Program Specification

for

Master Degree in Pharmaceutics

(Pharmaceutics and Pharmaceutical Technology)

Master Degree Program

Faculty of Pharmacy

Pharos University in Alexandria

2021-2022

First Edition

A- Basic Information:

1-**Program Title**: Master's Degree in Pharmaceutics

2- **Program Type:** Single Double Multiple

3- **Department:** Pharmaceutics & Pharmaceutical Technology

4- **Program Coordinator:** Professor Rasha Shalaan

5- Date of Program Specifications Approval:

B- Special Information:

1. Program Aims:

The aim of the program is to provide the candidate with advanced knowledge, understanding and training in the field of advanced pharmaceutics, critical, analytical problem solving and transferable skills; ability to think rigorously and independently to meet higher level expectations in the field of specialty. In addition to preparing the postgraduate student in some specialized fields including drug delivery, nanomedicine, pharmacokinetics, biopharmaceutics, drug targeting, drug stability and industrial pharmacy. Moreover, providing students with enhanced knowledge of applying the conventional as well as the advanced methods to evaluate knowledge in pharmaceutics field. The candidate will have a wide vision about identifying professional research problems and finding innovative solutions. The acquired knowledge and skills are planned to acquire the researcher the proper search and research attitude based on the international criteria and sustainability principles.

Graduate Attributes:

By the end of this program the graduate should be able to:

1. Have the opportunity to continue their postgraduate education by conducting a thesis that involves extensive literature surveys and laboratory-based practical work which make them able to pursue a career in professional practices in the field of pharmaceutics.
2. Demonstrate acquisition of knowledge of fundamental concepts in pharmaceutics and integrate advanced knowledge and concepts in pharmaceutical sciences and other areas related to nanomedicine and industrial pharmacy
3. Develop the expertise and skills necessary for the design, preparation and evaluation of various drug delivery systems.
4. Have the ability of self-learning, problem solving, critical and analytical thinking, working in a team professionally and be aware about his/her role in community development.
5. Denote a research topic novelty, key research questions and principles as well as applications of basic methodologies of scientific research in the fields of advanced pharmaceutics and prepare a comprehensive written report that is professionally presented and contains all the required components of a master's thesis.
6. Communicate effectively and perform responsibilities in accordance with legal, ethical, and professional rules.

2- Intended Learning Outcomes (ILOs):

2.1- Knowledge and Understanding:

By completion of the program, students should be qualified to

A.1 Explain the principles of physicochemical characteristics of conventional and nanosized formulations.

A.2 Discuss the fundamental background and principles in the development of novel drug delivery systems. In addition to their application in different routes.

A.3 Recognize the biopharmaceutical aspects of drug absorption and how dosage forms and formulation factors influence drug absorption in different routes.

A.4 Discuss compartmental and non-compartmental analysis of pharmacokinetic data as well as nonlinear pharmacokinetics.

A.5 Recognize the principles of technology for producing pharmaceuticals on a commercial scale efficiently and economically. In addition to the various manufacturing processes required in realistic production.

A.6 Describe the basic idea behind GMP, purpose and the relation of GMP to other systems such as quality management and ISO. In addition to the specifications and regulations according to WHO.

A.7 Identify the knowledge of cosmetic products regarding their nature, formulations, and unwanted effects. In addition to the evaluation and testing of the cosmetic products and recent trend in cosmetic products.

A.8 Understand the major methods, models, and equations used in pharmacokinetics in relation to their physicochemical and physiological theories and limitations.

A.9 Discuss the basic information on the role of pre-formulation studies in drug delivery, drug development in the final generic products

A.10 Recognize the theoretical understanding of the role of excipients and their application in different formulation development.

A.11 Describe nanostructures as well as the basic principles of UV, Visible, fluorescence spectroscopy and different types of chromatographic, spectroscopic, and electrochemical techniques used in drug analysis.

A.12 Recognize bioinformatics software and web-based applications; that are required to search for, analyze and submit molecular biology and gene technology data to learn how to access new information in pharmaceutical research and development of new drugs.

A.13 Define the basic rules and principles of physical chemistry (states of matter, buffers, law of thermodynamics, kinetics terminology).

A.14 Recall rules needed for calculations to solve problems in different areas of analytical chemistry.

A.15 Illustrate the ability of using drug information resources and internet to acquire pharmaceutical knowledge.

