharmacotherapeutic approaches.

2.13. Pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, ADRs and drug interactions.

2.14. Principles of clinical pharmacology, pharmacovigilance and the rational use of drugs.

2.15. Basis of complementary and alternative medicine.

2.16. Toxic profile of drugs and other xenobiotics including sources, identification, symptoms, management control and first aid measures.

2.17. Methods of biostatistical analysis and pharmaceutical calculations.

2.18. Principles of management including financial and human resources.

2.19. Principles of drug promotion, sales and marketing, business administration, accounting and pharmacoeconomics.

2.20. Principles of proper documentation and drug filing systems.

2.21. Regulatory affairs, pharmacy laws and ethics of health care and pharmacy profession.

3. Professional and Practical Skills:

3.1. Use the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.

3.2. Handle and dispose chemicals and pharmaceutical preparations safely.

3.3. Compound, dispense, label, store and distribute medicines effectively and safely.

3.4. Extract, isolate, synthesize, purify, identify, and/or standardize active substances from different origins.

3.5. Select medicines based on understanding of etiology and pathophysiology of diseases.

3.6. Monitor and control microbial growth and carry out laboratory tests for identification of infectious and non-infectious diseases.

3.7. Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.

3.8. Apply techniques used in operating pharmaceutical equipment and instruments.

3.9. Maintain public awareness on rational use of drugs and social health hazards of drug abuse and misuse.

3.10. Advise patients and other health care professionals about safe and proper use of medicines.

3.11. Conduct research studies and analyze the results.

3.12. Employ proper documentation and drug filing systems

4. Intellectual Skills:

4.1. Apply pharmaceutical knowledge in the formulation of safe and effective medicines as well as in dealing with new drug delivery systems.

4.2. Comprehend and apply GLP, GPMP, GSP and GCP guidelines in pharmacy practice.

4.3. Apply qualitative and quantitative analytical and biological methods for QC and assay of raw materials as well as pharmaceutical preparations.

4.4. Recognize and control possible physical and/or chemical incompatibilities that may occur during drug dispensing.

4.5. Select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.

4.6. Apply the principles of bio-informatics and computer-aided tools in drug design.

4.7. Apply various principles to determine the characteristics of biopharmaceutical products.

4.8. Select and assess appropriate methods of infection control to prevent infections and promote public health.

4.9. Utilize the pharmacological basis of therapeutics in the proper selection and use of drugs in various disease conditions.

4.10. Calculate and adjust dosage and dose regimen of medications.

4.11. Assess drug interactions, ADRs and pharmacovigilance.

4.12. Apply the principles of pharmacoeconomics in promoting cost/effective pharmacotherapy.

4.13. Analyze and interpret experimental results as well as published literature.

4.14. Analyze and evaluate evidence-based information needed in pharmacy practice.

5. General and Transferable Skills

5.1. Communicate clearly by verbal and written means.

5.2. Retrieve and evaluate information from different sources to improve professional competencies.

5.3. Work effectively in a team.

5.4. Use numeracy, calculation and statistical methods as well as information technology tools.

5.5. Practice independent learning needed for continuous professional development.

5.6. Adopt ethical, legal and safety guidelines.

5.7. Develop financial, sales and market management skills.

5.8. Demonstrate creativity and time management abilities.

5.9. Implement writing and presentation skills.

5.10. Demonstrate critical thinking, problem-solving and decision-making abilities.

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Attachment # 2:

Comparison of clinical pharmacy program Aims to graduate attributes (NARS)

Program Aims	Graduate Attributes (NARS)
1. Fulfill the needs of the local and regional market, and bear responsibilities at work place, in compliance with the pharmacy laws and legislations, and with the ethical and professional rules and the community values.	1.1
2. Handle safely and prudently chemicals and pharmaceutical products and participate in systems for prescribing, dispensing, storing and distribution of medications.	1.1 1.2
3. Practice effectively the good manufacturing, good laboratory, and good safety principles to assure the quality of raw materials, procedures and pharmaceutical products.	1.3
4. Deliver patient care in hospital and community pharmacies; and promote rational, safe and effective use of medication in pharmacy practice settings.	1.4.
5. Collaborate actively with other health care professionals in health education of the public, and in prevention and management of diseases, by providing drug information and preventive health care systems to the community.	1.5.
6. Perform research at competitive level, using appropriate evidence-based methodologies, and in compliance with the academic standards.	1.6.
7. Develop presentation, marketing, promotion, business administration and information technology skills.	1.7.
8. Conduct effective communication, time management, critical thinking, problem solving, decision-making, team-working, performance appraisal and self-assessment.	1.8.
9. Commit to educate and train the upcoming generation of pharmacists, and to assure and improve the quality of health care of the society.	1.9
10. Oblige to life-long learning for continuous professional improvement.	1.10

Comparison of the intended learning outcomes (ILOs) with the National Academic Reference Standards (NARS)

a. Knowledge and Understanding:

	Bachelor of Pharmacy (clinical pharmacy) Intended Knowledge and Understanding Learning Outcomes	NARS's Intended outcomes
a1	Recall the principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice.	2.1.
a2	Define the physico-chemical properties of various natural and synthetic substances used in preparation of medicines and the properties of different pharmaceutical dosage forms.	2.2.
a3	List the principles of different analytical techniques, using good laboratory practice (GLP) guidelines and validation procedures.	2.3.
a4	Describe the theories of isolation, synthesis, purification, identification and standardization methods of chemicals and pharmaceutical compounds; as well as the fundamentals of drug design and development.	2.4.
a5	Identify the structure-activity relationship of group of pharmaceutical compounds.	2.5.
a6	Memorize the principles of operation of various instruments and techniques including manufacturing, packaging, labeling and storing processes in pharmaceutical industry.	2.7.
a7	Utilize and implement the basics of pharmacokinetics and biopharmaceutics and their application in therapeutic drug monitoring (TDM), dose modification and bioequivalence studies.	2.8.
a8	Distinguish appropriate good manufacturing practice (GMP) and Quality Control (QC) criteria to aseptic and sterile production facilities and other pharmaceutical industry.	2.7.
a9	Describe properties of different pharmaceutical dosage forms including novel drug delivery systems and radiopharmaceuticals.	2.6.
a10	Describe the principles of clinical, community and hospital pharmacy, including I.V. admixtures, total parenteral nutrition (TPN) and drug distribution system.	2.9.
a11	Discuss the principles of immunology, public health, sources of infection, control of microbial contamination, sanitation, disinfection, sterilization methods and microbiological QC of pharmaceutical products.	2.10.
a12	Define the principles of body function in health and diseases states; as well as the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases; and their pharmacotherapeutic approaches.	2.11. 2.12.
a13	Describe the role of new techniques, pharmaceutical trends and biotechnology in the discovery of new remedies.	2.11.
a14	Classify the pharmacological properties of drugs including mechanism of action, therapeutic uses, doses, biotransformation, contraindications, adverse drug reactions and drug interactions.	2.13.

