Zagazig University

Faculty of Pharmacy

Pharmaceutics Department

Program and Course Specifications

Master and Ph.D.

Degrees

2017/2018

Master Degree

Program Specification

Program Specification

A- Basic Information

1- Program title: M.Pharm. Sci Degree in **Pharmaceutics**

2- Program type: Single

3- Faculty/ University: Faculty of Pharmacy, Zagazig University

4- Department: Pharmaceutics

5- Coordinator: Prof. Dr.

6- Date of program specification approval: 2017/2018

B- Professional Information

1- Program aims:

Master's program, Zagazig University is a 3-5 five years pharmacy education offering a Master's degree in pharmaceutical sciences (Pharmaceutics). This Program aims at providing postgraduate students with knowledge, skills and abilities needed to practice the pharmacy profession effectively in various settings including Research Institutes, private and public medical laboratories, universities, National Quality Control Centers (foods & drugs) and Ministry of Health.

The program aims are summarized as follows:

1. Provide the community with highly qualified professionals with skills and ethical values based on National Academic Reference Standards (NARS).

2. Help acquire the necessary knowledge and skills in areas related to physical pharmacy, biopharmaceutics and pharmacokinetics, pharmaceutical technology, trandermal drug delivery, controlled release dosage forms and drug stability.

3. Apply various recent quantitative techniques in biopharmaceutics and pharmacokinetics.
4. Develop communication skills, time management, critical thinking, problem solving, decision making, team working, using modern information technology, design and conduct research.
5. Implement the sense of self learning for continuous improvement of professional knowledge and skills.

2- Graduate attributes:

Masters graduates work in a multidisciplinary profession and must acquire the necessary attributes in various pharmaceutics aspects for pursuing their career. Graduate attributes are the qualities, skills and understandings a faculty community agrees its students should develop during their time with the institution, these attributes include the disciplinary expertise and technical knowledge in the core of the studied course and research studies as follows:

1- Illustrate the advances in biopharmaceutics and pharmacokinetics and estimate bioavailability and rate of drug release and calculate drug doses.
2- Illustrate and apply the principles and mechanisms of different apparatus for pharmaceutical processes and choose the appropriate methods for quality assurance and assay of raw materials and pharmaceutical preparations during manufacture.
3- Acquire knowledge of the principles of physical pharmacy.
4- Illustrate the principles of design, properties, and mechanisms of controlled-release dosage forms and illustrate the stability programs for different pharmaceutical products.

5- Determine different types of transdermal drug delivery systems and their therapeutic uses
6- Acquire the essential knowledge of pharmacy including laws, ethics, duties and rights.

3-Intended Learning Outcomes (ILOs):

The Program provides excellent opportunities for students to demonstrate knowledge and understanding qualities and develop skills appropriate for Pharmaceutics Master of sciences degree.

3-1- Knowledge and Understanding :

On successful completion of the Master degree Program, students will be able to:

A.1- Demonstrate biostatistics application and interpretation of statistical analysis of experimental data.

A.2- Illustrate the essential information about the mechanism of diseases and the appropriate methods of treatment.

A.3- Illustrate the basics for genetic engineering and principal and applications of PCR technology.

A.4- Mention the principles of physical pharmacy.

A.5- Identify the principles of Biopharmaceutics and pharmacokinetics and estimate bioavailability and rate of drug release and calculate drug doses.

A.6- Demonstrate the principles and mechanisms of different apparatus for pharmaceutical processes, choose the appropriate methods for quality assurance and assay of raw materials and pharmaceutical preparations during manufacture.

A.7- Mention the principles of design, properties, and mechanisms of controlled-release dosage forms.

A.8- Demonstrate the stability programs for pharmaceutical products and the latest regulations for stability testing and ability to predict the degradation pathways of a drug design a stabilization protocol and predict a product shelf-life.

A.9- Outline different types of transdermal drug delivery systems and their therapeutic uses

A.10- Outline the basis and applications of instrumental analysis and describe theories, operation, pharmaceutical and biological applications of instrumental techniques.

A.11- Mention the legal aspects for professional practices.

A.12- Define ethics and relevant law of scientific research and professional work.

3-2 - Intellectual Skills:

On successful completion of the Master degree Program, students will be able to:

B.1- Analyze and evaluate the information gained in the field of pharmaceutics to solve problems.

B.2- Suggest proper and logic solutions to the research problems using the available information.

B.3- Plan to solve possible problems based on the integration of required pharmaceutical knowledge.

B.4- Conduct research and write reports and papers on the obtained data.

B.5-Deal effectively with risks and hazards during professional practice.

B.6- Evaluate the studied topic and plan to improve the performance.

B.7- Take professional decisions in the area of specialization.

3-3 - Professional and Practical Skills:

It is intended that, on successful completion of the Master degree Program, students will be able to:

C.1-Acquire and apply different basic and modern skills in formulation, improving properties and bioavailability of different dosage forms.

C.2- Write and evaluate research projects and reports in the field of pharmaceutics.

C.3- Evaluate and improve methods and tools and use advanced technology in the practical work.

3-4 - General and Transferable Skills:

On successful completion of the Master degree Program, students will be able to:

D.1- Communicate effectively with professors, colleagues and technicians.

D.2- Acquire computer skills in analyzing results and presenting them.

D.3-Self assessment and plan to cover the needs.

D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.

D.5- Evaluate performance of others and help them to develop the performance.

D.6- Work effectively as a member of team.

D.7- Get maximum use of time to achieve goals.

D.8- Continuous learning to improve the career.

4- Academic Standards:

Faculty is committed to the Academic References Standards for postgraduate studies (March 2009).

Matrix : Comparison between Master degree program ILOs and the Academic Reference Standards (ARS).

	ARS	Program ILOs
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Demonstrate biostatistics application and interpretation of statistical analysis of experimental data. A.2- Illustrate the essential information about the mechanism of diseases and the appropriate methods of treatment. A.3- Illustrate the basics for genetic engineering and principal and applications of PCR technology.
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.4- Mention the principles of physical pharmacy. A.5- Identify the principles of Biopharmaceutics and pharmacokinetics and estimate bioavailability and rate of drug release and calculate drug doses. A.6- Demonstrate the principles and mechanisms of different apparatus for pharmaceutical processes, choose the appropriate methods for quality assurance and assay of raw materials and pharmaceutical preparations during manufacture.
	2.1.3- Scientific developments in the area of specialization.	A.7- Mention the principles of design, properties, and mechanisms of controlled-release dosage forms. A.8- Demonstrate the stability programs for pharmaceutical products

		and the latest regulations for stability testing and ability to predict the degradation pathways of a drug design a stabilization protocol and predict a product shelf-life. A.9- Outline different types of transdermal drug delivery systems and their therapeutic uses.
	2.1.4- Moral and legal principles for professional practice in the area of specialization.	A.10- Outline the basis and applications of instrumental analysis and describe theories, operation, pharmaceutical and biological applications of instrumental techniques.
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.11- Mention the legal aspects for professional practices.
	2.1.6- The fundamentals and ethics of scientific research.	A.12- Define ethics and relevant law of scientific research and professional work.
2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and evaluate the information gained in the field of pharmaceutics to solve problems.
	2.2.2- Solve specified problems in the lack or missing of some information.	B.2- Suggest proper and logic solutions to the research problems using the available information.
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Plan to solve possible problems based on the integration of required pharmaceutical knowledge.
	2.2.4- Conduct research and write scientific report on research specified topics.	B.4- Conduct research and write reports and papers on the obtained data.

	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B.5-Deal effectively with risks and hazards during professional practice.
	2.2.6- Plan to improve performance in the field of specialization.	B.6- Evaluate the studied topic and plan to improve the performance.
	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B.7- Take professional decisions in the area of specialization.
2.3	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1-Acquire and apply different basic and modern skills in formulation, improving properties and bioavailability of different dosage forms.
	2.3.2- Write and evaluate professional reports.	C.2- Write and evaluate research projects and reports in the field of pharmaceutics.
	2.3.3- Assess methods and tools existing in the area of specialization.	C.3- Evaluate and improve methods and tools and use advanced technology in the practical work.
2.4	2.4.1- Communicate effectively.	D.1- Communicate effectively with professors, colleagues and technicians.
	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.
	2.4.3- Self-assessment and define his personal learning needs.	D.3-Self assessment and plan to cover the needs.
	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.
	2.4.5- Set criteria and parameters to evaluate the performance of others	D.5- Evaluate performance of others and help them to develop the performance.
	2.4.6- Work in a team and lead teams carrying out	D.6- Work effectively as a member of team.

	various professional tasks.	
	2.4.7- Manage time effectively.	D.7- Get maximum use of time to achieve goals.
	2.4.8- Continuous and self learning.	D.8- Continuous learning to improve the career.

5-Curriculum Structure and Contents:

a- Program duration: **3- 5** years

b- Program structure:

- The Masters program can be completed in 3-5 years.
- The Faculty of pharmacy implements the credit hour system.
- The program is structured as:

1- Courses: General (1 year) and Special

No. of credit hours for program courses:

Compulsory: 12

Elective: (2x4) 8

Special: (3x4) 12

2- Thesis: 30 hours

The candidate must complete a research project on an approved topic in the Pharmaceutical Sciences. To fulfill this requirement the student must present (written and orally) a research proposal and write a thesis.

3- General University Requirements: 10 credit hours including:

a- TOEFL (400 units)

b- Computer course

c-Program Curriculum:

Course Code	Course Title	Credit hours	Program ILOs Covered
	General Courses:		
M103	1- Physical Pharmacy	2	A4, B5 D2, D4
M104	2- Biopharmaceutics and Pharmacokinetics	2	A5, B1, D2, D4
ME1	3- Pharmaceutical technology	2	A6, B3 D2, D4, D6
M111	4- Biostatistics	2	A1, B1, B6, D2
M102	5- Instrumental analysis	4	A10, B2, B3, D2, D5, D6
ME4	6- Elective A Biotechnology	4	A3, B3 D2, D4,D6, D8
ME5 ME7	7- Elective B Applied Pharmacology Drug induced diseases	4 4	A2, B3, B7, D3 A1, A2, B2, B3, D4
	Special Courses:		
Esp1	Controlled release dosage forms	4	A7, B3 D2, D4
Esp2	Drug stability	4	A8, A11, A5, B1, B2 D2, D4
Esp3	Transdermal drug delivery systems	4	A9, A11, A5, B1 D2, D4

	Thesis	30	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, C1, C2, C3, D1, D2, D3, D4, D5, D6, D7, D8

6-Program admission requirements:

- The Applicant should finish or being permanently or temporarily exempted from the military service and temporary exemption should be valid for at least one year from the date of beginning of study. (Exceptions apply for demonstrators and assistant lecturers).
- The applicant admission to the M.Sc. program should be no later than ten years from the time of graduation.
- Acquisition of an approval from the Faculty Council following an approval of concerned Departmental Board as well as Graduate Studies and Research Committee recommendation within a maximum of one month for any conditions stated by the concerned Departmental Board.

