Academic Reference Standards (ARS)
For
PhD in Pharmaceutical Sciences
(*Pharmaceutics*)

Pharmaceutics Department

Academic Year: 2021/2022

Head of Department

Prof. Dr. Irhan Ibrahim Abu Hashim

PhD degree in Pharmaceutical Sciences (Pharmaceutics)
Academic Reference Standards (ARS)

(Department Council Approval on 15/5/2022)

(Faculty Council Approval on 5/2022)

I. Attributes of the graduate:

1. Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Pharmaceutics.
2. Mastering of advanced knowledge, professional research skills, attitudes and values in the field of Pharmaceutics and integrating with the relevant subjects in his/her professional practice.
3. Recognizing the current issues in producing recent suitable dosage forms.
4. Adopting the scientific thinking approaches in subjects relevant to the bioavailability of the drug and how to enhance it.
5. Identifying and solving problems in the field of Pharmaceutics.
6. Mastering adequate range of specialized professional skills and using appropriate technology to improve his/her professional practice.
7. Communicating effectively and having ability to participate and lead teamwork.
8. Taking appropriate professional and scientific decisions in light of the available Information.
9. Providing the ability to critically analyze the impact and outcomes of research results.
10. Training in ethical and legal aspects of scientific research.
11. Employing the available resources to achieve and preserve the maximum benefit.

II. General Standards

1. Knowledge and Understanding:

Upon successful completion of the Program, graduates should be able to:

1.1 Identify the theories and fundamentals of Pharmaceutics and other related fields.
1.2 Recognize the recent and advanced scientific developments in the field of Pharmaceutics.
1.3 Detect all basic and new techniques used in the field of Granulation and practice.
1.4 Distinguish the value of ethics and legal issues of research and professional practice in Pharmaceutics.
1.5 Identify principles and fundamentals of quality in professional practice in the field of dosage form production and enhancing the bioavailability of drug.
1.6 Illustrate the mutual interaction between the pharmaceutical professional practice and the

surrounding environment.

2. Intellectual Skills

Upon successful completion of the Program, graduates should be qualified to:

2.1 Analyze and evaluate information in the field of Pharmaceutics.
2.2 Deduce solutions for specialized problems in absence of some information
2.3 Integrate information to solve professional problems.
2.4 Develop methodological scientific studies on certain research problems.
2.5 Assess risk assessment of professional practice in pharmaceutics.
2.6 Plan for development in pharmaceutical dosage forms.
2.7 Generate professional decision in response to various professional contexts.

3. Professional and Practical Skills

Upon completion of the program, graduates should be able to

3.1 Master basic and professional skills in pharmaceutics and related fields.
3.2 Assess methods and techniques used in pharmaceutics and drug quality control.
3.3 Write and evaluate professional research reports in pharmaceutics.

4. General and transferable skills:

Upon completion of the program, graduates should be able to:

4.1 Communicate effectively by various methods.
4.2 Effectively utilize information technology in professional practice development.
4.3 Perform self-assessment, continuous learning and identifying personal educational needs.
4.4 Use different resources to acquire knowledge and information.
4.5 Anticipate needs and risks in the research fields.
4.6 Work in a team and lead others in various professional contexts.
4.7 Manage time effectively.
4.8 Interpret and evaluate data available from scientific research.
4.9 Show awareness of ethics and legal issues of research and professional practice in pharmaceutics.

Program Specifications
For
PhD in Pharmaceutical Sciences (*Pharmaceutics*)

Department of Pharmaceutics

Academic Year: *2021/2022*

Head of Department

Prof. Dr. Irhan Ibrahim Abu Hashim

A-Basic Information

1	**Faculty**	Pharmacy
2	**Program Title:**	PhD in Pharmaceutical Sciences (*Pharmaceutics*)
3	**Program Type:**	Single
4	**Department (s):**	Department of Pharmaceutics
5	**Final award:**	PhD degree in Pharmaceutics
6	**Coordinator:**	Prof. Dr. Yosry Elsaid
7	**External Evaluator(s):**	
8	**Date of Program Specification Approval:**	*Department council: 15/5/ 2022*

B-Professional Information

1-Program Aims

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences and *Pharmaceutics*.

1.1. Apply the basics and methodologies of scientific research and manipulating its various tools in the field of pharmaceutics.
1.2. Master of advanced knowledge, professional research skills, attitudes, and values in the field of pharmaceutics and integrating with the relevant subjects in his/her professional practice.
1.3. Recognize the current issues in producing recent suitable dosage forms.
1.4. Adopt the scientific thinking approaches in subjects relevant to the bioavailability of the drug and how to enhance it.
1.5. Identify and solve problems in the field of pharmaceutics.
1.6. Master adequate range of specialized professional skills and using appropriate technology to improve his/her professional practice.
1.7. Communicate effectively and having ability to participate and lead team-works.
1.8. Provide the ability to critically analyze the impact and outcomes of research results.
1.9. Exhibit awareness of his/her role in the community development and preservation of environment in response to regional global changes.