a15	Summarize the principles of therapeutic, pharmacovigilance and the rational use of drugs.	**2.14.**
a16	List the bases of nutrition, phytotherapy, complementary and alternative medicines and quality control of herbal drugs.	**2.15.**
a17	Discuss the toxic profile of various drugs and other xenobiotics including sources, identification, symptoms, management and control and first aid measures.	**2.16.**
a18	Use the methods of statistical analysis and pharmaceutical calculations.	**2.17.**
a19	Illustrate the principles of drug information, drug promotion and pharmacoeconomics and the principles of sales, marketing, business administration, accounting and management including financial and human resources.	**2.18.** **2.19.**
a20	State the regulatory affairs, pharmacy laws and ethics of pharmacy profession and health care.	**2.21.**
a21	Define the proper pharmaceutical and medical terminology, abbreviations and symbols in health reports and pharmacy practice.	**2.20.**
a22	Recognize principle guidelines for treatment and management of various disorders associated with gastrointestinal, cardiovascular, respiratory systems, dermatological and pediatric diseases and oncology.	**2.21.**

b. Intellectual Skills:

	Bachelor of Pharmacy (clinical pharmacy) Intended Intellectual Learning Outcomes	**NARS's Intended outcomes**
b1	Apply principles of pharmaceutical knowledge in formulation of safe and effective medicines and dealing with new drug delivery systems.	**4.1.**
b2	Recommend good manufacturing practice (GMP), good laboratory practice (GLP), good clinical practice (GCP) and good safety practice (GSP) guidelines in pharmaceutical technology, pharmaceutical research and pharmacy practice.	**4.2.**
b3	Determine suitable qualitative and quantitative analytical and biological methods of analysis and QC of drugs as raw material, in dosage forms and in biological fluids.	**4.3.**
b4	Predict possible incompatibilities and other prescription-related problems that may occur during drug dispensing.	**4.4.**
b5	Design appropriate methods for isolation, synthesis, purification, identification and standardization of various natural compounds, chemicals and pharmaceutical compounds.	**4.5.**
b6	Apply the principles of bioinformatics and computer-aided tools and molecular modeling programs in the design of new molecular entities.	**4.6.**
b7	Specify clinical pharmacy practice requirements in prescribing drugs and handling of biopharmaceutical and other biotechnology products.	**4.7.**
b8	Develop appropriate methods for infection control and promote public health awareness.	**4.8.**
b9	Appraise the pharmacotherapeutic principles in the proper selection and use of drugs in various	**4.9.**

	disease conditions.	
b10	Adjust dosage and dose regimen of medication based on pharmacokinetic principles.	**4.10.**
b11	Assess possible drug interactions, adverse drug reactions and other drug-related problems, as essential issues in clinical pharmacy practice.	**4.11.**
b12	Promote cost/effective pharmacotherapy by applying principles of drug information and pharmacoeconomics.	**4.12.**
b13	Interpret experimental data and published literatures, based on relevant chemical, pharmaceutical, statistical principles.	**4.13.**
b14	Evaluate evidence-based information needed in pharmacy practice decisions.	**4.14.**
b15	Estimate social health hazards and drug abuse, misuse and exposure to toxic agents.	**----**
b16	Predict the physical and chemical properties and biological activity of organic compounds based on molecular structure.	**----**
b17	Formulate a systemic approach for the laboratory diagnosis of common clinical conditions and for identification of causative agents and organisms.	**----**
b18	Correlate histological, physiological and pathological structure with the function of the human body; and integrate basic anatomical, biochemical and physiological facts with clinical data.	**----**
b19	Analyze herbal drugs for the purpose of determination of adulteration to control quality of produced pharmaceutical agents.	**----**
b20	Design a systemic approach for pharmacological and non-pharmacological management of gastrointestinal, cardiovascular, respiratory, dermatological, pediatrics' diseases and oncology.	**----**

c. Professional and Practical Skills:

	Bachelor of Pharmacy (clinical pharmacy) Intended Professional and Practical Learning Outcomes	**NARS's Intended outcomes**
c1	Utilize the proper pharmaceutical and medical terminologies, to communicate with other health care professionals.	**3.1.**
c2	Handle and dispose hazardous chemicals, biological and pharmaceutical preparations safely.	**3.2.**
c3	Employ proper and safe dispensing, dispersing, labeling, distribution and storing of medicines, natural and synthetic chemicals and pharmaceutical preparation.	**3.3.**
c4	Apply appropriate methods for extraction, isolation, synthesis, purification, identification and standardization of active substances from different origins.	**3.4.**
c5	Prescribe medications based on proper understanding of etiology and pathophysiology of diseases, and drug chemistry.	**3.5.**
c6	Monitor and control microbial infections, and carry out laboratory tests for diagnosis of various diseases.	**3.6.**
c7	Assess toxicity profiles of different xenobiotics and detect toxins in various biological	**3.7.**

	samples.	
c8	Manage pharmaceutical instruments and equipment safely and efficiently and solve commonly encountered problems in pharmaceutical manufacturing processes.	3.8.
c9	Persuade public awareness on rational use of drugs and social health hazards of drug abuse and misuse.	3.9.
c10	Counsel patients when dispensing OTC and prescription drugs to ensure safe and proper use of medicines.	3.10.
c11	Conduct experimental and research studies and present, analyze and interpret the results.	3.11.
c12	Employ proper documentation and drug filing system.	3.12.
c13	Assess risks concerning drug-drug interaction, adverse reaction and incompatibilities in different pharmaceutical preparations.	----
c14	Employ different qualitative and quantitative chemical and biological methods for quality control (QC) and assay of raw materials as well as sterility of pharmaceutical preparations.	----
c15	Analyze the economic principles, and estimate costs and profits in a given process.	----
c16	Utilize legal and ethical guidelines to ensure correct and safe supply of medical products to the general public.	----
c17	Apply the concepts of clinical pharmacy and pharmaceutical care in different pharmacy practice settings.	----
c18	Apply the rules and regulations governing the practice of pharmacy.	----
c19	Explain behavior and relationships between individuals and their family/parteners, immediate social groups and society at large.	----
c20	Formulate pharmaceutical care plans for patients suffering from different disorders with reference to their particular health issues and special considerations.	----

d. General and Transferable Skills:

	Bachelor of Pharmacy (clinical pharmacy) Intended General and Transferable Learning Outcomes	NARS's Intended outcomes
d1	Communicate clearly by verbal and written means with patients and other health care professionals.	5.1.
d2	Retrieve and critically evaluate pharmaceutical information and clinical laboratory data from different sources to improve professional competencies.	5.2.
d3	Interact effectively in team working.	5.3.
d4	Exploit calculations and statistical methods as well as information technology (IT) tools.	5.4.
d5	Practice independent learning needed for continuous professional development.	5.5.
d6	Adopt professional ethical, legal and safety guidelines in pharmacy practice.	5.6.
d7	Develop management, financial, sales and marketing skills.	5.7.

d8	Present information clearly in written, electronic and oral forms.	**5.9.**
d9	Promote critical thinking, problem-solving, decision-making, and time managing capabilities.	**5.8.** **5.10**
d10	Support patient, pharmaceutical and health care.	**----**
d11	Plan strategies to fulfill workplace pharmaceutical needs.	**----**

Attachment 3:

Matrix
Courses versus program ILOs

Level One

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PC 101	Physical & Inorganic Chemistry	a2, a3	b3	c2	d8
2	PC102	Pharmaceutical Organic chemistry -1	a2	b16	c2	d8
3	MD101	Biophysics	a2	b4	c3	d2
4	PG 101	Botany and medicinal plants	a16	b5	c3	d8
5	MD 102	Cell Biology	a1	b7	C	d1, d2
6	MS 101	Mathematics and statistics	a18	b13	---	d4
7	EN 101	English language			---	d1

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PC 203	Pharmaceutical Organic chemistry-2	a3	b16	c2	d8
2	PC 205	Pharmaceutical Analytical chemistry-1	a3	b2	c2	d8
3	PG 202	Pharmacognosy -1	a16	b19	c4	d8
4	MD 203	Histology	a1	b18	---	d8
5	PT 201	Physical pharmacy	a2	b4	c2	d8
6	PT 202	Pharmacy orientation	a18	b4	c10	d4
7	HU 201	Human rights*	a20	---	c18	d6

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Level Two

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PC 304	Pharmaceutical Organic chemistry-3	a2	b16	c3	d2, d8
2	PC 306	Pharmaceutical Analytical chemistry-2	a3	b2	c3	d8
3	PG 303	Pharmacognosy -2	a16	b5, b19	c4	d8
4	MD 304	Anatomy	a1		---	d8
5	MD 305	Physiology	a1		---	d8
6	EN 302	Medical Terminology	a21		c1	d1
7	HU 302	Psychology	a1		c19	d1, d6

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PB 401	Biochemistry -1	a1	---	c2	d2
2	PG 404	Phytochemistry -1	a4	b3	c4	d8
3	PC 407	Instrumental Analysis	a3, a4	b2, b3	c2, c3	d8
4	PM 401	General Microbiology and Immunology	a1, a11	b17	c6	d1
5	MD 406	Parasitology	a11	b8	c6	d1
6	PT 403	Pharmaceutical dosage forms-1	a2	b1	c3	d4
7	PT 404	Pharmacy legislation	a20	---	c16	d6

Level Three

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PO 501	Pharmacology-1	a14	b9	c5, c10	d2, d3
2	PM 502	Clinical microbiology	a11	b7	c6	d2
3	PT 505	Pharmaceutical dosage forms-2	a2	b1	c3	d4
4	PB 502	Biochemistry-2	a1	b7	c5	d2
5	PG 505	Phytochemistry-2	a16	b3	c4	d8
6	MD 507	Pathophysiology	a1	b7	c5	d3, d6
7	PT 506	Pharmacy Administration	a19	---	---	d9

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PC 609	Medicinal chemistry-1	a2, a4	b6	c2, c3	d3, d8
2	PT 607	Pharmaceutical technology	a6, a8	b2	c8	d8
3	PT 608	Community pharmacy practice	a10	b14	c1	d1, d10
4	PT 609	Biopharmaceutics and pharmacokinetics	a7	b9	---	d8
5	PG 606	Quality Control of Herbal Drugs	a16	b3	c4	d8
6	MD 608	Pathology	a11	b7	c6	d1
7	MD 609	Tromas and First Aid	a17	---	c2	d1

Level Four

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PO 701	Pharmacology -2	a14	b9	c20	d2, d3
2	PP 701	Radiopharmaceuticals	a9	b1	c2	d6
3	PP 702	Clinical pharmacy -1	a12	b11	c13, c17	d1
4	PP 703	Hospital pharmacy	a10	b7	c1	d1
5	PT 704	Controlled drug delivery system	a9	b1	c3	d8
6	MD 710	Public health and preventive medicine	a11	b7	c6, c9	d8
7	PM 703	Pharmaceutical Biotechnology	a13	b1	c14	d2
8	PM 704	Pharmaceutical microbiology	a11	b3	c6	d2

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PC 810	Medicinal chemistry-2	a4	b6	c3	d3, d8
2	PP 805	Clinical pharmacy -2	a12	b9	c17	d1
3	PG 807	Phytotherapy	a16	b9	c10	d8
4	PC 808	Pharmaceuticals analysis and quality control	a2	b2	c14	d8
5	PB 803	Clinical biochemistry	a7	b3	c5	d2
6	PP 806	Drug marketing	a19	b12	c15	d7, d9
7	PO 803	Drug interactions	a14	b11	c13	d3, d8
8	PE	Elective course				

Level Five

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PO 904	Toxicology and forensic chemistry	a17	b15	c7, c9	d3, d8
2	PO 905	Therapeutics -1	a14, a15	b9	c5, c10	d3, d8
3	PP 907	Clinical pharmacokinetics	a12	b10	c5, c10	d3, d8
4	PP 908	Oncology	a22	b20	c5	d3, d10
5	PP 909	Clinical nutrition	a16	---	c10	---
6	PO 906	Clinical pharmacology	a22	b9	c5, c10	---
7	HU 903	Sociology	a1	---	c19	d10
	PE	Elective course				

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PO 007	Therapeutics -2	a14, a15	b9	c5, c10	d3, d8
2	PP 010	Treatment of dermatological and reproductive diseases	a22	b20	c5	d10
3	PP 011	Treatment of Pediatrics diseases	a22	b20	c5	d10
4	PP 012	Treatment of Cardiovascular diseases	a22	b20	c5	d10
5	PP 013	Gastroenterology	a22	b20	c5	d10
6	PP 014	Treatment of Respiratory system diseases	a22	b20	c5	d10
7	PP 015	Drug information	a22	b12	c11	d10
	PE	Elective course				

Elective course

No	Course Code	Course Title	K & U	IS	P&PS	G&TS
1	PM E5	Biological Standardization	a17	b7	c7	D8
2	PM E6	Antimicrobial Agent	a11	b8	c7	
3	PG E8	Alternative Medicinal Therapies	a2, a16	b5	c4	
4	PG E9	Production & Manufacture of Medicinal Plants	a4	b5	c4	
5	PO E9	Veterinary Pharmacology	a2	b1	c2	
6	PG E10	Chromatography and Separation Techniques	a3	b3	c4	
7	PT E10	Quality Assurances and GMP	a8	b2	c8, c14	
8	PC E11	Drug Design	a4, a5	b6		
9	PT E11	Applied Industrial Pharmacy	a6	b2	c8	
10	PT E12	Good Manufacturing Practices	a8	b2	c8	
11	PT E13	Cosmetic Preparations	a2	b1	c2	
12	PC E12	Advanced Pharmaceutical Analysis- Spectroscopy	a3	b3	c4	