Admission Conditions for M.Sc. degree

In addition to the general admission conditions stated before, applicants are admitted to M.Sc. degree upon fulfillment of the following:

The applicants should be holders of Bachelor in Pharmaceutical Sciences from any Faculty of Pharmacy with a general grade at least good (cancelled by a decision of the university council) affiliated to

the Egyptian Universities or an equivalent degree granted by any institute recognized by the Supreme Council of Universities.

The Faculty council is allowed, on consent of the concerned Departmental Board as well as Graduate Studies and Research Committee, to accept student for registration of M.Sc. degree if he has got a diploma from one of the Egyptian Universities in one of the pharmaceutical sciences fields, Faculties, or Institutes that are recognized by the Supreme Council of Universities with a general grade of Good regardless his grades in bachelor degree.

Students should fulfill all the admission requirements stated by the concerned Departmental Board (ICDL certificate, local TOEFL certificate with a grade at least 450).

Admission has to be done within the period announced by the university. Candidate thesis discussion isn't before one calendar year from research point registration.

Regulations to complete the program:

The Faculty Council, in compliance with the concerned Departmental Board as well as Graduate Studies and Research Committee recommendation awards the M.Sc. degree upon fulfillment of the following requirements:

- Carrying out a deep research in the area of specialization for at least one or two calendar years and at most three years from the time of registration.
- The student has to succeed in all courses examinations.
- Acceptance of the research thesis by the Jury Committee according to statement 104 of universities regulating law.

Cancellation of Registration

The Faculty Board is allowed to cancel registration for M. Sc. programs in the following circumstances

- Student's failure to pass the course examinations for two times.
- Student's nonattendance or unsatisfactory progress (at least two annual reports) in research work being reported by the advisors and chief supervisor to the Departmental Board and forwarded to the Graduate Studies and Research Committee recommendation for approval of cancellation.
- Dissertation refusal by the Jury Committee.
- Incapability of the student to graduate by the deadlines indicated.

7- Admission Policy:

The faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (ESCU).

8-Student assessment methods:

Method	ILOS
Written exam	Knowledge and Understanding and Intellectual Skills
Oral exam	Knowledge and Understanding ,Intellectual Skills and General and Transferable Skills
Activity	Intellectual Skills and General and Transferable Skills
Seminars	Knowledge and Understanding ,Intellectual Skills & General and Transferable Skills
Follow up	Professional and practical Skills & General and Transferable Skills

Thesis and oral presentation	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

Grade Scale	Grade point average value (GPA)	Numerical scale
A+	5	≥ 95%
A	4.5	90- < 95%
B+	4	85- < 90%
B	3.5	80- < 85%
C+	3	75- < 80%
C	2.5	70- < 75%
D+	2	65- < 70%
D	1.5	60- < 65%

9-Failure in Courses:

Students who fail to get 60% (1 point)

10-Methods of program evaluation

Evaluator	Method	Sample
Internal evaluator: Professor Dr. Hanaa El-Ghamry	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor Dr. Osama Hassan	Program evaluation Courses evaluation	Program report Courses report
Others methods	Matrix with ARS Questionnaires	The Matrix Results of the

		questionnaires

Program coordinator **Head of Department**

تم اعتماد التوصيف بمجلس القسم بتاريخ

Biopharmaceutics and pharmacokinetics

Course specification of Biopharmaceutics and pharmacokinetics

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.

- **Date of specification approval:** 2017

1- Basic information:

Title: **Biopharmaceutics and pharmacokinetics** Code: M 104
Lectures: 2 hrs/week Credit hours: 2 hrs/week
Total: 2 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Describe the principles of Biopharmaceutics and pharmacokinetics.
- Estimate bioavailability and rate of drug release and calculate drug doses.

3- Intended learning outcome s (ILOs) of Biopharmaceutics and pharmacokinetics:

Knowledge and Understanding	
a1	Describe the effects of different factors on the rate of absorption, distribution, biotransformation and elimination of drugs.
a2	Illustrate methods of estimation of bioavailability and principles of drug clearance
a3	State applications of pharmacokinetics in clinical situations.
Intellectual skills	
B1	Apply methods for estimation of bioavailability and drug clearance in the body
General and Transferable skills	
d1	Develop critical thinking, problem-solving and decision-making abilities.

4. Course Content of Biopharmacutics and pharmacokinetics (Master degree):

Week number	Lecture content (2 hrs/week)
1	Factors affecting bioavailability (biological and physiological)
2	Physicochemical factors, advantages and disadvantages of oral administration.
3	Distribution and factors affecting it.
4	Elimination , biotransformation, and urinary excretion .
5	Minor routes of drug elimination
6	Use of physical and animal models to evaluate bioavailability.
7	Review on bioequivalence study through revision of certain scientific research papers.
8	Pharmacokinetic models, volume of distribution, and total body clearance.
9	Problems in determination of bioavailability of urine and saliva sample.
10	Loading dose, steady state, lag time, and flip-flop.
11	Method of residuals, therapeutic drug monitoring, and dosage regimen design.
12	Pharmacokinetic parameters.
13	Kidney and liver function tests.
14	Haemodialysis.
15	Revision and open discussion.

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1
Oral exam to assess: a1, a2, a3, b1, c1
Activities to assess: b1, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	-----	100	100%

7- References and books:

A-Scientific papers

B- Essential books: Text book of biopharmaceutics and clinical pharmacokinetics, Safaris Niazi, Appleton-century-crofts, 292 Madison Avenue, New York, USA (1979).

C- Suggested books: Applied Biopharmaceutics and Pharmacokinetics Shargel, L., and Andrew B.C.,VU. 3rd edition, East Norwalk, Connecticut, USA (1993).

D- Websites: Pubmed, Sciencedirect, Nejm, Weily interscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, computers and data show.

- **Course Coordinators: Prof Dr/ Fakhr El-din Ghazy**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:** **تم اعتماد التوصيف بمجلس الكلية رقم بتاريخ 23-9-2017**

Matrix I of Biopharmaceutics and Pharmacokinetics

	Course Contents	ILOs of Bipopharmaceutics and Pharmacokinetics course					
		Knowledge and understanding			Intellectual skills	Transferable and general skills	
		a1	a2	a3	b1	d1	d2
1	Factors affecting bioavailability (biological and physiological)	X					
2	Physicochemical factors, advantages and disadvantages of oral administration.	X					
3	Distribution and factors affecting it.		X				
4	Elimination , biotransformation, and urinary excretion .	X					
5	Minor routes of drug elimination	X					
6	Use of physical and animal models to evaluate bioavailability.	X					
7	Review on bioequivalence study through revision of certain scientific research papers.	X				x	x
8	Pharmacokinetic models, volume of distribution, and total body clearance.		X		X		
9	Problems in determination of bioavailability of urine and saliva sample.		X				
10	Loading dose, steady state, lag time, and flip-flop.		X				
11	Method of residuals, therapeutic drug monitoring, and dosage regimen design.		X				
12	Pharmacokinetic parameters.		X				
13	Kidney and liver function tests.			x	X		
14	Haemodialysis.	x	X	x	X		
15	Revision and open discussion.	X	X	x	X	x	

Matrix II of Biopharmaceutics and pharmacokinetics										
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Understand the basics and principles of pharmaceutics and different related subjects.	a1	Basic pharmacokinetic relationships Major pharmacokinetic parameters Enterohepatic circulation Clearance Popular pharmacokinetic in therapeutic drug monitoring	Textbooks, Scientific papers and self learning	x	x	X	x	
	2.1.3- Scientific developments in the area of specialization.	A.3- Illustrate the continuous development in pharmaceutics and applications of pharmaceutical industries in different fields.	a2	Absorption 1st pass effect P-Glycoprotein Cytochrome P-450 Drug dosing in renal disease Pharmacokinetic in hepatic disease	Textbooks, Scientific papers and self learning	x	x	X	x	

			a3	Pharmacogenetics Non-linear pharmacokinetics Non-compartmental pharmacokinetics	Textbooks, Scientific papers and self learning	x	x	X	x	
2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1-Analyze and evaluate the information gained in the field of pharmaceutics to solve problems.	b1	Order of reactions Applications of pharmacokinetics in clinical situations	Textbooks, Scientific papers and self learning	x	x	X		
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks, Scientific papers and self learning		x			**x**
	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks, Scientific papers and self learning		x			**x**

Pharmaceutical Technology

|Course specification of Pharmaceutical Technology

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Pharmaceutical technology** Code: ME1
Lectures: 2 hrs/week Credit hours: 2 hrs/week
Total: 2hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Illustrate the principles and mechanisms of different apparatus for pharmaceutical processes
- Apply the principles that should be followed during drug manufacture, formulation, design, labeling and storing
- Choose the appropriate methods for quality assurance and assay of raw materials and pharmaceutical preparations during manufacture
- Interact effectively and work as a member of a team.

3- Intended learning outcome s (ILOs) of Pharmaceutical Technology:

Knowledge and Understanding	
a_1	Identify principles and mechanisms of different pharmaceutical processes.
a_2	Ensure quality during pharmaceutical manufacturing.
a_3	Illustrate recent apparatus used in pharmaceutical manufacturing
Intellectual skills	
b1	Apply the needed pharmaceutical knowledge for solving problems in manufacturing
General and Transferable skills	

d1	Demonstrate critical thinking and decision making during pharmaceutical preparations
d2	work as a member of a team

4. Course Content of Pharmaceutical Technology (Master degree):

Week number	Lecture content (2 hr/w)
1	• Preformulation
2	• Material of fabrication and corrosion
3	• Granulation and factors affecting it
4	• Tablet manufacture
5	• Types of tablet coating
6	• Sterilization
7	• Packs of pharmaceutical preparation
8	• Size reduction and factors affecting it
9	• Technique of milling
10	• Wet and dry milling , types of mill
11	• Determination of particle size
12	• Micromeritic and methods of particle size control
13	• Factors affecting solid mixing
14	• Tumbling and agitator mixers and mixers for semisolid
15	• Open discussion and revision

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1
Oral exam to assess: a1, a2, a3, b1, c1, c2
Activities to assess: b1, c1, c2

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	------	100	100%

7- References and books:

A- Essential books: Bentley's text book of Pharmaceutics by Rawlins, E. A. 8th ed (1984).

B- Suggested books: The theory and Practice of Industrial Pharmacy (1976) by Lachman, L., Lieberman, H. A., Kanig, J. L., Lea and Febiger, Philidelphia, USA.

C- Websites: Pubmed, Sciencedirect, Nejm, Weily interscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, Computers, data show.