A.16 Describe different analytical procedures, instrumentation, automation, and

laboratory mathematics used in research.

A.17 Identify the different types of stem cells, stem cell lines culturing requirements, characteristics, and applications of stem cells in biology and medicine.

A.18 Identify principles and applications of statistics and biostatistics.

2.2- Intellectual Skills:

By completion of the program, students should be qualified to:

B.1 Plan a research protocol to conduct independent and effective original research in pharmaceutics field.

B.2 Illustrate how to effectively present scientific data based on knowledge of different topics in the specialty field.

B.3 Analyze potential errors and limitations of key research studies related to one's research focus, including studies conducted by the student

B.4 Correlate and integrate different pharmaceutical knowledge to solve research scientific problems.

B.5 Characterize and evaluate the physicochemical properties of different pharmaceutical materials and systems

B.6 Evaluate the nanotechnological drug delivery systems and their application in the field of pharmaceutical research.

B.7 Apply the different kinetics and pharmacokinetics models using different computer designed programs.

B.8 Select appropriate drug delivery carrier(s) to maximize the therapeutic benefits of the drug.

B.9 Suggest the most recent pharmaceutics techniques for improving and studying drug bioavailability, targeting and stability.

B.10 Describe the important factors necessary for the design, preparation and evaluation of various dosage forms and advanced drug delivery systems.

B.11 Innovate scientific and professional approaches regarding experimental drug formulation design in the fields of pharmaceutics, cosmetics, and nanomedicine.

B.12 Determine processes in which materials undergo physical changes (unit operations) or certain chemical changes (unit processes).

B.13 Apply the concept of GMP, self-inspection and quality audits.

B.14 Select the appropriate excipient and carriers related to the properties of final delivery system

B.15 Apply different instrumental analytical techniques toward the analysis of drug substances in various conventional and advanced drug delivery systems.

B.16 Discover the scope of computational biology and bioinformatics software and web-based applications to analyze molecular biology and gene technology data for pharmaceutical research and drug design.

B.17 Distinguish between the different orders of reactions and calculate the half-life time of drugs.

B.18 Apply knowledge of molecular basis of drug action to design and perform laboratory studies in pharmacodynamic sciences.

B.19 Identify the proper design of experiment for successful international-publishing process.

B.20 Evaluate information data from a variety of sources for planning different work strategies.

2.3 - Professional skills:

By the end of this program the graduate should be able to:

C.1 Design set of experiments necessary to develop different drug delivery systems.

C.2 Demonstrate full commitment to good laboratory practice and quality assurance.

C.3 Appraise the published research work in his field properly.

C.4 Operate advanced technological research tools and equipment relevant to pharmaceutical research.

C.5 Develop research skills including knowledge of general principles and procedures of research methodology and experimental design in the fields of advanced pharmaceutics, biopharmaceutics, and drug delivery.

C.6 Develop independent and self-critical learning ability by solving scientific problems related to the candidate research focus.

C.7 Apply spectrophotometry in qualitative and quantitative determination of drugs, as well as advanced analytical methods and operating related instruments in laboratory.

C.8 Develop and assess novel methods of drug pre-formulation studies.

C.9 Develop skilled computer users with the technical background, to develop well-designed program software-based solutions to a range of variable scientific problems.

C.10 Create comments on reports for situation related to the field of pharmaceutics including critical reviews of scientific articles and peer evaluation.

C.11 Tailor the proper nanocarrier to solve delivery obstacles of drugs.

C.12 Develop proper chemical formulas of different chemical compounds and skills using calculations in different tasks.

2. 4 - General Skills:

By the end of this program the graduate should be able to:

D.1 Use internet to search relevant materials in textbooks and electronic sources.

D.2 Create skills of self-learning. group work and being effective as a leader or a team member.

D.3 Verbally deliver information in an organized, persuasive, and logical manner using supportive documentation and visual aids.
D.4 Effectively disseminate and defend one's research both orally and in writings.
D.5 Develop problem solving skills by interpreting data, designing, and carrying out experimental work.
D.6 Develop skills of handling advanced tasks within given time limits.

3- Academic Standards of Program Specification:

Academic Reference Standards (ARS) for Master Degree of Pharmaceutical Sciences (Pharmaceutics) which was accredited in a faculty council on.