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 analuytical chemistry, biology, biophysics, computer science, mathmatics	15.89%	1. Physical & inorganic	3
			2. Pharmaceutical organic	3
			3. Biophysics	2
			4. Botany	3
			5. cell biology	2
			6. Pharmaceutical Organic 2	3
			7. Pharmaceutical analytical1	3
			8. Pharmaceutical Organic 3	3
			9. Pharmaceutical analytical2	3
			10. Biochemistry-1	3
			11. Biochemistry-2	3
			11 courses	**31/195**
Pharmaceutical 35 – 40 %	Pharmacy orientation, medical & pharmaceutical terminology,pharmaceutics, physical pharmacy,industrial pharmacy, pharmaceuticalTechenology,Biopharmaceutics, pharmacokinetics, pharmaceutical chemistry, pharmacognosy,	29.2%	1. Pharmacognosy -1	3
			2. Physical pharmacy	3
			3. Pharmacy orientation	2
			4. Pharmacognosy -2	3
			5. Phytochemistry -1	3
			6. Instrumental Analysis	2
			7. Pharmaceutical dosage forms-1	3
			8. Pharmaceutical dosage forms-2	3
			9. Phytochemistry -2	3
			10. Pharmaceutical technology	3

	pharmaceutical microbiology, molecular biology, pharmaceutical biotechnology, Quality Assurance and Quality Control, instrumental analysis, biological drug assay		11. Biopharmaceutics and pharmacokinetics	3
			12. Radiopharmaceuticals	1
			13. Controlled drug delivery system	2
			14. Pharmaceutical Biotechnology	3
			15. Pharmaceutical microbiology	3
			16. Medicinal chemistry-1	3
			17. Medicinal chemistry-2	3
			18. Pharmaceuticals analysis and quality control	3
			19. Phytotherapy	3
			20. Quality control of herbal drugs	3
			21. Medical Terminology	2
			21 course	**57/195**
Medical 20- 25 %	Anatomy, histology ,physiology, pathology, biochemistry parasitology, pharmacology, therapeutics, medical microbiology, immunologyand virology.	**21.03%**	1. Histology	3
			2. Anatomy	2
			3. Physiology	4
			4. Parasitology	2
			5. Clinical Microbiology	3
			6. Pathophysiology	2
			7. Pathology	3
			8. Clinical biochemistry	3
			9. Therapeutics -1	3
			10. Therapeutics -2	3
			11. Pharmacology-1	3
			12. Pharmacology-2	3
			13. Clinical Pharmacology	3
			14. General Microbiology and Immunology	4
			14 course	**41 /195**

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.	18.79%	1. Community Pharmacy Practice	3
			2. Clinical Pharmacy -1	3
			3. Hospital Pharmacy	3
			4. clinical pharmacy -2	3
			5. Drug interactions	2
			6. Oncology	3
			7. Dermatology	2
			8. Treatment of Cardiovascular diseases	3
			9. Treatment of Pediatrics diseases	3
			10. Gastroenterology	3
			11. Treatment of Respiratory system diseases	3
			12. Drug information	1
			13. Clinical nutrition	2
			14. Clinical Pharmacokinetics	3
			14 course	**37/195**
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.	5.13%	1. Tromas and First Aid	2
			2. Public health and preventive medicine	2
			3. Toxicology and forensic chemistry	3
			4. Pharmacy Legislations	1
			5. Mathematics and Statistics	2
			5 courses	**10/195**

Behavioral and social 2-4 %	Psychology, communications, social and administrative pharmacy .pharmacy ethics.	3.6%	1. Human right 2. Psychology 3. Sociology 4. English Language	2 2 1 2
			4 courses	**7/195**
Pharmacy management 2-4%	Sales, marketing and drug promotion, pharmaceutical business administration, pharmacoeconomics.	1.5%	1. Drug Marketing 2. Drug Administration	1 2
			2 courses	**3/195**
Discretionary Up to 8%	Professional and Non professional sciences	4.6%	1. Elective Course 2. Elective Course 3. Elective Course	3 3 3
			3 courses	**9/195**
Training	Not less than 300hr in a pharmaceutical location		• 200 Hours training in a pharmaceutical setting • 100 hours training in a clinical, hospital setting	
				195 hours

Attachment # 5
Detailed Courses distribution into 10 semesters

PROGRAMME CURRICULUM

Semester (1)

Course Title	Course code	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Physical & Inorg Chemistry	PC 101	2	1	3	Registrati	10	25	65	-	100	2
Pharmaceutical Or chemistry -1	PC102	2	1	3	Registrati	10	25	50	15	100	2
Biophysics	MD101	1	1	2	Registrati	10	25	65	-	100	1
Botany and medi plants	PG 101	2	1	3	Registrati	10	25	50	15	100	2
Cell Biology	MD 102	1	1	2	Registrati	10	25	65	-	100	1
Mathematics and statis	MS 101	2	-	2	Registrati	10	-	90	-	100	2
English language	EN 101	2	-	2	Registrati	10	-	90	-	100	2
Total		13	6	17						700	

Semester (2)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Pharmaceutical Org chemistry-2	PC 203	2	1	3	Pharmaceutical organic chemis	10	25	50	15	100	2
Pharmaceutical Analy chemistry-1	PC 205	2	1	3	Registration	10	25	50	15	100	2
Pharmacognosy -1	PG 202	2	1	3	Botany medicinal pla	10	25	50	15	100	2
Histology	MD 203	2	1	3	Registration	10	25	65	-	100	2
Physical pharmacy	PT 201	2	1	3	Registration	10	25	50	15	100	2
Pharmacy orientation	PT 202	2	-	2	Registration	10	-	90	-	100	2
Human rights*	HU 201	2	-	2	Registration	10	-	90	-	100	2
Total		14	5	19						700	

Semester (3)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Pharmaceutical Org chemistry-3	PC 304	2	1	3	Pharmaceutical organic chemis	10	25	50	15	100	2
Pharmaceutical Analy chemistry-2	PC 306	2	1	3	Pharmaceutica analytical chem	10	25	50	15	100	2
Pharmacognosy -2	PG 303	2	1	3	Botany and m plants	10	25	50	15	100	2
Anatomy	MD 304	1	1	2	Registration	10	25	65	-	100	1
Physiology	MD 305	3	1	4	Registration	10	25	65	-	100	3
Medical Terminology	EN 302	2	-	2	Registration	10	-	90	-	100	2
Psychology	HU 302	2	-	2	Registration	10	-	90	-	100	2
Total		14	5	19						700	

Semester (4)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Biochemistry -1	PB 401	2	1	3	Registration	10	25	50	15	100	2
Phytochemistry -1	PG 404	2	1	3	Pharmacogos	10	25	50	15	100	2
Instrumental Analysis	PC 407	1	1	2	Registration	10	25	50	15	100	1
General Microbiology Immunology	PM 401	3	1	4	Registration	10	25	50	15	100	3
Parasitology	MD 406	1	1	2	Registration	10	25	50	15	100	1
Pharmaceutical do forms-1	PT 403	2	1	3	Physical pharmacy	10	25	50	15	100	2
Pharmacy legislation	PT 404	1	-	1	Registration	10	-	90	-	100	1
Total		12	6	18							

Semester (5)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Pharmacology-1	PO 501	2	1	3	Physiology	10	25	50	15	100	2
Clinical microbiology	PM 502	2	1	3	General microc & immunology	10	25	50	15	100	2
Pharmaceutical dc forms-2	PT 505	2	1	3	Physical pharmacy	10	25	50	15	100	2
Biochemistry-2	PB 502	2	1	3	Biochemist	10	25	50	15	100	2
Phytochemistry-2	PG 505	2	1	3	Pharmacog 1	10	25	50	15	100	2
Pathophysiology	MD 507	2	-	2	Physiology	10	-	75	15	100	2
Pharmacy Administrat	PT 506	2	-	2	Registration	10	-	90	-	100	2
Total		14	5	19						700	