- **Course Coordinators: Prof Dr/ Fakhr El-din Ghazy**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:2017-9-23 تم اعتماد التوصيف بمجلس الكلية رقم بتاريخ**

Matrix I of Pharmaceutical technology								
Course Contents		ILOs of Pharmaceutical technology course						
		Knowledge and understanding			Intellectual skills	Transferable and general skills		
		a1	a2	a3	b1	d1	d2	d3
1	Preformulation	x						
2	Material of fabrication and corrosion			x				
3	Granulation and factors affecting it			x	x			
4	Tablet manufacture		x		x			
5	Types of tablet coating	x						
6	Sterilization	x						
7	Packs of pharmaceutical preparation	x				X	X	x
8	Size reduction and factors affecting it		x		x			
9	Technique of milling	x						
10	Wet and dry milling , types of mill			x	x			
11	Determination of particle size			x	x			
12	Micromeritic and methods of particle size control	x						
13	Factors affecting solid mixing	x						
14	Tumbling and agitator mixers and mixers for semisolid	x						
15	Open discussion and revision	x	x	x	x	X	X	x

Matrix II of Pharmaceutical technology										
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Understand the basics and principles of pharmaceutics and different related subjects.	a1	Types and classes of tablets Types of tablet coating film, coating solution and film coating process Filtration Cake compressibility and filter aid Membrane filter Powders and granules Granulation Powder flow	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.3-Illustrate the continuous development in pharmaceutics and applications of pharmaceutical industries in different fields.	a3	Manufacturing of compressed tablet Methods of tablet manufacturing Apparatus for continuous and patch filtration	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.5- Principles and the basics of quality in professional practice in the area of specialization	A.5- Identify the basics of good laboratory practice and quality assurance in the wide field of pharmaceutics.	a2	Evaluation of tablets Sterilization Methods of sterilization	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Plan to solve possible problems based on the integration of required pharmaceutical knowledge.	b1	Methods of tablet manufacturing - Evaluation of tablets -Apparatus for continuous and patch filtration - Sterilization - Methods of sterilization	Textbooks, Scientific papers and self learning	x	x	x	x	
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks, Scientific papers and self learning		x			**x**
	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks, Scientific papers and self learning		x			**x**

	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D.6- Work effectively as a member of team.	d3	Activity	Textbooks, Scientific papers and self learning		x			**x**

Physical Pharmacy

Course specification of Physical Pharmacy

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Physical pharmacy** Code: M103
Lectures: 2 hrs/week Credit hours: 2 hrs/week
Total: 2 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

• Acquire knowledge of the principles of physical pharmacy

• Be able to design, evaluate and interpret the therapeutic efficacy of homogenous and heterogeneous dosage forms.

• Understand the implications of the physical interactions on the outcome of the drug product.

3- Intended learning outcomes (ILOs) of Physical Pharmacy:

A-Knowledge and Understanding	
a1	Illustrate the principles of physical pharmacy including equilibrium phenomena, dissolution, phase equilibrium, phase rule and disperse systems
a2	Explain the polymer science controlling the formulation modification and use
a3	Mention types of complexation that may occur during preparation of different dosage forms and method of analysis of each type.
B-Intellectual skills	

b1	Apply the knowledge of properties of different ingredients and possible complexation that may occur in improving the formulation of different dosage forms
C-General and Transferable skills	
d1	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of Physical pharmacy (Master degree):

Week number	Lecture content (2 hr/w)
1	• Equilibrium phenomena (Strong and weak acid, bases, buffers, distribution).
2	• Complexation and protein binding.
3	• Drug release &dissolution.
4	• Types of flow
5	• Surface and interfacial phenomena
6	• Metal complexes &Organic molecular complexes
7	• Occlusion compounds, Complexation and method of analysis **(Presentation)**
8	• State of matter • Ideal gas law
9	• Colligative properties of solutions
10	• Phase rule
11	• Disperse systems
12	• Phase equilibria
13	• Polymer science
14	• Revision
15	• Open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning

- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1
Oral exam to assess: a1, a2, a3, b1, c1
Activities to assess: b1, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	------	100	100%

7- References and books:

A- Essential books:

i- Physical pharmacy, Martin. A, 4th edition, Philadelphia, London. (1993).

ii- Pharmaceutical calculations, Stoklosa, M and Ansel, H., Philadelphia, London. (1997).

B- Recommended books: Martin's physical pharmacy and pharmaceutical sciences: Patrick J. Sinko, Alfred N. Martin, Lippincott Williams & Wilkins, (2006).

C- Websites: Pubmed, Sciencedirect, Weilyinterscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, data show.

- **Course Coordinators: Prof Dr/ Hanan Mohamed El-Nahas**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:** **تم اعتماد التوصيف بمجلس الكلية رقم بتاريخ 2017-9-23**

Matrix I of Physical Pharmacy							
Course Contents		ILOs of Physical pharmacy course					
		Knowledge and understanding			Intellectual skills	Transferable and general skills	
		a1	a2	a3	b1	d1	d2
1	Equilibrium phenomena (Strong and weak acid, bases, buffers, distribution).	x					
2	Complexation and protein binding.			X	x		
3	Drug release &dissolution.	x					
4	Types of flow						
5	Surface and interfacial phenomena	x					
6	Metal complexes &Organic molecular complexes			X	x		
7	Occlusion compounds, Complexation and method of analysis Presentation			X	x	X	x
8	State of matter Ideal gas law	x					
9	Colligative properties of solutions	x			x		
10	Phase rule	x					
11	Disperse systems	x					
12	Phase equilibria	x					
13	Polymer science		x				
14	Revision	x	x	X	x		
15	Open Discussion Presentation	x	x	X	x	X	x

Matrix II of Physical Pharmacy										
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral Exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Understand the basics and principles of pharmaceutics and different related subjects.	a1	Equilibrium phenomena (Strong and weak acid, bases, buffers, distribution). Drug release &dissolution. Surface and interfacial phenomena State of matter Ideal gas law Colligative properties of solutions Phase rule Disperse systems Phase equilibria	Textbooks, Scientific papers and self learning	X	X	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.3-Illustrate the continuous development in pharmaceutics and applications of pharmaceutical industries in different fields.	a2	Polymer science	Textbooks, Scientific papers and self learning	X	X	x	x	

	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.5- Identify the basics of good laboratory practice and quality assurance in the wide field of pharmaceutics.	a3	Complexation and protein binding. Metal complexes &Organic molecular complexes Occlusion compounds, Comlexation and method of analysis	Textbooks, Scientific papers and self learning	X	X	x	x	
	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B.5-Deal effectively with risks and hazards during professional practice.	b1	Colligative properties of solutions Complexation and protein binding. Metal complexes &Organic molecular complexes Occlusion compounds, Complexation and method of analysis	Textbooks, Scientific papers and self learning	X	X	x	X	
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks, Scientific papers and self learning		x			**x**
	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks, Scientific papers and self learning		X			**x**

Special courses

Controlled Release Dosage Forms

Course specification of Controlled release dosage forms

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Controlled-release dosage forms** Code: Esp1
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Illustrate the principles of design, properties, mechanisms of controlled-release dosage forms.
- Propose modifications on existing formulations of controlled-release dosage forms.
- Analyze the best method for preparation and determine the ideal character of each
- Interact effectively and work as a member of a team.

3- Intended learning outcome s (ILOs) of Controlled-release dosage forms:

Knowledge and Understanding	
a1	Illustrate the properties and principles of design of controlled-release drug delivery systems and factors affecting it
a2	Mention up to date methods used for developing non- oral controlled-release dosage forms
a3	Enumerate method of preparation and modification of colloidal drug delivery systems
Intellectual skills	

b1	Modify the structure of a given dosage form to obtain the desired release duration.
General and Transferable skills	
d1	Develop a new methods for preparation of good pharmaceutical dosage forms
d2	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of Controlled-release dosage forms (Master degree):

Week number	Lecture content (4 hr/w)
1	• General design principle for controlled-release drug delivery systems
2	• Physicochemical factors influencing design and performance of controlled-release formulations
3	• Biological factors influencing design and performance of controlled-release formulations
4	• Controlled-release oral dosage forms
5	• Diffusion, dissolution and osmotic controlled drug delivery systems
6	• Microencapsulation
7	• Nanostructure-mediated controlled-release dosage forms **(Presentation)**
8	• Liposomes
9	• Niosomes
10	• Technologies for developing transdermal dosage forms
11	• Ocular controlled-release dosage forms
12	• Vaginal and uterine controlled-release dosage forms
13	• Release of drugs from time-controlled-release dosage forms
14	• Release of drugs from stimuli-induced controlled-release systems

15	• Revision and open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1
Oral exam to assess: a1, a2, a3, b1, c1, c2
Activities to assess: b1, c1, c2

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	------	100	100%

7- References and books:

A- Essential books: Colloidal drug delivery systems Jörg Kreuter, M. Dekker, 1994 - 353 pages

B- Suggested books: Martin's physical pharmacy and pharmaceutical sciences: Patrick J. Sinko, Alfred N. Martin, Lippincott Williams & Wilkins, (2006).

C- Websites: Pubmed, Sciencedirect, Weilyinterscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, Computer, data show.

- **Course Coordinators: Assist.Prof.Dr/ Azza Ali Hasan**
- **Head of Department: Prof Dr/Nagia Ahmed El-Megrab**
- **Date: 2017-9-23** **تم اعتماد التوصيف بمجلس الكلية بتاريخ**

Matrix I of Controlled release dosage forms

Course Contents		ILOs of Controlled release dosage forms course					
		Knowledge and understanding			Intellectual skills	Transferable and general skills	
		a1	a2	a3	b1	d1	d2
1	General design principle for controlled-release drug delivery systems	X					
2	Physicochemical factors influencing design and performance of controlled-release formulations	x		x			
3	Biological factors influencing design and performance of controlled-release formulations	x					
4	Controlled-release oral dosage forms	x					
5	Diffusion, dissolution and osmotic controlled drug delivery systems	x			x		
6	Microencapsulation	x					
7	Nanostructure-mediated controlled-release dosage forms Presentation			x		x	X
8	Liposomes	x		x			
9	Niosomes	x		x			
10	Technologies for developing transdermal dosage forms	x					
11	Ocular controlled-release dosage forms	x					
12	Vaginal and uterine controlled-release dosage forms	x					
13	Release of drugs from time-controlled-release dosage forms		x				
14	Release of drugs from stimuli-induced controlled-release systems		x				
15	Revision and open discussion Presentation	x	x	x	x	x	X

Matrix II of Controlled release dosage forms										
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Illustrate properly the principle of pharmaceutics and their widely growing subjects i	a1	General design principle for controlled-release drug delivery systems,Liposomes,niosomes, Ocular controlled-release dosage forms Physicochemical factors influencing design and performance of controlled-release formulations Biological factors influencing design and performance of controlled-release formulations Technologies for developing transdermal dosage forms	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.3- Express clearly the up to date information and methods in pharmaceutics and applications of pharmaceutical industries in	a2	Release of drugs from time-controlled-release dosage forms Release of drugs from stimuli-induced controlled-release systems	Textbooks, Scientific papers and self learning	x	x	x	x	

		different fields.	a3	Physicochemical factors influencing design and performance of controlled-release formulations Nanostructure-mediated controlled-release dosage forms Niosomes Liposomes	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Acquire the needed pharmaceutical knowledge to manage professional problems	b1	Diffusion, dissolution and osmotic controlled drug delivery systems	Textbooks, Scientific papers and self learning	x	x	x		
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks, Scientific papers and self learning		x			**x**
	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks, Scientific papers and self learning		x			**x**

Drug Stability

Course specification of Drug stability

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Drug stability** Code: Esp2
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Describe the degradation of drugs and the methods to determine the order of reaction.
- Illustrate the stability programs for pharmaceutical products and the latest regulations for stability testing.
- Ability to predict the degradation pathways of a drug design a stabilization protocol and predict a product shelf-life.