2-Intended Learning Outcomes (ILOs)

A- Knowledge and Understanding:

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

A1	Explain the theories and fundamentals of pharmaceutics, formulation, and evaluation of dosage forms.
A2	Explain the theories and fundamentals of dosage form design, development, stability, bioavailability, and pharmacokinetics.
A3	Recognize the drawbacks of current dosage forms and utilize recent advanced techniques to overcome them.
A4	Recall effectively all basic and recent techniques and technological tools used in the field of pharmaceutics.
A5	Identify the legal and ethical issues of research and professional practice in pharmaceutics.
A6	Define the principles and the basics of quality in professional practice in the fields of pharmaceutics.
A7	Identify appropriate types of data needed to tackle a certain research problem.

B- Intellectual Skills

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

B1	Analyze and evaluate the gained information in the field of pharmaceutics, granulation, compaction, and related fields.
B2	Investigate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
B3	Integrate creativity and innovative scientific and professional approaches regarding dosage form development.
B4	Analyze the available professional and scientific resources and research skills to solve problems.
B5	Create professional and scientific decisions based on proofs, evidence and available data
B6	Develop comprehensive scientific and professional discussions and communications based on scientific evidence and proofs.

C- Professional and Practical Skills

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

C1	Apply different statistical methods for data analysis and validation.
C2	Utilize different research methodologies and good experimental and reporting skills in the design, formulation, and evaluation of dosage forms.
C3	Manage safely and efficiently advanced technological research tools and equipment relevant to design, formulation (granulation, compaction, etc.) and evaluation of dosage forms.
C4	Perform scientific research and contribute to the knowledge in the field of pharmaceutics and related fields.
C5	Perform professional reports, write accurately, and publish scientific research papers in scientific journals and conferences.
C6	Write thesis in a scientific and precise way.

D. General and Transferable Skills

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

D1	Communicate clearly by verbal and written means.
D2	Practice self- assessment and learning needed for continuous professional development.
D3	Use different available information resources relevant to pharmaceutics.
D4	Motivate critical thinking, problem-solving and decision-making capabilities.
D5	Demonstrate the ability to deal with obstacles and problems.
D6	Work effectively in a team and offer expertise and advice to others
D7	Develop creativity and time management abilities.
D8	Evaluate and criticize scientific work, literature and research data.
D9	Adopt ethical, legal, professional responsibilities and safety guidelines.
D10	Develop presentation skills, give seminars and defend thesis in public.

3-Academic Reference Standards (ARS):

Approved by both the Department and Faculty Councils
Department council Approval Date: *15/5/2022,*
Faculty council Approval Date: *5/2022*

3a- Academic References Standards: (**Attached**)

3b- Comparison of provision to External References
Achievement of academic reference standards via program Intended Learning Outcomes.

ILOs	ARS	Program
1. **Knowledge and Understanding**	**1.1**	A1, A2
	1.2	A3
	1.3	A2, A4
	1.4	A5
	1.5	A6
	1.6	A6, A7
2. **Intellectual Skills**	**2.1**	B1
	2.2	B2, B3
	2.3	B4
	2.4	B5
	2.5	B6
	2.6	B3, B6
	2.7	B4, B6
3. **Professional and Practical Skills**	**3.1**	C1,C2
	3.2	C3
	3.3	C4, C5, C6
4. **General and Transferable Skills**	**4.1**	D1
	4.2	D2, D3
	4.3	D4
	4.4	D4
	4.5	D5
	4.6	D7
	4.7	D6, D8
	4.8	D9
	4.9	D10

4-Curriculum Structure and Contents

4A. Program duration: 2-5 years.

4B. Program structure:

a- The program consists of 50 credit hours of study (8 credit hours of courses and 42 credit hours for thesis).

b- Courses include 6 credit hours of obligatory courses, in addition to 2 credit hours for an elective course., All courses possess the code number [300], According to Faculty By-Law.

c- A scientific research thesis of 42 credit hours represents a main component of the program. It is achieved in a subject assigned by the supervision committee, endorsed by the Department Council, the committee of graduate studies & research and the Faculty Council.

d- The student should publish at least one scientific research paper in scientific journals before the public defense of the Thesis.