Semester (6)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Medicinal chemistry-1	PC 609	2	1	3	Pharmaceutical Organic chemis	10	25	50	15	100	2
Pharmaceutical techno	PT 607	2	1	3	Registration	10	25	50	15	100	2
Community pharm practice	PT 608	2	1	3	Registration	10	25	50	15	100	2
Biopharmaceutics pharmacokinetics	PT 609	2	1	3	Pharmaceutic dosage forms	10	25	50	15	100	2
Quality Control of H Drugs	PG 606	2	1	3	Pharmacog 1	10	25	50	15	100	2
Pathology	MD 608	2	1	3	Registration	10	25	50	15	100	2
Tromas and First Aid	MD 609	2	-	2	Registration	10	-	75	15	100	2
Total		14	6	20						700	

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Semester (7)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Pharmacology -2	PO 701	2	1	3	Pharmacolo	10	25	50	15	100	2
Radiopharmaceuticals	PP 701	1	-	1	Registration	10	-	90	-	100	1
Clinical pharmacy -1	PP 702	2	1	3	Registration	10	25	50	15	100	2
Hospital pharmacy	PP 703	2	1	3	Registration	10	25	50	15	100	2
Controlled drug deli system	PT 704	2	-	2	Pharmaceutic dosage forms	10	-	75	15	100	2
Public health preventive medicine	MD 710	2	-	2	Clinical Microb	10	-	75	15	100	2
Pharmaceutical Biotechnology	PM 703	2	1	3	Registration	10	25	50	15	100	2
Pharmaceutical microbiology	PM 704	2	1	3	Registration	10	25	50	15	100	2
Total		15	5	20						800	

Semester (8)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Medicinal chemistry-2	PC 810	2	1	3	Pharmaceutical Organic chemis	10	25	50	15	100	2
Clinical pharmacy -2	PP 805	2	1	3	Clinical pha 1	10	25	50	15	100	2
Phytotherapy	PG 807	2	1	3	Pharmacog 1	10	25	50	15	100	2
Pharmaceuticals analysis quality control	PC 808	2	1	3	Pharmaceutical Analytical che 11	10	25	50	15	100	2
Clinical biochemistry	PB 803	2	1	3	Biochemistry	10	25	50	15	100	2
Drug marketing	PP 806	1	-	1	Registration	10	-	90	-	100	1
Drug interactions	PO 803	2	-	2	Pharmacolog	10	-	75	15	100	2
Elective course	PE	2	1	3	Registration	10	25	50	15	100	2
Total		15	6	21						800	

Semester (9)

Course Title	Course c	Credit hours			Prerequisite	Examination Marks*				Total. marks	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Toxicology and for chemistry	PO 904	2	1	3	Pharmacolo 11	10	25	50	15	100	2
Therapeutics -1	PO 905	2	1	3	Pharmacolo 11	10	25	50	15	100	2
Clinical pharmacokine	PP 907	2	1	3	Biopharmace and pharmacokin	10	25	50	15	100	2
Oncology	PP 908	2	1	3	Pathology pharmacolog	10	25	50	15	100	2
Clinical nutrition	PP 909	1	1	2	Biochemist	10	25	50	15	100	1
Clinical pharmacology	PO 906	2	1	3	Pharmacolo 11	10	25	50	15	100	2
Sociology	HU 903	1	-	1	Registration	10	-	90	-	100	2
Elective course	PE	2	1	3	Registration	10	25	50	15	100	2
Total		14	7	21							

Semester (10)

Course Title	Course c	Credit hours			Prerequis	Examination Marks*				Total. mark	Final Exam. (hrs)
		Lect.	Pract	Total		Period	Pract.	Wr.	Oral		
Therapeutics -2	PO 007	2	1	3	Pharmacolo 11	10	25	50	15	100	2
Treatment of dermatologic reproductive diseases	PP 010	1	1	2	Pathology pharmacology-	10	25	50	15	100	1
Treatment of Pedi diseases	PP 011	2	1	3	Pathology pharmacology-	10	25	50	15	100	2
Treatment Cardiovascular disease	PP 012	2	1	3	Pathology pharmacology-	10	25	50	15	100	2
Gastroenterology	PP 013	2	1	3	Pathology pharmacology-	10	25	50	15	100	2
Treatment of Respir system diseases	PP 014	2	1	3	Pathology pharmacology-	10	25	50	15	100	2
Drug information	PP 015	1	-	1	Pharmacology Clinical pharm	10	-	75	15	100	2
Elective course	PE	2	1	3	Registration	10	25	50	15	100	2
Total		14	7	21						500	

Attachment # 6

[redacted]

PC 101 Physical and Inorganic Chemistry

Matter; its properties and measurement, electromagnetic spectrum, atomic structure, chemical bondi and intermolecular forces. Gases, liquids, and solids. Man and his environment and nuclear chemistry.

PC 102 Pharmaceutical Organic Chemistry (1)

Nature of organic compounds and structures. Nomenclature, aliphatic (saturated and unsaturate hydrocarbons. Organic reactions (substitutions, additions, eliminations and condensations). Chemistry the different organic classes: halogenated hydrocarbons, alcohols, ethers, carbonyl compounds, mono- a dibasic carboxylic acids and derivatives, amino acids.

PC 203 Pharmaceutical Organic Chemistry (2)

Chemistry of aromatic organic compounds including aromatic hydrocarbons, halogen and nitro derivativ amines and diazonium salts, phenols, aromatic carboxylic acids, aromatic aldehydes, aromatic ketone sulfonic acids and polynuclear aromatic hydrocarbons. Introduction to use of spectroscopic methods organic chemistry (UV, IR, MS, NMR).

PC 304 Pharmaceutical Organic Chemistry (3)

Stereochemistry and Stereoisomerism. Organic reaction mechanisms (substitutions, additions, eliminati and condensations). Heterocyclic compounds including monocyclic monoheteroatom and fused bicy compounds.

PC 205 Pharmaceutical Analytical Chemistry (1)

Quantitative analytical chemistry comprises; acid base titrations and buffer solution, precipitimetry a gravimetry.

PC 306 Pharmaceutical Analytical Chemistry (2)

An introduction to statistical analysis, Oxidation-reduction titrations,(electrical properties of re systems, factors affecting oxidation potential, redox titration curves). Complexometry (importa complexones stability titration curves, application, direct EDTA titrations, masking and demasking, I EDTA titrations)

PC 407 Instrumental Analysis

Spectrophotometric methods of analysis including; ultra-violet, visible and flame photome spectrofluorometry, atomic absorption & flame, electrochemistry (potentiometry, conductime polarography), chromatography.

PC 808 Pharmaceutical Analysis and Quality Control

Control and quality assurance, inprocess control and validation, sampling process prior to analysis, analys of raw materials and finished products using reference standards, pharmacopeial methods of stability ar stability testing of drugs, performance and calibration of instruments used in pharmaceutical analysi validation of analytical methods and ISO and BSI

PC 609 Medicinal Chemistry (1)

Introduction to pharmaceutical and medicinal chemistry, physicochemical properties of drugs in relation biological action, chemotherapeutic agents, synthetic antimicrobial agents, malaria chemotherap antibacterial antibiotics and cancer chemotherapy.