3- Intended learning outcome s (ILOs) of Drug stability:

Knowledge and Understanding	
a1	Illustrate the principles of order of reactions and methods of determination order of reactions
a2	Describe the principles of physical and chemical degradation of drugs in different dosage forms
a3	Mention stability testing of different dosage forms
Intellectual skills	
b1	Suggest suitable stabilization methods for drugs in the various dosage forms.
b2	Design in a self-directed and original research investigations on drug stability in dosage forms from degradation pathways

General and transferable skills	
d1	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of Drug stability (Master degree):

Week number	Lecture content (4 hr/w)
1	• Rate of chemical reactions
2	• Orders of reactions • Zero order
3	• First order
4	• Second order
5	• Apparent zero order reaction • Pseudo first order reaction
6	• Determination of order of reaction • Substitution method
7	• Graphical method **(Presentation)**
8	• Half-life method
9	• Routes of degradation • Hydrolysis • Oxidation
10	• Photochemical degradation • Incompatibility
11	• Physical degradation routes • Vaporization • Aging • Adsorption
12	• Complex reactions
13	• Stability testing
14	• Revision
15	• Open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1, b2
Oral exam to assess: a1, a2, a3, b1, b2, c1
Activities to assess: b1, b2, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total		100	100%

7- References and books:

A- Essential books: Drug Stability: Principles and Practices (Drugs and the Pharmaceutical Sciences) by Jens T. Carstensen and Christopher Rhodes (2000).
B- Suggested books: Handbook of Stability Testing in Pharmaceutical Development: Regulations, Methodologies, and Best Practices, Kim Huynh-Ba, 389 (2008).
C- Websites: Pubmed, Sciencedirect, Weilyinterscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, data show.

- **Course Coordinators: Prof.Dr/ Hanaa Abd El-Fattah El-Ghamry**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:** **2017-9-23 تم اعتماد التوصيف بمجلس الكلية بتاريخ**

Matrix I of Drug Stability								
Course Contents		ILOs of drug stability course						
		Knowledge and understanding			Intellectual skills		Transferable and general skills	
		a1	a2	a3	b1	b2	d1	d2
1	Rate of chemical reactions	x						
2	Zero order	x						
3	First order	x						
4	Second order							
5	Apparent zero order reaction Pseudo first order reaction	x						
6	Determination of order of reaction -Substitution method	x						
7	Graphical method Presentation	x					X	x
8	Half-life method	x						
9	Routes of degradation -Hydrolysis -Oxidation		x			X		
10	Photochemical degradation -Incompatibility		x			X		
11	Physical degradation routes -Vaporization -Aging - adsorption		x			X		
12	Complex reactions		x	x				
13	Stability testing			x	x	X		
14	Revision	x	x	x	x	X		
15	Open discussion Presentation	x	x	x	x	X	X	x

Matrix II of Drug stability

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral Exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Illustrate properly the principle of pharmaceutics and their widely growing subjects.	a1	Rate of chemical reactions Zero order First order Second order Apparent zero order reaction Pseudo first order reaction Determination of order of reaction -Substitution method Graphical method Half-life method	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.2- Identify the impact of pharmaceutics and industrial pharmacy on the environment.	a2	Routes of degradation -Hydrolysis -Oxidation Photochemical degradation -Incompatibility Physical degradation routes -Vaporization -Aging - adsorption Complex reactions	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.5- Identify the basics of good laboratory practice and quality assurance in the wide field of pharmaceutics.	a3	Stability testing Complex reactions	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and interpret quantitative data obtained from pharmaceutical research in a specific and suitable form.	b1	Stability testing	Textbooks, Scientific papers and self learning	x	x	x	x	
2.2	2.2.2- Solve specified problems in the lack or missing of some information.	B.2- Suggest significant solutions for pharmaceutical results and outcome errors based on a wide academic background.	b2	Stability testing Routes of degradation -Hydrolysis -Oxidation Photochemical degradation -Incompatibility Physical degradation routes -Vaporization -Aging - adsorption	Textbooks, Scientific papers and self learning	x	X	x	x	
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks , Scientific papers and self learning		x			**x**

	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks , Scientific papers and self learning		x			**x**

Transdermal Drug Delivery System

Course specification of Transdermal drug delivery systems

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Transdermal drug delivery systems** Code: Esp3
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Have an overview on different types of transdermal drug delivery systems and their therapeutic uses.
- Interact effectively and work as a member of a team.

3- Intended learning outcome s (ILOs) of Transdermal drug delivery systems:

Knowledge and Understanding	
a1	Describe the basic considerations of transdermal drug delivery systems.
a2	Understand the formulation of different transdermal drug delivery systems.
a3	Identify therapeutic uses of transdermal drug delivery systems.
a4	Ensure quality of transdermal drug delivery systems.
Intellectual skills	
b1	Achieve the ideal product formulation through proper selecting

	of the composition.
General and transferable skills	
d1	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of Transdermal drug delivery (Master degree):

Week number	Lecture content (4 hr/w)
1	• Skin • Advantages and disadvantages of transdermal drug delivery system
2	• Kinetics of transdermal permeation
3	• Basic components of transdermal drug delivery system
4	• Factors affecting transdermal bioavailability
5	• Various methods for preparation of transdermal drug delivery system
6	• Types of transdermal patches
7	• Mechanism of action of transdermal patches **(Presentation)**
8	• Evaluation parameters
9	• Transdermal market
10	• Advance developments in transdermal drug delivery system
11	• Formulation of semisolid dosage forms(Ointments) and equipments used
12	• Formulation of semisolid dosage forms(Creams) and equipments used
13	• Formulation of semisolid dosage forms(Gels) and equipments used
14	• Formulation of semisolid dosage forms(Pastes)
15	• Revision and open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, a4, b1
Oral exam to assess: a1, a2, a3, a4, b1, c1
Activities to assess: b1, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	------	100	100%

7- References and books:

A- Essential books: Aulton's Pharmaceutics: The Design and Manufacture of Medicines. Aulton, M. E., Taylor, K. (2002)

B- Suggested books: Transdermal and Topical Drug Delivery Systems. Ghosh T. K., Pfister W., Su Il Yum (1997).

C- Websites: Pubmed, Sciencedirect, Nejm, Weilyinterscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, computers, data show.

- **Course Coordinators: Assist.Prof.Dr/ Azza Ali Hasan**
- **Head of Department: Prof. Dr/ Nagia Ahmed El- Megrab**
- **Date:** **2017-9-23 تم اعتماد التوصيف بمجلس الكلية بتاريخ**

Matrix I of Transdermal drug delivery systems

Course Contents		ILOs of Transdermal drug delivery systems course						
		Knowledge and understanding				Intellectual skills	Transferable and general skills	
		a1	a2	a3	a4	b1	d1	d2
1	Skin Advantages and disadvantages of transdermal drug delivery system	x						
2	Kinetics of transdermal permeation	x						
3	Basic components of transdermal drug delivery system	x				X		
4	Factors affecting transdermal bioavailability	x						
5	Various methods for preparation of transdermal drug delivery system		x			X		
6	Types of transdermal patches	x						
7	Mechanism of action of transdermal patches Presentation	x					X	x
8	Evaluation parameters				X			
9	Transdermal market			X				
10	Advance developments in transdermal drug delivery system			X				
11	Formulation of semisolid dosage forms(Ointments) and equipments used		x			X		
12	Formulation of semisolid dosage forms(Creams) and equipments used		x			X		
13	Formulation of semisolid dosage forms(Gels) and equipments used		x			X		
14	Formulation of semisolid dosage forms(Pastes)		x			X		
15	Revision and open discussion Presentation	x	x	X	X	X	X	x

Matrix II of Transdermal drug delivery systems									
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Understand the basics and principles of pharmaceutics and different related subjects.	a1	Skin Advantages and disadvantages of transdermal drug delivery system Kinetics of transdermal permeation - Basic components of transdermal drug delivery system Factors affecting transdermal bioavailability Types of transdermal patches Mechanism of action of transdermal patches	Textbooks, Scientific papers and self learning	X	X	x	x	
			a2	Various methods for preparation of transdermal drug delivery system Formulation of semisolid dosage forms and equipments used |(Ointments, creams, gels, pastes)					

	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.2- Identify the impact of pharmaceutics and industrial pharmacy on the environment.	a3	Transdermal market Advance developments in transdermal drug delivery system	Textbooks, Scientific papers and self learning	X	X	x	x	
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization	A.5- Identify the basics of good laboratory practice and quality assurance in the wide field of pharmaceutics	a4	Evaluation parameters	Textbooks, Scientific papers and self learning	X	X	x	x	
2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and evaluate the information gained in the field of pharmaceutics to solve problems.	b1	Basic components of transdermal drug delivery systems Various methods for preparation of transdermal drug delivery system - Formulation of semisolid dosage forms and equipments used |(Ointments, creams, gels, pastes)	Textbooks, Scientific papers and self learning	X	X	x		
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Acquire computer skills in analyzing results and presenting them.	d1	Activity	Textbooks, Scientific papers and self learning		x			**x**

	2.4.4- Use variable sources to get information and knowledge.	D.4-Practice how to retrieve information from a variety of sources including libraries, databases and internet.	d2	Activity	Textbooks, Scientific papers and self learning		X			**x**

Thesis Specification

Master Thesis in Pharmaceutics

Course specifications:

- **Program on which the thesis is done:** Master of Pharmaceutical sciences (Pharmaceutics)
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the thesis:** Pharmaceutics Dept.
- **Date of specification approval:** 2017/2018