4- External References for Standards (Benchmarks):

NA

5- Program Structure and Contents:

a- Program Duration: Minimum of two years

b- Program Structure:

Subject Areas	Percentage
Basic Sciences Courses	**36.8%**
Specialized Courses	**42.1%**
Thesis	**21.1%**

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

First Level (First Semester) 7 Credit hours (General courses)

No.	Course Code	Course Title	Credit Hours
1	PC 601	Physical Chemistry	2
2	PP 602	Pharmaceutical Nanotechnology	2
3	PM 601	Molecular Biology & Genetics	2
4	PM 602	Bioinformatics	1

First Level (Second Semester) 7 Credit hours (General courses)

No.	Course	Course Title	Credit

	Code		Hours
1	PC 602	Analytical & Instrumental Methods	2
2	PL 601	Molecular Basis of Drug Action	2
3	PP 601	Research Methods & Experimental Design	2
4	PL 602	Statistics & Biostatistics	1

Second Level (First Semester):

8 credit hours (6 Cr. compulsory specialized courses and 2 Cr. elective courses)

No.	Course Code	Course Title	Credit Hours
1	PP 703	Appraisal of Pharmaceutical Formulations	3
2	PP 704	Advanced Drug Delivery Systems	3
3		Elective Course	2

Second Level (Second Semester)

8 credit hours (6 Cr. compulsory specialized courses and 2 Cr. elective courses)

No.	Course Code	Course Title	Credit Hours
1	PP 705	Biopharmaceutics & Pharmacokinetics	2
2	PP 706	Advanced Industrial Pharmacy	2
3	PP 707	Seminars in Pharmaceutics	2
4		Elective Course	2

Thesis Research

No.	Course Code	Course Title	Credit Hours
1	PP 800	Thesis Research	8

d- Program Courses

a. Compulsory:

Course Code	Course Title	No. of Units	Hours per Week			Grade & Level	Semester
			Lect.	Lab.	Tut.		
PC 601	Physical Chemistry	2	2	—	—	First Level	First
PP 602	Pharmaceutical Nanotechnology	2	2	—	—	First Level	First
PL 601	Molecular biology & Genetics	2	2	—	—	First Level	First
PM 601	Bioinformatics	1	1	—	—	First Level	First
PC 603	Analytical & Instrumental Methods	2	2	—	—	First Level	Second
PL 602	Molecular basis of drug actions	2	2	—	—	First Level	Second
PP 601	Research Methods & Experimental Design	2	2	—	—	First Level	Second
PL 603	Statistics & Biostatistics	1	1	—	—	First Level	Second
PP 703	Appraisal of Pharmaceutical Formulations	3	3	—	—	Second Level	First
PP 704	Advanced Drug Delivery Systems	3	3	—	—	Second Level	First
PP 705	Biopharmaceutics & Pharmacokinetics	2	2	—	—	Second Level	Second
PP 706	Advanced Industrial Pharmacy	2	2	—	—	Second Level	Second

b. Elective courses:

Course Code	Course Title	No. of Units	Hours per Week			Grade & Level	Semester
			Lect.	Lab.	Tut.		
PP L08	Pharmaceutical industrial Quality Assurance	2	2	—	—	Second Level	
PP L09	Advanced Cosmetics	2	2	—	—	Second Level	
PP L10	Clinical Pharmacokinetics	2	2	—	—	Second Level	
PP L11	Pre-formulation: Basic excipients and applications	2	2	—	—	Second Level	

6- Program Courses Contents:

Course Title	Research Methods & Experimental Design								
Course Code	PP 601	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:
This course is designed to enhance students' research skills by introducing general principles and procedures of research methodology and experimental design in the fields of pharmacy including drug literature retrieval and evaluation, experimental design and methodology and the design of single and multiple factors experiments (e.g. factorial design or others). It also sheds light on accurate sampling techniques, data collection, reliability, validity analysis and ethical conduct in research. Finally, it introduces the candidate for thesis preparation, scientific writing and referencing styles & software.