PC 810 Medicinal Chemistry (2)

Central nervous system depressants, central nervous system stimulants, cardiovascular agents, analge agents, steroids and related compounds.

PC E11 Drug Design

Structure activity relationships, quantum mechanical approaches, molecular connectivity, pharmacoph generation, molecular modification by isosteric replacement. Natural products leading to new pharmaceutic mathematical treatment serving prediction, defining sites and targets, molecular modeling, prodrugs and d latentiation.

PC E12 Advanced Pharmaceutical Analysis -Spectroscopy

Applications of instrumental methods of analysis (ultraviolet and infrared spectroscopy; NMR; m spectrometry; atomic absorption spectroscopy) to pharmaceutical compounds.

PG 101 Botany and Medicinal Plants

Plant Kingdom; classification and systematic botany of some lower and higher plants with example medically active plants; Cytology, morphology and anatomy of different plant organs, plant physiolog general introduction of medicinal plants (cultivation, collection, drying, packing, storage, and adulterati

PG 202 Pharmacognosy (1)

An introduction to pharmacognosy and a detailed pharmacognostical study of drugs composed of lea flowers, barks, galls and woods and unorganized drugs.

PG 303 Pharmacognosy (2)

Detailed pharmacognostical study of drugs composed of seeds, fruits, herbs, rhizomes and roots and an drugs

PG 404 Phytochemistry (1)

Devoted to the study of plants therapeutically active principles; volatile oils, carbohydrates, resins and combinations, bitter principles and tannins

PG 505 Phytochemistry (2)

Detailed study of phytochemicals; alkaloids and glycosides, in addition to hallucinating and anticanc drugs. Introduction to chromatography and separation technique.

PG 606 Quality Control of Herbal Drugs

Quality control of herbal drugs including; herbal adulteration, detection of common pollutants in herb medicine such as pesticide residues, heavy metal, radioactive contaminants, aflatoxins, bacteria and fungi

PG 807 Phytotherapy

Guidelines for prescribing herbal medicines, drugs affecting digestive system, cardiovascular system, respiratory system, nonspecific enhancement of resistance, urinary system, rheumatic conditions, nervous system, nonspecific enhancement of resistance, urinary system, rheumatic conditions, nervous system, gynaeocological conditions, cancer, skin diseases, eye diseases, wounds and other injuries.

PG E8 Alternative Medicinal Therapies

The study of herbal preparations, nutritional supplements, and homeopathies. The study of herbal preparations that are widely used by the general public as self-selected OTC (over-the-counter) products/NPDs (nonprescription drugs). Food items for therapeutic, disease prevention, or health promotion purposes. Emphasis will be placed on the role of the pharmacist to help clients make an informed choice and counsel them on the selection of useful and safe products.

PG E9 Productions and Manufacture of Medicinal Plants

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

PG E10 Chromatography and Separation Techniques

Introduction and modes of separation, gel filtration and permeation, ion exchange chromatography, type properties, ion exchange and non-ion exchange manifestation and applications. High-pressure liquid chromatography, gas liquid chromatography and their applications.

PT 201 Physical Pharmacy

Principles of physical pharmacy, rheology and the flow of fluids, surface and interfacial phenomena, solutions and their properties, solubility and dissolution rate, disperse systems

PT 202 Pharmacy Orientation

Topic covered: History of pharmacy practice with particular emphasis on Arab impact, roles of the pharmacist, pharmacy organizations, systems of medicine, ethics of pharmacy, system for weights and measures, routes of drug administration, introduction to pharmaceutical dosage forms, types of prescription, and Incompatibilities, pharmaceutical terminology.

PT 403 Pharmaceutical Dosage Forms (1)

Includes, pharmaceutical calculation, pharmaceutical solutions, colloids and macromolecular system, coarse dispersions, suspensions and emulsions. Formulation, preparation and evaluation of solid forms, micromeritics, powders and granules, tablets, coating, hard capsules, soft capsules and microencapsulation

PT 404 Pharmacy Legislation

A detailed presentation of law that governs and affects the practice of pharmacy, legal principles for non-controlled and controlled prescriptions, over-the-counter 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.

PT 505 Pharmaceutical Dosage Forms (2)

Formulation, preparation and evaluation of semisolids and related dosage forms, transdermals, topical Drugs and Suppositories, parentral medications, ophthalmic preparations.

PT 506 Pharmacy Administration

Capital requirements, purchasing and financing a new pharmacy, location analysis, pharmacy layout design, space management for pharmacy practice, inventory purchasing and control, OTC merchandising, advertising, interpersonal communication, inter-professional relations and patient consultation

PT 607 Pharmaceutical Technology

Heat transfer, evaporation, drying, extraction, crystallization, filtration, centrifugation and distillation; Mixing, emulsification, homogenization, size reduction, size separation, size enlargements, materials for plant constructions, packaging materials, good manufacturing practice, flow of fluids, mass transfer, safety measures and validation

PT 608 Community Pharmacy Practice

Concept and techniques of pharmaceutical care, the pharmacy profession, professional communication, patient counseling, problem solving skills, role of the pharmacist in management of symptoms of certain disease of cardiovascular system, GIT, kidney, respiratory tract, eye, skin and certain rheumatic and metabolic disease.

PT 609 Biopharmaceutics and Pharmacokinetics

Factors affecting drug absorption, factors affecting drug elimination, product development, pharmacokinetics models, pharmacokinetics following I.V. administration, pharmacokinetics following oral dosage forms, kinetics of drug absorption, clearance, bioavailability and bioequivalence, absolute and relative bioavailability, assessment of bioavailability and correlation between in vitro dissolution and in vivo absorption.

PT E10 Quality Assurances and GMP

Quality control and assurance organization, analytical control, inspection control, documentatio environmental control, GMP regulations, statistical quality control.

PT E11 Applied Industrial Pharmacy

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

PT E12 Good Manufacturing practices

Concepts, objectives and applicability, general provisions, organization and personal, Building an facilities, materials, equipment, production and process controls, packing and labeling, contro distribution, laboratory controls, records and reports, returned and salvaged drug products, repacking inspections and recalls

PT E13 Cosmetic Preparations

Definition and concepts, classification, hair preparation, bath preparation, fragrance preparation, make up preparation, nail lacquers, shaving preparations, after-shave preparations, skin care, anal hygien products, antiperspirants and deodorants, quality control tests and evaluation of cosmetic products.