1- Basic information:

Title: **Master of Pharmaceutical sciences (pharmaceutics)**
Credit hours: 30hrs

2- Overall aim of the thesis:

On completion of the thesis, the students will be able to outline the possible protocol for solving harsh problem that the candidate can work after integrating suitable knowledge about this point of research, to identify and perform different techniques and methods used in the experimental work according to the designed protocol, to derive and present the results of the study from the data collected and to draw conclusions about the contribution to knowledge made by the study which may be concerned with the problem under investigation, the methods deployed or the student as researcher

3- Intended learning outcome's (ILOs):	
Knowledge and Understanding	
a1	Outline theoretical and advanced bases of pharmaceutics
a2	Demonstrate the importance of knowledge of modern techniques used during working in the area of specialization of research
a3	Define the up to date professional and academic practices
a4	Demonstrate the legal aspects during professional and academic practices
a5	Illustrate the importance of quality assurance during the formulation of different dosage forms
a6	Identify and apply scientific experimental ethics.
Intellectual skills	
b1	Solve problems related to practical work by obtained quantitative data from the practical work
b2	Discuss professional problems and suggest solutions rely on different pharmaceutical knowledge and recent information
b3	Plan a research in the field of drug delivery or targeting that allow discovery of modern and efficient techniques for drug targeting
b4	Manage risks and hazards related to professional practical area
b5	Outline principles that should be followed in research to develop laboratory performance
b6	Decide what to do with full responsibility in scientific research
Professional and practical skills	
c1	Apply different techniques related to practical thesis work.
c2	Use and evaluate practical data to write report
c3	Estimate laboratory techniques used in pharmaceutics and industrial pharmacy labs
General and Transferable skills	
d1	Interact with health care professional.
d2	Use information technology in review and thesis preparation
d3	Study independently and evaluate learning needs in pharmaceutics

d4	Reprocess up-to-date information in different areas under study and research
d5	Implement tasks as a member of a team.
d6	Set rules for evaluation and judging others performance.
d7	Acquire time management skills

4. Thesis Content:

Steps	Content
1st	Suggest the possible points/ problems of research that the candidate can work on in the frame of the aim of work and choose proper point. Collect all available information about this subject by all possible means. Use internet, journals, books and others thesis to get previous and recent information about the subject under study. Design the protocol including the steps of work following the suitable timetable. Increase the awareness of the recent pharmaceutical techniques that will be used during practical work and determined by the protocol. Integrate different knowledge (Pharmaceutics, industrial pharmacy, GMP, Hospital pharmacy, incompatibilities ……..) to solve suggested problem. Continuous evaluation to the thesis outcome according to the schedule.
2nd	Identify different practical techniques and methods to assess pharmacokinetic parameters related to the subject under study. Perform various techniques to improve physical and chemical characters of drugs under research

	Formulate many classes of drugs in new dosage forms (suppositories, capsules, tablets, …….) Operate scientific instruments according to instructions. Evaluate and manage hazards (chemical and biological) throughout the whole practical work. Organize the experimental work according to the designed protocol (either individual, parallel or sequential experiments). Induction of some diseases in experimental animals (Hypertension, inflammation, seizures…….). Separate biological samples (e.g. blood, plasma). Apply ethical recommendations during dealing with experimental animals
3rd	Collect raw data for the tested pharmacokinetic parameters. Interpret raw data to get valuable information. Perform statistical analysis for the results. Present and describe the results graphically. Suggest solution to the problem understudy based on this presented data.
4th	Communicate with supervisors to discuss results Work effectively as a member of a team (e.g. Supervisors, various professionals and Technicians). Present the results periodically in seminars. Define ethics of scientific research. Write scientific reports on the obtained results with conclusive significance.

	Discuss obtained results in comparison with pervious literatures. Suggest possible recommendations based on the outcome of the thesis and decide future plans. Summarize the thesis in an understandable Arabic language for non professionals. Write references in the required form (Thesis, Paper…….). Demonstrate the thesis in a final power point presentation. Continue self-learning throughout the experimental work and writing scientific papers.

5- Teaching and Learning Methods:

- Self learning (Activities, Research….)
- Lab work
- Seminar
- reporting
- Critical thinking
- Solving problem
- Open discussion

6- References:

- Websites: Pubmed, Sciencedirect, Weilyinterscience

Facilities required for:

1. **For practical work:** U.V spectrophotometer, centrifuge, Dissolution, Vortex, HPLC, Analytical balance (4digit), Thermostatic water bath, Vacuum Oven

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- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**

Program Matrix of Master degree of Pharmaceutics

		Program ILOs																											
		Knowledge and Understanding												Intellectual skills							Professional & practical skills			General and Transferable skills							
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	D1	D2	D3	D4	D5	D6	D7	D8
General courses	Physical Pharmacy				X													X							X		X				
	Biopharmaceutics & Pharmacokinetics					X								X											X		X				
	Pharmaceutical technology						X									X									X		X		X		
	Biostatistics	X												X					X						X						
	Instrumental analysis										X				X	X									X			X	X		
	Biotechnology			X												X									X		X		X		X
	Applied Pharmacology		X													X				X						X					

	Drug induced diseases	X	X												X	X											X				
Special courses	Controlled release dosage forms							X								X										X		X				
	Drug stability					X			X			X		X	X											X		X				
	Transdermal drug delivery systems					X				X		X		X												X		X				
Thesis		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

PhD Degree

Program Specification

Program Specification

A- Basic Information

1- Program title: PhD. Pharm. Sci Degree in **Pharmaceutics**

2- Program type: Single.

3- Faculty/ University: Faculty of Pharmacy, Zagazig University

4- Department: Pharmaceutics

5- Coordinator: Prof. Dr.

6- Date of program specification approval: 2017/2018

B- Professional Information

1- Program aims:

The PhD program, Zagazig University is a 3-5 five years pharmacy education offering a PHD degree in pharmaceutical sciences (Pharmaceutics). This Program aims at providing postgraduate students with knowledge, skills and abilities needed to practice the pharmacy profession effectively in various settings including Research Institutes, private and public medical laboratories, universities, National Quality Control Centers (foods & drugs) and Ministry of Health.

The program aims are summarized as follows:

1. Provide the community with highly qualified professionals with skills and ethical values based on National Academic Reference Standards (NARS).

2. have the advanced and in-depth knowledge and skills in areas related to drug targeting and nanotechnology applications in drug delivery.

3.Figure out the principles of disease pathophysiology and correlate it with drug targeting techniques

4. Apply various recent and modern techniques in drug targeting and nanotechnology applications in drug delivery.

5-Plan study, develop innovate methods and tools in PCR, genomic & proteomic fields for the conduct of scientific research in drug targeting.

6- Effectively use information technology for the preparation and submission of a detailed literature review

7-Actively participate in the awareness and development of the community.

2- Graduate attributes:

They should acquire the necessary attributes & skills in various nanotechnology applications including the following:

1- Figure out the advanced aspects of pharmaceutical drug delivery like drug targeting and nanotechnology applications.
2- Capable to design research projects.
3- Suggest the most appropriate methods for research.
4- analyze the information and problems in research.
5- write manuscripts following the international standards and publish paper.
6- Acquire the essential skills that enable the postgraduate to be either a team member or a team leader.
7- Develop the creative skills to carry out the pharmaceutical research.

3-Intended Learning Outcomes (ILOs):

The Program provides excellent opportunities for students to demonstrate knowledge and understanding qualities and develop skills appropriate for **Pharmaceutics** PhD of sciences degree.

3-1- Knowledge and Understanding :

On successful completion of the PHD degree Program, students will be able to:

A.1- Outline the basic information about different topics of pharmaceutics including physical, biopharmaceutics and pharmacokinetics, pharmaceutical technology, contolled drug release, drug stability and transdermal drug delivery.

A.2- Outline the basic information about the application of DNA and biodegradable particles in drug delivery.

A.3- Identify the colloidal drug delivery systems.

A.4- Illustrate the applications of nanotechnology in drug delivery.

A.5- Mention different types of packaging materials and their properties.

A.6- Illustrate different factors affecting packaging and properties of good packaging.

A.7- Mention the interactions between drugs and packaging materials.

A.8- Demonstrate the basic knowledge about tablets and capsules and their evaluation.

A.9- Demonstrate the different methods for formulations of tablets and capsules.

A.10- Illustrate ethical and legal principles in academic practices .

A.11- Outline different aspects and principles that are followed in quality assurance during manufacturing of different dosage forms

A.12- Identify the influence of different pharmaceutical practices on the development of the surrounding environment and society and helping patients

3-2 - Intellectual Skills:

On successful completion of the PhD degree Program, students will be able to:

B.1- Analyze information in the field of pharmaceutics and data obtained from specific and suitable research.

B.2- Suggest possible and applicable solutions for different problems in the field of pharmaceutics and that may be observed during the research.

B.3- Acquire the needed knowledge to perform proper pharmaceutical researches in different areas.

B.4- Write reports and scientific papers on the results obtained from different pharmaceutical researches.

B.5- Overcome the possible hazards that may rise during research

B.6- Write a planned protocol that should be followed during research to improve performance.

B.7- Take important decisions and enhance the responsibility of each individual to improve the pharmaceutical research.

B.8- Suggest new ideas and applications in different pharmaceutical researches.

B.9- Discuss the obtained results in open sessions and revealed errors and how to avoid them.

3-3 - Professional and Practical Skills:

It is intended that, on successful completion of the PhD degree Program, students will be able to:

C.1- Apply the basic professional skills and modern pharmaceutical technologies during research.

C.2- Write monthly reports about the pharmaceutical researches and make evaluation to these reports.

C.3- Perform up to date methods and techniques during different pharmaceutical researches.

C.4- Use technology e.g. computer skills, internet…. to obtain better results during research.

C.5- Develop and innovate methods and tools and apply new methods to improve work in pharmaceutical laboratories.

3-4 - General and Transferable Skills:

On successful completion of the PhD degree Program, students will be able to:

D.1- Communicate effectively during research with technicians and team of work.

D.2- Apply modern techniques to improve pharmaceutical researches including computer skills, Language, others.

D.3- Enhance self learning with evaluations of the trained persons in pharmaceutics fields.

D.4- Collect and evaluate information in the field of pharmaceutics continuously.

D.5- Collect up to date and the required information from different sources like Books, journals, papers and internet for improving knowledge.

D.6- Work effectively as a member of team.

D.7- Take advantage of the time and attend scientific meetings in the area of specialization.

4- Academic Standards:

Faculty is committed to the Academic References Standards for postgraduate studies (March 2009).