Course Title	Molecular Biology & Genetics								
Course Code	PM 601	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Microbiology & Immunology								

Course Description:
This course aims to demonstrate an understanding of the current concepts of DNA structure, maintenance, and repair and to introduce the students to the basics of molecular biology and biotechnology. The course content will include the detailed structure of nucleic acids and description of DNA replication process, transcription and translation process in both eukaryotic and prokaryotic cells. One of the main objectives of this course is to describe the mechanisms of different molecular biology techniques, besides studying the mutations that cause some inherited diseases. The course will also point out the principles of gene cloning and gene therapy

Course Title	Bioinformatics									
Course Code	PM 602	Credit Hours	1	Lecture	1	Tutorial	0	Practical	0	
Pre-requisite	Permission of Instructor									
Department	Microbiology & Immunology									

Course Description:

The course aims at introducing the scope of computational biology to graduate students of pharmacy and to familiarize the students with bioinformatics software and web-based applications. Also, it helps the student to acquire the ability to search for, analyze and submit molecular biology and gene technology data, with the help of biological archives and public organizations. The course helps the postgraduate students in mastering the new approaches of pharmaceutical technology including Bioinformatics-based drug design, drug side effects, and interactions. The course Allows the students to learn how to access new information and to continue learning beyond the limits of this course.

Course Title	Statistics & Biostatistics								
Course Code	PL 602	Credit Hours	1	Lecture	1	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmacology & Therapeutics								

Course Description:

The course was designed to prepare the students to be able to differentiate between the different types of epidemiological studies, to recognize the nature of data whether qualitative or quantitative and hence apply the suitable descriptive statistics to summarize the data and/or visualize it. Moreover, students will understand the concept of normal distribution which is the basic needed to understand the concept of confidence interval and hypothesis testing. They will be able to use the suitable test whether parametric or non-parametric to compare groups or test the association between two variables. The course will enable students to interpret statistical outputs from computer generated results and evaluate the relative importance of those outcomes; and use Excel or other

statistical programs to evaluate pharmaceutical data.

Course Title	Physical Chemistry								
Course Code	PC 601	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutical Chemistry								

Course Description:
This course is formulated to give the essential basis and principles underpinning research in pharmaceutical chemistry. By the end of this course the student will be aware of the basis and principles of Physical Chemistry that will help him in the courses of Pharmaceutical Chemistry, Pharmaceutics, Phytochemistry, Microbiology and Pharmacology research. This course includes the essential basics regarding the thermochemistry and thermodynamics, chemical kinetics, electrochemistry, solutions, ionic equilibrium and acid base equilibrium of functional groups. In the meantime the course provides conceptual and intellectual foundation for further studies.

Course Title	Pharmaceutical Nanotechnology								
Course Code	PP 602	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:
This course has been developed to introduce students to the underlying principles and applications of the emerging field of pharmaceutical nanotechnology, scientific principles and theory relevant at the nanoscale dimension and to discuss the current and future research abilities and nanotechnology applications in physics, chemistry, biology, pharmacy and medicine. The student will study the methods of development of therapeutic nanosystems for the release and vectorization of drugs with chemical and biotechnological origin. The course will introduce the chemical preparation, analysis of nanomaterial and the chemical study of nanostructures. It will also include an overview of the chemical and physical fundamentals for nanotechnology, biosystems and molecular recognition. Tools for measuring and characterizing nanostructures, nanomaterials and nanofabrication will be studied. Structural study of organic/inorganic nanocomposites, pharmaceutical nanotechnology drug delivery systems including emulsions, microemulsion, multiple emulsions, micro-nano capsules and micro-nano spheres, liposomes and niosomes will be discussed.

Course Title	Analytical & Instrumental Methods								
Course Code	PC 602	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutical Chemistry								

Course Description:

This course is designed to provide the specialist essential fundamental background in pharmaceutical analysis and for other aspects of pharmaceutical sciences. In this course, the student will know the chemical composition of aqueous solutions and the effect of electrolytes on chemical equilibria. Moreover, the student will learn how to make equilibrium calculations for simple and complex systems and chemical calculations to determine concentrations of species of interest. The course covers the basic separation techniques such as chromatography & its applications in identification and quantification of drugs. In this course, the student will be able to describe the basic properties of electromagnetic radiation & interaction between radiation and matter and operate instrumental components used in spectrometry. Moreover, basic principles of molecular absorption & molecular fluorescence spectroscopy will be covered. The fundamental principles of electro-chemistry will be also covered such as oxidation-reduction reactions, electro-chemical calculations, potentiometry, pH measurements and electrolysis in analysis of medicinal substances.