PM 401 General Microbiology and Immunology

Eukaryotic and prokaryotic cells, nomenclature of microorganisms, structure and form of the bacteria cells, spores, mycoplasma or PPLO, actinomycetes. Rickettsiae, viruses, eukaryotic microorganism (fungi), bacterial genetics, molecular genetics, physiology of microorganisms, the growth curve microbia metabolism. + Immunology

PM 502 Clinical Microbiology *

Topic covered include: Bacteriology; gram positive bacteria, the mycobacterium group, Gram negative bacteria, Chlamydia and Rickettsiae. Mycology: Ringworm, Moniliasis, Maduromycosis and Sporotrichosis Virology: RNA viruses and DNA viruses

Immunology: Host parasite relationship, Non-specific and specific immunity, Mechanism of protective immunity, Hypersensitivity and in vitro antigen antibody reactions, Autoimmunity and auto-immune disease, Immune deficiency disorders, Transplantation immunology, Cancer immunology, Immunologica tolerance

PB 703 Pharmaceutical Biotechnology

Introduction, biology of industrial micro-organisms, biophysical and biochemical processes, introductior to tissue culture and genetic engineering techniques. Techniques for the improvement of the economically important plants and animals and for the development of micro-organisms to act on the environment. Manipulation of living organisms, especially at the molecular genetic level, to produce new products, such as hormones, vaccines or monoclonal antibodies.
production of pharmaceuticals by microorganisms. Gene therapy.

PM 704 Pharmaceutical Microbiology

Sterilization, sterilization indicators, sterility testing, microbial contamination of pharmaceutical products, aseptic area, the microbiological quality of pharmaceuticals. Antimicrobial agents: classification, mechanism of action of antimicrobial drugs, drug combination, resistance of microorganisms to antimicrobial agents, assessment of a new antibiotic, microbiological assay of antibiotics, microbiological assay of vitamins, amino acids and growth factor, mode of action of nonantibiotic antimicrobial agents. Chemical disinfectants, antiseptics and preservatives.

PM E5 Biological Standardization

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

PM E6 Antimicrobial Agents

Factors affecting choice of antimicrobial agent, types of antimicrobial compounds, types of antibiotics and synthetic antimicrobial agents, clinical uses of antimicrobial drugs, manufacturing of antibiotics and other synthetic antimicrobial agents, principle methods of assaying antibiotics, mechanism of action antibiotics, bacterial resistance

PO 501 Pharmacology (1)

The general principles of pharmacology, pharmacokinetics, pharmacodynamics, receptor theory and drug interaction. This is followed by a comprehensive study of drugs acting on the autonomic nervous system cardiovascular system and renal system and autacoids.

PO 702 Pharmacology (2)

Drugs affecting the central nervous system, the gastrointestinal system, the blood and blood forming elements, as well as the drugs acting locally; the course deals with the chemotherapy of microbial diseases, neoplastic diseases and parasitic infestation and the study of hormones and hormone antagonists.

PO 803 Drug Interactions

Mechanism of drug interaction, significance of drug-drug interaction, management of drug-drug interaction, drug interaction of antibiotics, antiarhythmics, anticoagulants, anticonvulsants, barbiturates beta-agonists and antagonists, calcium channel antagonists, sulfonamides, drug-food interaction, drug smoking interaction, drug-environment interaction.

PO 904 Toxicology and Forensic Chemistry

Introduction to toxicology, general principles of toxicology, disposition of toxicants, poisoning with common drugs, poisoning with common chemicals, chemical and biological warfare agents, radiation and radioactive material toxicity, general management of poisoning, clinical toxicology of specific drug groups management of enveromation with natural toxins, maternal, foetal and neonatal toxicity.

Therapeutics

Therapeutic regimens for important prevalent diseases, including non-pharmacological approaches pharmacotherapeutic requirements for treatment of pediatric and geriatric patients, and for pregnant and lactating mothers, immuno-compromised patients, patients with reduced organ function, and those with multi-morbidities, importance of form and route of administration, dialysis procedures

characteristics of certain therapeutic regimens, particularly with regard to anti-infective therapy oncological therapy, and supportive therapy, anticoagulant therapy, immuno- and gene therapy an therapy of patients in intensive care

PO 906 Clinical Pharmacology
General principles of pharmacotherapy, principles of pharmacotherapy in special patients, impact of dru interactions on therapeutics, pharmacotherapy for infectious diseases, cardiovascular disorders respiratory disorders, gastrointestinal tract disorders and neurological and psychiatric disorders.

PO 007 Therapeutics (2)

PO E9 Veterinary Pharmacology
The commonly used veterinary biological and pharmaceutical preparations; general sanitary an management procedures for the prevention and control of livestock diseases; a brief review of infectiou diseases and animal parasites

PB 401 Biochemistry (1)
Subcellular organelles and membranes. Biological and biochemical properties of proteins, nucleic acids carbohydrates, lipids, porphyrins and enzymes. Biological oxidations, and related biochemical processes.

PB 502 Biochemistry (2)
Metabolic map, regulation of metabolism, metabolism of carbohydrates, metabolism of lipids, nitroger metabolism, integration of metabolism.

PB 803 Clinical Biochemistry
The course covers the analysis of blood and body fluid tests for the functional state of liver, kidney, heart bone, gastrointestinal tract, endocrine glands, and interpretation of the results in relation to health anc disease.

MD 101 Biophysics
Cell membrane structure, method of transport, channel types, receptors. Application of action potential, electrocardiogram and electroencephalogram identification and waves elucidation.

MD 102 Cell Biology
The cell theory, membranous organelles, non-membranous organelles, the cell inclusions, the nucleus, cell growth and proliferation, apoptosis, apoptosis and cancer, apoptosis and AIDS, apoptosis and organ transplants, cellular aging.

MD 203 Histology
Cytology, various tissues (epithelial, connective, muscular and nervous), heart, blood vessels, lymphatic organs, skin and its appendages, systems (digestive and associated glands, respiratory, urinary, reproductive, central nervous system), endocrine glands and eye.

MD 304 Anatomy
Introduction, skeletal system, muscular system, articular system, fascia, cardio-vascular system, lymphatic system, nervous system, digestive system, respiratory system, uro-genital system, endocrine glands, cytology, blood, structure of liver, spleen, lungs, kidney, lymph nodes, cardiac muscle, stomach, intestine and aorta

MD 305 Physiology
Introduction (body water, homeostasis, transport of materials), nervous system (autonomic nervous system), neuron structure and function (reflex arc), cardiovascular system, blood, respiratory cycle, gastrointestinal system, reproduction system, renal system, endocrine glands and body temperature regulation

MD 406 Parasitology
Introduction, protozoology; amoebae; ciliate; flagellates; blood and tissue sporozoa. Medica helminthology; nematodes; cestodes; trematodes, and arthropods

MD 507 Pathophysiology
Introduction to pathophysiology, cell injury, inflammation and immune response, autonomic nervous system in health and disease, endocrine disorders, pancreatic disorders, fluid and electrolyte imbalance, vascular and haematological disorders, disease of urinary, pulmonary and digestive systems.

MD 608 Pathology
The study of the etiology, principle diagnostic features, and main characteristics of diseases of the cardiovascular system, respiratory tract, central nervous system and other important organ systems of the body.