Matrix: Comparison between PhD degree program ILOs and the Academic Reference Standards (ARS, 2009)

	ARS	Program ILOs for pharmaceutics department
Knowledge and Understanding	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1- Outline the basic information about different topics of pharmaceutics including physical, biopharmaceutics and pharmacokinetics, pharmaceutical technology, controlled drug release, drug stability and transdermal drug delivery.
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.2- Outline the basic information about the application of DNA and biodegradable particles in drug delivery. A.3- Identify the colloidal drug delivery systems. A.4- Illustrate the applications of nanotechnology in drug delivery. A.5- Mention different types of packaging materials and their properties. A.6- Illustrate different factors affecting packaging and properties of good packaging. A.7- Mention the interactions between drugs and packaging materials. A.8- Demonstrate the basic knowledge about tablets and capsules and their evaluation. A.9- Demonstrate the different methods for formulations of tablets and capsules.
	2.1.3- The ethical and legal principles in pharmacy and academic practices.	A.10- Illustrate ethical and legal principles in academic practices .
	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.11- Outline different aspects and principles that are followed in quality assurance during manufacturing of different dosage forms

	2.1.5- All relevant knowledge concerning the impact of professional practice on society and environment and the ways of their conservation and development.	A.12- Identify the influence of different pharmaceutical practices on the development of the surrounding environment and society and helping patients
Intellectual Skills	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.1- Analyze information in the field of pharmaceutics and data obtained from specific and suitable research
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.2- Suggest possible and applicable solutions for different problems in the field of pharmaceutics and that may be observed during the research
	2.2.3- Conduct research studies that add to the current knowledge.	B.3- Acquire the needed knowledge to perform proper pharmaceutical researches in different areas
	2.2.4- Formulate scientific papers.	B.4- Write reports and scientific papers on the results obtained from different pharmaceutical researches
	2.2.5- Asses hazards and risks in professional practice in his \ her areas of specialization.	B.5- Overcome the possible hazards that may rise during research
	2.2.6- Plan to improve performance in the pharmaceutical area of interest.	B.6- Write a planned protocol that should be followed during research to improve performance
	2.2.7- Take Professional decisions and bears responsibility in wide array of pharmaceutical fields.	B.7- Take important decisions and enhance the responsibility of each individual to improve the pharmaceutical research
	2.2.8- Be creative and innovative.	B.8- Suggest new ideas and applications in different pharmaceutical researches

	2.2.9- Manage discussions and arguments based on evidence and logic.	B.9- Discuss the obtained results in open sessions and revealed errors and how to avoid them.
Professional and Practical Skills	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1- Apply the basic professional skills and modern pharmaceutical technologies during research.
	2.3.2- Write and critically evaluate professional reports.	C.2- Write monthly reports about the pharmaceutical researches and make evaluation to these reports
	2.3.3- Evaluate and develop methods and tools existing in the area of specialization.	C.3- Perform up to date methods and techniques during different pharmaceutical researches
	2.3.4- Properly use technological means in a better professional practice.	C.4- Use technology e.g. computer skills, internet…. To obtain better results during research
	2.3.5- Plan to improve professional practice and to improve the performance of other scholars.	C.5- Develop and innovate methods and tools and apply new methods to improve work in pharmaceutical laboratories.
General and Transferable Skills	2.4.1- Effective Communication in its different forms.	D.1- Communicate effectively during research with technicians and team of work
	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Apply modern techniques to improve pharmaceutical researches including computer skills, Language, others.
	2.4.3- Help others to learn and evaluate their performance.	D.3- Enhance self learning with evaluations of the trained persons in pharmaceutics fields.
	2.4.4- Self-assessment and continuous learning.	D.4- Collect and evaluate information in the field of pharmaceutics continuously

	2.4.5- Use various sources to get information and knowledge.	D.5- Collect up to date and the required information from different sources like Books, journals, papers and internet for improving knowledge.
	2.4.6- Work as a member and lead a team of workers.	D.6- Work effectively as a member of team.
	2.4.7- Direct scientific meetings and to manage time effectively.	D.7- Take advantage of the time and attend scientific meetings in the area of specialization

5-Curriculum Structure and Contents:

a- Program duration: **3- 5** years

b- Program structure:

- The PhD program can be completed in 3-5 years.
- The Faculty of pharmacy implements the credit hour system.
- The program is structured as:

1- Courses:

No. of credit hours for program courses:

Special: (3x4) 12

2- Thesis: 30 hours

The candidate must complete a research project on an approved topic in the Pharmaceutical Sciences. To fulfill this requirement the student must present (written and orally) a research proposal and write a thesis.

3- General University Requirements: 10 credit hours including:

a- TOEFL (500 units)

b- Computer course

c-Program Curriculum:

Course Code	Course Title	Credit hours	Program ILOs Covered
	Special Courses:		
Esp4	Drug targeting	4	A2, A3, A4, A11, B1, B2
Esp5	Packaging	4	A5, A6, A7, A11, B7
Esp6	Solid oral dosage forms	4	A8, A9, A11, B1, B2
	Thesis	30	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, B1, B2, B3, B4, B5, B6, B7, B8, B9, C1, C2, C3,C4, C5, D1, D2, D3, D4, D5, D6, D7

6-Program admission requirements:

Applicants are admitted to PhD degree any time throughout the academic year upon fulfillment of the following:

1. The applicants should be holders of Bachelor in Pharmaceutical Sciences from any Faculty of Pharmacy and also finish M.Sc. degree affiliated to the Egyptian Universities affiliated to the Egyptian Supreme Council of Universities (ESCU).
2. Students should fulfill all the admission requirements stated by the concerned Departmental Board.

Regulations to complete the program:

Conditions of granting the degree

The Faculty Council, in compliance with the concerned Departmental Board as well as Graduate Studies and Research Committee recommendation awards the PhD degree upon fulfillment of the following requirements:

1. Carrying out a deep research in the area of specialization for at least two calendar years from the time of registration.
2. The student has to succeed in all courses examinations.
3. Acceptance of the research thesis by the judges Committee according to statement 104 of universities regulating law.

Cancellation of Registration

The Faculty Board is allowed to cancel registration for PhD programs in the following circumstances:

1. Student's failure to pass the course examinations for two times.
2. Student's nonattendance or unsatisfactory progress in research work being reported by the advisors to the Departmental Board and forwarded to the Graduate Studies and Research Committee for approval of cancellation.
3. Dissertation refusal by the Jury Committee.

Incapability of the student to graduate by the deadlines indicated

7- Admission Policy:

The faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (ESCU).

8-Student assessment methods:

Method	ILOS
Written exam	Knowledge and Understanding and Intellectual Skills
Oral exam	Knowledge and Understanding ,Intellectual Skills and General and Transferable Skills
Activity	Intellectual Skills and General and Transferable Skills
Seminars	Knowledge and Understanding ,Intellectual Skills & General and Transferable Skills
Follow up	Professional and practical Skills & General and Transferable Skills
Thesis and oral presentation	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

Grade Scale	Grade point average value (GPA)	Numerical scale
A+	5	≥ 95%
A	4.5	90- < 95%
B+	4	85- < 90%
B	3.5	80- < 85%
C+	3	75- < 80%
C	2.5	70- < 75%
D+	2	65- < 70%
D	1.5	60- < 65%

9-Failure in Courses:

Students who fail to get 60% (1 point)

10-Methods of program evaluation

Evaluator	Method	Sample
Internal evaluator: Professor Dr. Mahmoud Abdel-ghany	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor Dr. Osama Abdel-azem	Program evaluation Courses evaluation	Program report Courses report
Others methods	Matrix with ARS Questionnaires	The Matrix Results of the questionnaires

Program coordinator **Head of Department**

تم اعتماد التوصيف بمجلس القسم بتاريخ

Special courses

Drug Targeting

Course specification of Drug Targeting

Course specifications:

- **Program on which the course is given:** PhD of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Drug Targeting** Code: ESP 4
Credit hours: 4 hrs/week Lectures: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Discuss factors affecting different ADME processes
- Describe new systems applied for drug targeting
- Discuss commercial reasons for developing advanced drug delivery systems
- Identify the differences between the developed and developing worlds as markets for advanced drug delivery systems
- Illustrate different mechanisms of drug release from implantable dosage forms
- Describe advanced and conventional transdermal delivery systems
- Describe advanced and conventional vaginal delivery systems
-

3- Intended learning outcome s (ILO's) of Drug Targeting:

Knowledge and Understanding	
a1	Discuss basic bioavailability concepts
a2	Describe different drug release mechanisms from controlled drug delivery systems
a3	Describe conventional and modern approaches for transdermal drug delivery

a4	Describe conventional and modern approaches for vaginal drug delivery
Intellectual skills	
b1	Evaluate the benefits of using controlled release forms in different situations
b2	Propose appropriate strategies for controlled drug delivery
b3	Solve different problems related to low drug absorption
General and Transferableskills	
d1	Use information technology to collect and present information.
d2	Work effectively as a member of a team

4. Course Content of Drug Targeting (PhD degree):

Week	Lecture content (4 hr/w)
1st	Drug Delivery: The Basic Concepts: - The concept of bioavailability - The process of drug absorption
2nd	Drug Delivery: The Basic Concepts: (Cont.) - Pharmacokinetic processes - Timing for optimal therapy - Drug delivery considerations for the 'new biotherapeutics'
3rd	Drug Delivery: Market Perspectives: - Commercial importance of advanced drug delivery technologies - Market analysis - Industry evolution and structure
4th	- Terminology of drug delivery and targeting - Rate-controlled release in drug delivery and targeting - Drug targeting systems - Dosage forms for advanced drug delivery and targeting systems
5th	Rate Control in Drug Delivery and Targeting: Fundamentals and Applications to Implantable Systems: - Advantages and disadvantages of implantation therapy

	- Biocompatibility issues - Non-degradable polymeric implants
6th	Rate Control in Drug Delivery and Targeting: Fundamentals and Applications to Implantable Systems(Cont.) - Biodegradable polymeric implants - Implantable pumps
7th	Transdermal Drug Delivery - Introduction - Structure and physiology of the skin - Factors affecting transdermal bioavailability
8th	Transdermal Drug Delivery - Advantages and disadvantages of transdermal drug delivery - Current technologies for transdermal drug delivery
9th	Transdermal Drug Delivery - New and evolving technologies for transdermal drug delivery
10th	Vaginal Drug Delivery - Introduction - Structure and physiology of the vagina - Physiological factors affecting vaginal drug delivery
11th	Vaginal Drug Delivery - Formulation factors affecting vaginal drug delivery - Advantages and disadvantages of vaginal delivery
12th	Vaginal Drug Delivery - Current technologies in vaginal drug delivery - New technologies in vaginal drug delivery
13th	Tutorial
14th	Tutorial
15th	Presentation about selected topics (self learning part)

5- Teaching and Learning Methods:

- Lectures
- Self learning

- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1, b2
Oral exam to assess: a1, a2, a3, b1, b2
Activities to assess: d1, d2

Assessment schedule:

Assessment (1): Activity	Week 7-15
Assessment (2): Written exam	Week 16
Assessment (3): oral exam	Week 16

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• Oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A-Scientific Papers

B-Essential books: Drug Delivery and Targeting: For Pharmacists and Pharmaceutical Scientists. Hillery A. M., Andrew W. Loyd and James Swarbrick (2001)

C- Suggested books: Remington's Pharmaceutical Science. Alfonso, R. Gennaro,

17 th edn, Mack Publishing Company, USA. (1985).