Course Title	Appraisal of Pharmaceutical Formulations								
Course Code	PP 703	Credit Hours	3	Lecture	3	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course is designed to develop a detailed professional in-vitro, ex-vivo and in-vivo assessment of various pharmaceutical formulations starting from conventional dosage forms and reaching novel nanosized drug delivery systems. The physicochemical appraisal of conventional and nanosized formulations may include the study of; buffered and isotonic solutions, solubility and partitioning effects, principles and kinetics of drug stability, diffusion and dissolution, drug release and dialysis release studies, interfacial and adsorption phenomena, rheological parameters, particle size, zeta potential, poly dispersity index, electron microscopy, ex-vivo assessment, cell line studies and the most common in-vivo animal models.

Course Title	Advanced Drug Delivery Systems								
Course Code	PP 704	Credit Hours	3	Lecture	3	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course provides multidisciplinary approaches to fundamental background and principles in the development of novel drug delivery systems. Students should comprehend the pharmaceutical aspects of formulation principles in controlled drug release; diffusion-controlled, dissolution-controlled, osmotic-controlled, gastric retentive, controlled parenteral and pulsatile drug delivery systems. The application of the use of prodrugs, polymers, lipids, protein, and peptide and gene delivery science to optimize the drug delivery will also be focused on. Approaches will be studied in passive and active targeted drug delivery systems comprising fundamental conditions for their development.

Course Title	Biopharmaceutics & Pharmacokinetics								
Course Code	PP 705	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

Materials in this course are designed to familiarize the students with the biopharmaceutics classification system and biopharmaceutical aspects of drug absorption from gastrointestinal tract. The effect of dosage forms and formulation factors in influencing drug absorption will be studied. Bioavailability, absolute bioavailability, comparative bioavailability, bioequivalence, therapeutic equivalence, pharmaceutically equivalent products and pharmaceutical alternatives will be covered in this course. Compartmental and non-compartmental analysis of pharmacokinetic data as well as nonlinear pharmacokinetics will also be discussed.

Course Title	Advanced Industrial Pharmacy								
Course Code	PP 706	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course provides in-depth studying of the science and technology of producing pharmaceuticals on a commercial scale efficiently and economically. The course will cover pharmaceutical aspects in products' development, problems encountered with the formulation and production of different dosage forms, pharmaceutical packaging, pharmaceutical quality control procedures and industrial administration aspects. This course provides the quantitative study of various manufacturing processes to express the different operations in realistic production.

Course Title	Seminars in Pharmaceutics								
Course Code	PP 707	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

The seminar course is designed to provide students opportunities to present and discuss pharmaceutical topics and current research development in these areas through oral and written presentation. The topic and scope of the seminar should be within the disciplines of pharmaceutics and approved by the seminar supervisor. Students will become better acquainted with pharmaceutical literature and retrieval skills. They will be able to express and present their ideas and research for discussion by their peers and faculty staffs. Students will gain knowledge in critical appraise peer reviewed literature related to the research topic and present a good discussion and closing conclusion.

Course Title	Pharmaceutical Industrial Quality Assurance								
Course Code	PP L08	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course aims to ensure that the standards and principles, requested under the pharmaceutical inspection convection are implemented and intended to serve as a reference for the preparation of information during drug manufacturing practice. This guideline contains the updates according to FDA & EMEA and basic guidelines according to MOH in Egypt. The guidelines are applicable to all large-scale operations for the production of drugs in their finished dosage forms. The course includes the guide to GMP that can be used as a standard to justify GMP status on the quality of pharmaceutical products in Egypt. Justification will be implemented through the assessment of applications for manufacturing authorizations and as a basis for the inspection of manufacturing facilities, equipment used in quality assessment, clean room requirements for pharmaceutical systems and HVAC design. The student will learn the methods applied in documentation (SOP's and batch production records) as well as self- inspection, quality audits and validation (process and cleaning validation). An overview on the specifications and regulations according to WHO will be implemented.

Course Title	Advanced Cosmetics								
Course Code	PP L09	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course is designed to develop an in-depth introduction to the knowledge of cosmetic products regarding their nature as well as formulations, indications and unwanted effects. In addition, the evaluation and testing of the cosmetic products will be studied. This information is of particular interest for conveying proper counseling to consumers looking for pharmacist's consultation as an expert. The course will cover several topics with emphasis on the structure, function and disorders of skin, hair and nails, formulation, manufacture, and evaluation of cosmetics for the different body parts and unwanted side effects of the applied cosmetics. Nanotechnology and recent trends in cosmetics will also be implemented.