MD 609 First AID
Basic Life Support, bleeding, shock, medical emergencies, poisoning, bones and joints, soft tissue injuries, rescue and transportation

MD 710 Public Health
Introduction, epidemiology, communicable and non-communicable diseases, control of communicable diseases, immunization, infections, occupational medicine, environmental health, water-borne and food borne diseases, milk-born diseases, nutrition and family health, environmental pollution, waste water treatment, waste disposal

PP 701 Radiopharmaceuticals
Basic principles involving the application of radiation and radioactive compounds in medical diagnosis, therapy and industry. Rationale for utility, preparation and quality control of radiopharmaceuticals. Biologic effects of various radiations

PP 702 Clinical Pharmacy (1)
Definition and concepts, case history, patient management approach, patient history taking, clinical problem solving. Topics of discussion include, clinical drug-interactions, adverse drug reactions, drugs interference and clinical laboratory data.

PP 703 Hospital Pharmacy
Organisation and structure of a hospital pharmacy, hospital pharmacy department and dispensing hospital formulary, radio-pharmaceuticals and nuclear pharmacy, surgical dressing and sutures, plasma substitute, central sterile supply unit and its management, manufacture of sterile and non-sterile products, I.V. admixtures, pharmacy and therapeutic committee and manufacturing units in hospitals.

PP 704 Controlled Drug Delivery
Controlled and Modulated release drug delivery systems, theory, methods. eg. Microcapsules - Bioadhesives.

PP 805 Clinical Pharmacy (2)
Clinical pharmacy in obstetrics, gynaecology, neonates, paediatrics, geriatrics, blood disease and CNS disease. Nutritional deficiencies, energy and nutritional needs, enteral and parenteral nutrition

PP 806 Drug Marketing
Marketing analysis, orientation to decision making, management of new product venture, advertising distribution, marketing information system.

PP 907 Clinical Pharmacokinetics
Introduction, applied clinical pharmacokinetics, therapeutic drug monitoring, mono and multi-exponential 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 low therapeutic index, especially in patients with compromised renal and hepatic function.

PP 908 Oncology
Cancer etiology, risk factors, prognosis, types of tumors, systems affected, treatment, adjuvant therapy patients factors and patient's support measures.

PP 909 Clinical Nutrition
The course focuses on the kinds and amounts of macronutrients (carbohydrates, fat, and proteins) and micronutrients (vitamins and minerals) that are needed to maintain optimal health and prevent chronic disease in adults. Fluid and electrolyte therapy and acid-base balance.

PP 010 Treatment of Dermatological and Reproductive Disease
Most popular skin diseases, types, bacterial, viral and fungal diseases, differentiation.

PP 011 Treatment of Pediatrics Disease
Nutritional requirements in neonates and infants, Nutritional disorders, neonatology, infectious diseases in pediatrics, congenital heart diseases, endocrine disorders, neurological disorders, pediatric emergencies.

PP 012 Treatment of Cardiovascular Disease

Diseases comprising the cardiovascular system, symptoms, prognosis drugs, selection, patients advice with hospital setting practice.

PP 013 Gastroenterology
GIT diseases, epidemiological aspects, symptoms, treatment, patient advice, case reports.

PP 014 Treatment of Respiratory System Disease
Infections, occupational, immunological diseases. Assessment of respiratory efficiency treatment, O2 supply with case study reports.

PP 015 Drug information
Drug information and poison information centres, drug-drug interactions, drug-food interactions, drug disease interactions, and intravenous incompatibilities. Use of the Internet for drug and research information.

MS 101 Mathematics and Statistics
Functions and graphs, limits and continuity, differentiation, exponential, logarithmic, and trigonometric functions, integration, basic differential equations, functions of several variables and problems related to them, probability and random variables, hypothesis testing.

EN 101 English Language
Training in reading, comprehension, basic grammatical rules, writing and translation. The course adopts a systematic approach to proper essay writing, such as idea development, paragraph structure, introductions, support, and conclusions.

EN 302 Medical Terminology
Train the students to understand medical and pharmaceutical terminologies, medical abbreviations, medical idioms, suffixes and prefixes.

HU 201 Human right
* Pass Only

HU 302 Psychology
The objective of this course is to help understand the behavior of the people around us. Topics include Contemporary psychology: Psychological processes, sensation, perception, conditioned learning motivation. Secondary psychological processes: learning, memory, language and cognition, intelligence, personality, developmental psychology, environmental and child psychology.
Behavior dynamics: Groups, the individual, environmental, group problems, differentiation, density, handicaps, aggression, the media.
Mental Health: signs of good mental health and disturbances (neuroses and psychoses), conflicts and frustration as precursors to the neuroses, genetic predisposition and diseases as precursors to the psychoses, some of the main therapies in psychology.

HU 903 Sociology

Culture ethnicity, ethnocentrism, prejudice, race and stereotype subculture, skills of communication (verbal and non verbal

PC 306 Pharmaceutical Analytical Chemistry (2)

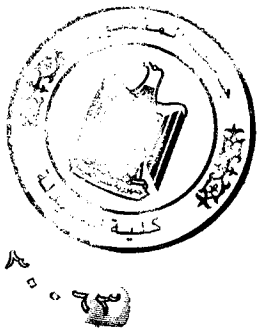
Includes titrimetry, acid-base equilibria and titrations, nonaqeous titrations, complexation equilibria and titration, oxidation-reduction and precipitation equilibria and titration, gravimetry. potentiometry conductimetry, principles and instruments of spectrometric methods of analysis and applications, water and lipid analysis

PC 407 Instrumental Analysis

This course includes, potentiometry, conductimetry, principles and instruments of spectrometric methods and applications, water and lipid analysis.

PP 702 Clinical Pharmacy (1)

Definition and concepts, case history, patient management approach, clinical problem solving. Topics of discussion include applied clinical pharmacokinetics, therapeutic drug monitoring, clinical drug interactions, adverse drug reactions, drugs and clinical laboratory data.



Attachment # 7
Students' Evaluation and Grading System

Grades are a measure of the performance of a student in an individual course.

Grade Expression	Grade Scale	Grade Point Average Value* (GPA)	Numerical Scale of Marks
Excellent	A	4	≥ 90 %
	A-	3.7	85 – < 90 %
Very Good	B+	3.3	82.5 – < 85 %
	B	3	77.5 – < 82.5 %
	B-	2.7	75 – < 77.5 %
Good	C+	2.3	72.5– < 75 %
	C	2	67.5 – < 72.5 %
	C-	1.7	65 – < 67.5 %
Satisfactory	D+	1.3	62.5 – < 65 %
	D	1	60 – < 62.5 %
Fail	F	0	< 60 %

a.* The grade point values above apply to marks earned in individual courses; grade point averages are weighted sums of the grade points earned.

2- Grade Point Average (GPA): The University calculates for each student, both at the end of each grading period and cumulatively, a grade point average (GPA) based on the ratio of grade points earned divided by the number of credits earned with grades of A-F (including pluses and minuses). Both the periodic and cumulative GPA appears on each student's record. Repeated courses will be counted once toward the calculation of accumulated credit hours. The best-achieved GPA will be used for calculating GPA. The cumulative GPA calculation starts from the first semester for each student and is updated each semester till his/her graduation. The semester GPA of the student is the weighted average of the grade points acquired in the courses passed in that particular semester.

The Board of Examiners will review and approve all final grades The Board of Examiners is to be advised of any adjustment made and the reason for doing so. This pertains to grades adjusted for the overall class. (Any adjustments made for individual students should be considered on an individual basis at Board of Examiners.