D- **Websites:** Pubmed, Sciencedirect, Nejm, Weilyinterscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, overhead projectors, data show.

- **Course Coordinators: Prof.Dr/ Nagia Ahmed El-Megrab**
- **Head of Department: Prof.Dr/ Nagia Ahmed El-Megrab**
- **Date: 2017-9-23 تم اعتماد التوصيف بمجلس القسم بتاريخ**

Matrix I of Drug targeting								
Course Contents		**ILOs of Drug targeting course**						
		Knowledge and understanding			Intellectual skills		Transferable and general skills	
		a1	a2	a3	b1	b2	d1	d2
1	Drug Delivery: The Basic Concepts: The concept of bioavailability The process of drug absorption	x						
2	Drug Delivery: The Basic Concepts: (Cont.) Pharmacokinetic processes Timing for optimal therapy Drug delivery considerations for the 'new biotherapeutics'	x						
3	Drug Delivery: Market Perspectives: Commercial importance of advanced drug delivery technologies Market analysis Industry evolution and structure		x		x			
4	Terminology of drug delivery and targeting Rate-controlled release in drug delivery and targeting Drug targeting systems Dosage forms for advanced drug delivery and targeting systems		x					
5	Rate Control in Drug Delivery and Targeting: Fundamentals and Applications to Implantable Systems: Advantages and disadvantages of implantation therapy Biocompatibility issues Non-degradable polymeric implants	x						
6	Rate Control in Drug Delivery and Targeting: Fundamentals and Applications to Implantable Systems(Cont.) Biodegradable polymeric implants Implantable pumps		x		x			
7	Transdermal Drug Delivery Introduction Structure and physiology of the skin Factors affecting transdermal bioavailability		x				x	x

8	Transdermal Drug Delivery Advantages and disadvantages of transdermal drug delivery Current technologies for transdermal drug delivery	x						
9	Transdermal Drug Delivery New and evolving technologies for transdermal drug delivery		x		x			
10	Vaginal Drug Delivery Introduction Structure and physiology of the vagina Physiological factors affecting vaginal drug delivery		x					
11	Vaginal Drug Delivery Formulation factors affecting vaginal drug delivery Advantages and disadvantages of vaginal delivery		x					
12	Vaginal Drug Delivery Current technologies in vaginal drug delivery New technologies in vaginal drug delivery			x				
13	Tutorial			x				
14	Tutorial		x			x		
15	Presentation about selected topics (self learning part)	x	x	x	x	x	x	x

Matrix II of Drug Targeting

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1- Illustrate the orientation of different topics in pharmaceutics and their related subjects including their application	a3	Artificial DNA nanostructures Biodegradable particles	Textbooks, Scientific papers and self learning	x	x	X	X	
	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.4- Outline different aspects and principles that followed in quality assurance during manufacturing of different dosage forms	a2	Methods of Loading of drugs within liposomes Methods of Loading of drugs within niosomes Methods of Loading of drugs within nanoparticles Micelles and dendrimers Formulation of liposomes, niosomes and nanoparticles Problems encountered during manufacture and how to overcome	Textbooks, Scientific papers and self learning	x	x	X	X	

	2.1.5- All relevant knowledge concerning the impact of professional practice on society and environment and the ways of their conservation and development.	A.5- Identify the influence of different pharmaceutical practices on the development of the surrounding environment and society	a1	Colloidal drug delivery systems Liposomes, niosomes and nanoparticles	Textbooks, Scientific papers and self learning	x	x	X	X	
	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.1- Analyze data obtained from specific and suitable research in different pharmaceutical applications	b1	Formulation of liposomes, niosomes and nanoparticles	Textbooks, Scientific papers and self learning	x	x	X		
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.2- Suggest possible applicable solutions for different problems that may be observed during the research and determined upon the obtained data	b2	Problems encountered during manufacture and how to overcome	Textbooks, Scientific papers and self learning	x	x	X		
2.4	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Apply modern techniques to improve pharmaceutical researches including computer skills, Language, others.	d1	Activity	Textbooks, Scientific papers and self learning		x			x
	2.4.6- Work as a member and lead a team of workers.	D.6- Work effectively as a member of team.	d2	Activity	Textbooks, Scientific papers and self learning		x			x

Packaging

Course specification of Packaging

A- Course specifications:

- **Program on which the course is given:** PhD of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Packaging** Code: ESP 5
Credit hours: 4 hrs/week Lectures: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Describe types, properties, problems and evaluation of packaging materials.
- Discuss certain topics related to packaging
- Prepare reports on certain topics of packaging

3- Intended learning outcome s (ILO's) of Packaging:

Knowledge and Understanding	
a1	Mention different types of packaging materials and their properties
a2	Mention Package-related contents in the official compendia
a3	Illustrate techniques used in packaging
Intellectual skills	
b1	Discuss recent modifications carried out on packaging materials to match the desired quality
General and transferable skills	
d1	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of Packaging (PhD degree):

Week No.	Lecture content (4 hr/w)
1	• Properties of good packaging • Factors affecting packaging
2	• Moisture, Volatility, Heat, Light, Oxygen, Sterilization and mechanical shock
3	• Glass Types of glass Protection of light sensitive drugs in glass • Advantages and disadvantages of glass
4	• Plastics • General properties of plastics
5	• Types of plastics • Thermoplastic
6	• Types of plastics • Thermosetting
7	• Drug-plastic possible interactions Permeation • Leaching **(Presentation)**
8	• Drug-plastic possible interactions Sorption Chemical reactions • Physical alterations
9	• Metals
10	• Rubber
11	• Forms of pharmaceutical package • For liquids
12	• Forms of pharmaceutical package • For semi-solid
13	• Forms of pharmaceutical package • For solid
14	• Pouches, plaster package and unit dose packaging
15	• Revision and open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning (Activities, Research….)
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1, c1
Oral exam to assess: a1, a2, a3, b1, c1
Activities to assess: b1, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	5%
Total	-----	100	100%

7- References and books:

A-Handouts

B- Essential books: Package Design Workbook: The Art and Science of Successful Packaging by Steven DuPuis and John Silva (2011).

C- **Suggested books:** Package Design Workbook: The Art and Science of Successful Packaging by Steven DuPuis and John Silva (2011).

D- **Websites:** Pubmed, Sciencedirect, Nejm, Weily interscience

Facilities required for teaching and learning:

1.For lectures: Black (white) boards, overhead projectors, data show.

- **Course Coordinators: Prof Dr/ Hanaa Abd El-Fattah El-Ghamry**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:** **2017-9-23 تم اعتماد التوصيف بمجلس الكلية بتاريخ**

Matrix I of Packaging

Course Contents		ILOs of Packaging course					
		Knowledge and understanding			Intellectual skills	Transferable and general skills	
		a1	a2	a3	b1	d1	d2
1	-Properties of good packaging - Factors affecting packaging			x			
2	Moisture, Volatility, Heat, Light, Oxygen, Sterilization and mechanical shock	x					
3	Glass - Types of glass - Protection of light sensitive drugs in glass - Advantages and disadvantages of glass	x					
4	• Plastics • General properties of plastics	x					
5	Types of plastics - Thermoplastic	x					
6	Types of plastics - Thermosetting	x					
7	Drug-plastic possible interactions - Permeation - Leaching Presentation		x		X	X	X
8	Drug-plastic possible interactions - Sorption - Chemical reactions - Physical alterations		x		X		
9	Metals	x					
10	Rubber	x					
11	Forms of pharmaceutical package - For liquids		x		X		
12	Forms of pharmaceutical package - For semi-solid		x		X		
13	Forms of pharmaceutical package - For solid		X		X		
14	Pouches, plaster package and unit dose packaging			x			
15	Revision and Open discussion Presentation	x	X	x	X	X	X

Matrix II of packaging

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1- Illustrate the orientation and principles of different topics in pharmaceutics and their related subjects including their application	a1	Moisture, Volatility, Heat, Light, Oxygen, Sterilization and mechanical shock Types of glass - Protection of light sensitive drugs in glass - Advantages and disadvantages of glass Plastics -General properties of plastics Metals and Rubbers Types of plastic	Textbooks, Scientific papers and self learning	X	x	x	x	
	2.1.3- The ethical and legal principles in pharmacy and academic practices.	A.3- Illustrate ethical and legal principles in academic practices .	a3	Properties of good packaging - Factors affecting packaging Pouches, plaster package and unit dose packaging	Textbooks, Scientific papers and self learning	X	x	x	x	

	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.4- Outline different aspects and principles that followed in quality assurance during manufacturing of different dosage forms	a2	Drug-plastic possible interactions - Permeation - Leaching - Sorption - Chemical reactions Forms of pharmaceutical package	Textbooks, Scientific papers and self learning	x	x	x	x	
2.2	2.2.7- Take Professional decisions and bears responsibility in wide array of pharmaceutical fields.	B.7- Take important decisions and enhance the responsibility of each individual to improve the pharmaceutical research	b1	Drug-plastic possible interactions Forms of pharmaceutical package - For liquids, solids and semi-solids	Textbooks, Scientific papers and self learning	X	x	x		
2.4	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Apply modern techniques to improve pharmaceutical researches including computer skills, Language, others.	d1	Activity	Textbooks, Scientific papers and self learning		x			x
	2.4.6- Work as a member and lead a team of workers.	D.6- Work effectively as a member of team.	d2	Activity	Textbooks, Scientific papers and self learning		x			x

Solid Dosage Forms

Course specification of Solid Dosage Forms

A- Course specifications:

- **Program on which the course is given:** PhD of Pharmaceutical Sciences
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the course:** Pharmaceutics Dept.
- **Date of specification approval:** 2017

1- Basic information:

Title: **Solid Dosage Forms** Code: ESP 6
Credit hours: 4 hrs/week Lectures: 4 hrs/week
Total: 4 hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to:

- Describe the properties of different solid dosage forms and their manufacture and evaluation
- Propose solutions for manufacturing problems
- Write and evaluate scientific reports on solid dosage forms

3- Intended learning outcome s (ILO's) of Solid dosage forms:

Knowledge and Understanding	
a1	Mention steps of development and design of tablets and capsules
a2	Describe the properties of different types of ingredients used in formulation of tablets and capsules
a3	Illustrate the different techniques and equipments used in manufacture of different solid dosage forms
Intellectual skills	
b1	Evaluate the results obtained from using different ingredients in formulation of solid dosage forms
b2	Propose solutions for certain problems occurring in manufacture of solid dosage forms
General and transferable skills	
d1	Demonstrate critical thinking and decision making during pharmaceutical preparations

4. Course Content of solid dosage forms (PhD degree):

Week	Lecture content (4 hr/w)
1st	• Design and formulation of compressed tablets
2nd	• Tablet manufacture
3rd	• Tableting equipment
4th	• Coated tablets
5th	• Evaluation of tablets
6th	• Recent developments in tableting
7th	• Historical development and role of capsules as a dosage form **(Presentation)**
8th	• Hard gelatin capsules
9th	• Manufacture of hard gelatin capsules
10th	• Filling of hard gelatin capsules
11th	• Soft gelatin capsules
12th	• Formulation and Manufacture of soft gelatin capsules
13th	• Soft/liquid-filled hard gelatin capsules
14th	• Evaluation of capsules
15th	• Revision and Open discussion **(Final Presentation)**

5- Teaching and Learning Methods:

- Lectures
- Self learning (Activities, Research….)
- Open discussion

6- Student Assessment methods:

Written exams to assess: a1, a2, a3, b1,b2, c1
Oral exam to assess: a1, a2, a3, b1, b2, c1
Activities to assess: b1, b2, c1

Assessment method	Time	Marks	Percentage
Written exam	Week 16	75	75%
Oral exams	Week 16	15	15%
Activities	Week 7, 15	10	10%
Total	-----	100	100%

7- References and books:

A-Scientific Papers

B- Essential books: Pharmaceutical dosage forms and drug delivery systems, Ansel, H. c., Popovich, N. G., Allen, L. V. 6 th edn, Williams and Wilkins (1995).

C- Suggested books:

1-Remington's Pharmaceutical Science Alfonso, R. Gennaro, 17 th edn, Mack Publishing Company, USA (1985).

2-Pharmaceutical dosage forms: parenteral medications (1993), Kenneth Kavis, Herbert A.lieberman and Leon lachman, 2 nd edition Marcel Dekker, Inc., 270 Madison Avenue, New York.

D- Websites: Pubmed, Science direct, Nejm, Weily interscience

Facilities required for teaching and learning:

1. **For lectures:** Black (white) boards, overhead projectors, data show.

- **Course Coordinators: ProfDr/ Mahmoud Abdul-Ghany Mahdy**
- **Head of Department: Prof Dr/ Nagia Ahmed El-Megrab**
- **Date:** **تم اعتماد التوصيف بمجلس الكلية بتاريخ 2017-9-23**

Matrix I of Solid Dosage Forms								
Course Contents		ILOs of Solid dosage forms course						
		Knowledge and understanding			Intellectual skills		Transferable and general skills	
		a1	a2	a3	b1	b2	d1	d2
1	Design and formulation of compressed tablets	X				x		
2	Tablet manufacture		X			X		
3	Tableting equipment			X				
4	Coated tablets	X						
5	Evaluation of tablets	X						
6	Recent developments in tableting	X			X			
7	Historical development and role of capsules as a dosage form Presentation	X					X	x
8	Hard gelatin capsules	X						
9	Manufacture of hard gelatin capsules		X	X				
10	Filling of hard gelatin capsules		X	X				
11	Soft gelatin capsules	X						
12	Formulation and Manufacture of soft gelatin capsules		X	X		X		
13	Soft/liquid-filled hard gelatin capsules	X						
14	Evaluation of capsules	X						
15	Revision and open discussion Presentation	X	X	X	X	X	X	x

Matrix II of Solid Dosage Forms										
ARS		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**		**Method of assessment**		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.2- Outline methods and techniques used in out coming a scientific research	a1	Design and formulation of compressed tablets Coated tablets Recent developments in tableting Soft and hard gelatin capsules Soft/liquid-filled hard gelatin capsules Evaluation of tablets Historical development and role of capsules as a dosage form Evaluation of capsules	Textbooks, Scientific papers and self learning	x	x	x	x	
			a3	Manufacture of hard gelatin capsules Filling of hard gelatin capsules Formulation and Manufacture of soft gelatin capsules Tableting equipment	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.4- Outline different aspects and principles that followed in quality assurance during manufacturing of different dosage forms	a2	Tablet manufacture Manufacture of hard gelatin capsules Filling of hard gelatin capsules Formulation and Manufacture of soft gelatin capsules	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.1- Analyze data obtained from specific and suitable research in different pharmaceutical applications	b1	Recent developments in tableting	Textbooks, Scientific papers and self learning	x	x	x		
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.2- Suggest possible applicable solutions for different problems that may be observed during the research and determined upon the obtained data	b2	Design and formulation of compressed tablets- Tablet manufacture- Formulation and Manufacture of soft gelatin capsules	Textbooks, Scientific papers and self learning	X	x	x		
2.4	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Apply modern techniques to improve pharmaceutical researches including computer skills, Language, others.	d1	Activity	Textbooks, Scientific papers and self learning		x			x
	2.4.6- Work as a member and lead a team of workers.	D.6- Work effectively as a member of team.	d2	Activity	Textbooks, Scientific papers and self learning		x			x

Thesis Specification

PhD Thesis in Pharmaceutics

Course specifications:

- **Program on which the thesis is done:** PhD of Pharmaceutical sciences (Pharmaceutics)
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmaceutics Dept.
- **Department offering the thesis:** Pharmaceutics Dept.
- **Date of specification approval:** 2017/2018

1- Basic information:

Title: **PhD of pharmaceutical sciences (pharmaceutics)**
Credit hours: **30 hrs**

2- Overall aim of the thesis:

On completion of the thesis, the students will be able to define and plan the project, identify and perform different techniques and methods used in the experimental work according to the designed protocol, derive and present the results of the study from the data collected, draw conclusions about the contribution to knowledge made by the study which may be concerned with the problem under investigation, the methods deployed or the student as researcher and provide a complete and accurate record of the material used in the study, cited consistently according to a recognized system.

3- Intended learning outcome's (ILOs):	
Knowledge and Understanding	
a1	Outline different principles of pharmaceutics and their possible application in the research study
a2	Demonstrate methods and techniques used during working in the area of specialization of research
a3	Understand the legal aspects of for professional and academic practices
a4	Illustrate the importance of quality assurance during the formulation of different dosage forms
a5	Define different practices that can be used in understanding the problem of the research and help in solving it
Intellectual skills	
b1	Solve problems related to practical work by obtained quantitative data from the practical work
b2	Discuss professional problems and suggest solutions rely on different pharmaceutical knowledge and recent information
b3	Plan a research in the field of drug delivery or targeting that allow discovery of modern and efficient techniques for drug targeting
b4	Integrate scientific results and write report following conducting research
b5	Manage risks and hazards related to professional practical area
b6	Outline principles that should be followed in research to develop laboratory performance
b7	Decide what to do with full responsibility in scientific research
b8	Demonstrate creativity and innovation in modifying techniques and in utilization of various therapy
b9	Discuss the obtained results in open sessions and revealed errors and how to avoid them.
Professional and practical skills	
c1	Apply different techniques related to practical thesis work.
c2	Use and evaluate practical data to write report
c3	Estimate laboratory techniques used in pharmaceutics and industrial pharmacy labs.

c4	Apply technology in methodology development during practical work.
c5	Improve performance by all possible means
General and Transferable skills	
d1	Interact with health care professional.
d2	Use information technology in review and thesis preparation
d3	Set rules for evaluation and judge others performance.
d4	Study independently and evaluate learning needs in pharmaceutics
d5	Reprocess up-to-date information in different areas under study and research
d6	Implement tasks as a member of a team.
d7	Utilize time effectively to achieve goals

4. Thesis Content:

Steps	Content
1st	Suggest the possible points/ problems of research that the candidate can work on in the frame of the aim of work and choose proper point. Collect all available information about this subject by all possible means. Use internet, journals, books and others thesis to get previous and recent information about the subject under study. Design the protocol including the steps of work following the suitable timetable. Increase the awareness of the recent pharmaceutical techniques that will be used during practical work and determined by the protocol. Integrate different knowledge (Pharmaceutics, industrial pharmacy, GMP, Hospital pharmacy, incompatibilities ……..) to solve suggested problem. Continuous evaluation to the thesis outcome according to the schedule.
2nd	Identify different practical techniques and methods to assess pharmacokinetic parameters related to the subject under study. Perform various techniques to improve physical and chemical characters of drugs under research Formulate many classes of drugs in new dosage forms

	(suppositories, capsules, tablets, …….) Operate scientific instruments according to instructions. Evaluate and manage hazards (chemical and biological) throughout the whole practical work. Organize the experimental work according to the designed protocol (either individual, parallel or sequential experiments). Induction of some diseases in experimental animals (Hypertension, inflammation, seizures…….). Separate biological samples (e.g. blood, plasma). Apply ethical recommendations during dealing with experimental animals Modify techniques required for the progression of work
3rd	Collect raw data for the tested pharmacokinetic parameters. Interpret raw data to get valuable information. Perform statistical analysis for the results. Present and describe the results graphically. Suggest solution to the problem understudy based on this presented data.
4th	Communicate with supervisors to discuss results Work effectively as a member of a team (e.g. Supervisors, various professionals and Technicians). Present the results periodically in seminars. Define ethics of scientific research. Write scientific reports on the obtained results with conclusive significance. Discuss obtained results in comparison with pervious literatures. Suggest possible recommendations based on the outcome of the thesis and decide future plans. Summarize the thesis in an understandable Arabic language for non professionals. Write references in the required form (Thesis, Paper…….). Demonstrate the thesis in a final power point presentation. Continue self-learning throughout the experimental work and writing scientific papers.

5- Teaching and Learning Methods:

- Self learning (Activities, Research….)
- Lab work
- Seminar
- reporting

- Critical thinking
- Solving problem
- Open discussion

6- References:

- **Websites:** Pubmed, Sciencedirect, Weilyinterscience

Facilities required for:

1-For practical work: U.V spectrophotometer, centrifuge, Dissolution, Vortex, HPLC, Analytical balance (4digit), Thermostatic water bath, Vacuum Oven

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- **Head of Department: Prof/Dr. Mahmoud Abdul Ghany Mahdy**

Program Matrix of PhD degree of Pharmaceutics

		Program ILOs																														
		Knowledge and Understanding												Intellectual skills									Professional and practical skills					General and Transferable skills						
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6	D7
Special courses	Drug targeting		X	X	X							X		X	X																	
	Packaging					X	X	X				X								X													
	Solid oral dosage forms								X	X		X		X	X																		
Thesis		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X