Course Title	Clinical Pharmacokinetics								
Course Code	PP L10	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course is designed to highlight the major methods, models, and equations used in pharmacokinetics in relation to their physicochemical and physiological theories and limitations. Graphical and computer methods of applying pharmacokinetics experimental and clinical data will be explored. Clinical research literature and approaches to the design of studies will be studied together with the international ethical approval guidelines.

Course Title	Preformulation: Basic Excipients and Applications								
Course Code	PP L11	Credit Hours	2	Lecture	2	Tutorial	0	Practical	0
Pre-requisite	Permission of Instructor								
Department	Pharmaceutics & Pharmaceutical Technology								

Course Description:

This course will provide the students with the basic information on the role of preformulation studies in drug delivery and development in the final generic products. Preformulation assessments will involve the study of different aspects as aqueous solubility, permeability, solid state properties, stability, compaction and compatibility studies. The role of excipients in generic products' development will be also discussed.

7- Program Admission Requirements:

Admission requirements include:

1. Holders of bachelor's degree in Pharmaceutical Sciences minimum general grade Good (C+), or the equivalent of this grade from one of the universities recognized by the Supreme Council in the field of specialty, or from an equivalent foreign university.
2. In case the applicant is granted a Pass in his bachelor's degree and wants to register for a master's degree, he must obtain a specialty diploma with general grade (C^{+}) at least, or pass the complementary courses determined by the department, with a general grade no less than (C^{+}) and these courses are not part of the hours of the program.
3. The student gets the approval of the department council if he fulfills the terms set by the scientific department (if any) and then the approval of the faculty's Council.

8- Regulations Rules for Program Course Completion:

To obtain a master's degree, 30 credit hours must be studied, in addition to 8 credit hours for the thesis, so that the total number of hours to obtain the degree is no less than 38 credit hours.

9- Teaching and Learning Methods

Teaching and Learning Method	**Skills to be Achieved**
Lectures	Knowledge, Understanding, Intellectual and Professional Skills
Practical	Knowledge, Understanding, Intellectual, Professional & Practical and General & Transferable Skills
Research project	
Interactive modules: Self-Learning assignments, Group presentation/Discussion, Case study, Problem solving, Cooperative learning, Simulation and Videos	

10- Methods and Rules of Student's Evaluation:

Methods	Program Intended Learning Outcomes
Written exams Final written exam (40%) Midterm exam (20%)	General knowledge & Understanding and Intellectual and Professional Skills
Oral exams (10%)	General Knowledge & Understanding, Intellectual, Professional and General Skills
Continuous assessment (30%)	General Knowledge & Understanding, Intellectual, Professional and General skills

11- Examinations Procedure:

1. **The final grade awarded to student in a course are distributed as follows:**
   - 30% for the continuous assessment.
   - 20% for the mid-semester exam.
   - 40% for the final written exam
   - 10% for the oral exam

2. **Each credit hour is allotted a total of 100 points.**

- **Grading System:**

Grade		Numerical Average	Grade points
Excellent	A+	100 – 97	4.0
Excellent	A	$90 \leq X < 97$	3.85
Excellent	A-	$85 \leq X < 90$	3.7
Very Good	B+	$80 \leq X < 85$	3.3
Very Good	B	$75 \leq X < 80$	3.0
Good	C+	$70 \leq X < 75$	2.7
Good	C	$65 \leq X < 70$	2.3
Pass	D	$60 \leq X < 65$	2.0
Fail	F	$X < 60$	0.0
Satisfactory	S	—	—
Unsatisfactory	US	—	—
In progress	IP	—	—
Withdrawal	W	—	—
Military withdrawal	MW	—	—
Incomplete	I	—	—
Excuse	E	—	—
No excuse	NE	0.0	0.0
Denial	DN	0.0	0.0

X = Percentage Grade.

$$\text{Cumulative GPA} = \frac{\sum \text{Grade points} \times \text{N° Cr. Hrs}}{\sum \text{Cr. Hrs}}$$

Evaluation of Program Intended Learning Outcomes:

Evaluator	Tool	Sample	% Contribution in total marks of program evaluation
Student	Questionnaires and periodic meeting	Questionnaires 20% and periodic meeting	25%
Graduates	Questionnaires and periodic meeting	Questionnaires 20% and periodic meeting	25%
Stakeholders (employers)	Questionnaires and periodic meeting	One meeting/year	25%
External evaluator	Reviewing of the specifications of the program and the courses according to the by law.	At least one reviewer professor in the specialty	25%