4c. Program Components

1- Courses according to the By-law

Code number	Name of the course	Type	Credit Hours	Semester
PTP-301	Polymers	Compulsory	2	Fall
PTP-302	Granulation and compaction	Compulsory	2	Fall
PTP-303	Diffusion	Compulsory	2	Spring
PTP-304	Good laboratory practice	elective	2	Spring
PTP-305	Radiopharmaceuticals	elective	2	Spring
Total (Courses)	5		8	
	Thesis		42	
Total	6		50	

5- Program Courses

1- Achievement of Program Intended Learning Outcomes via the courses

Course Name	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
Special Courses (8 C.H.)					
First Semester					
Polymers ***(PTP-301)***	**2**	A1, A2, A7	B1, B5	C2	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Granulation and compaction (PTP-302)	**2**	A1, A2, A5, A7	B1, B2, B4	C1, C2, C3	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Second Semester					
Diffusion (PTP-303)	**2**	A1, A2, A6, A7	B1, B2, B4, B5, B6	C1, C2, C5, C6	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Good laboratory practice (Elective course) (PTP-304)	**2**	A3, A4, A5, A6, A7	B2, B3, B4, B5, B6	C1, C2, C3, C4, C5, C6	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Radiopharmaceuticals (Elective course) (PTP-305)	**2**	A3, A4, A7	B1, B3, B4, B5	C2, C3, C4	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Total	**8**				
Thesis	**42**	A1, A2, A3, A4, A5, A6, A7	B1, B2, B3, B4, B5, B6	C1, C2, C3, C4, C5, C6	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10
Total	**50**				

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*

Code	Course title	K.U*							IS**					
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6
(PTP-301)	Polymers	√	√					√	√				√	
(PTP-302)	Granulation and compaction	√	√			√		√	√	√		√		
(PTP-303)	Diffusion	√	√				√	√	√	√		√	√	√
(PTP-304)	Good laboratory practice (E)			√	√	√	√	√		√	√	√	√	√
(PTP-305)	Radiopharmaceuticals (E)			√	√			√	√		√	√	√	

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
E ***E**lective course*

Code	Course title	P.P.S***						G.T.S****									
		C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
(PTP-301)	Polymers		√					√	√	√	√	√	√	√	√	√	√
(PTP-302)	Granulation and compaction	√	√	√				√	√	√	√	√	√	√	√	√	√
(PTP-303)	Diffusion	√	√			√	√	√	√	√	√	√	√	√	√	√	√
(PTP-304)	Good laboratory practice (E)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
(PTP-305)	Radiopharmaceuticals (E)		√	√	√			√	√	√	√	√	√	√	√	√	√

*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*
E ***E**lective course*

6- Student Assessment Methods

6.1- Written exam (special courses).	To assess Knowledge and Understanding and Intellectual Skills
6.2- Oral exam (special courses).	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.3- Scientific seminar for thesis registration	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.4- Published scientific research paper.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills
6.5- Thesis writing	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6.5- Public presentation and discussion of the thesis.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

7- Program Admission Requirements

7.1- The candidate should hold a master's degree in pharmaceutical sciences in the same specialization from any faculty of pharmacy from Egypt or Arabian countries or foreign universities recognized by the Supreme Council of Universities.

7.2- The candidate should be available for study at least two days per week throughout the duration of study.

7.3- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

8- Regulations for progression and program completion

8.1- The minimum duration of time to gain the PhD degree is two years from the approval date of university council of graduate studies ad research on the registration of the PhD thesis.

8.2- The maximum duration of time to gain the PhD degree is 5 years from the date of registration, putting in consideration the periods of enrollment suspension. It is possible to extend this period up to two years (one year at a time) based on a request from the candidate's major supervisor, a suggestion from the department council and the committee of graduate studies & research and the approval of the faculty council. The final decision should be endorsed by the university council of graduate studies & research.

8.3- The student has to pass the assigned courses, and to practically do a scientific research thesis for complete fulfilment of the PhD degree.

8.4- An annual progress report is presented by the supervisors of Thesis to the Dept Council by December.

8.5- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

9- Facilities Required for Search:

9.1- Computers.
9.2- Library and digital library supplied by recent scientific books and journals.
9.3- Laboratories with enough chemicals, apparatus, and advanced instruments.
9.4- Access to research engines for scientific periodicals in the field of *Pharmaceutics*.

10-Thesis

A thesis should be prepared by the student for complete fulfilment of the PhD degree.

11- Evaluation of program

Evaluator	Method	Sample
Internal evaluator	Program evaluation Courses evaluation	Program report Courses report
External evaluator	Program evaluation Courses evaluation	Program report Courses report
Stakeholders	Questionnaires	To be Attached
Postgraduates	Questionnaires	To be Attached
Self-evaluation	Matrices	To be Attached
Supervisors of Thesis	Reports	Reports of staff members of committee to evaluate the thesis

Signature:

Course Coordinator	Head of Department	Date*
Prof. Dr. Yosry Elsaid	Prof. Dr. Irhan Ibrahim Abu Hashim	15/5/2022

Annex 1

Attach courses and thesis specifications.

Program: PhD in Pharmaceutical Sciences (*Pharmaceutics*)

Pharmaceutics Department

PhD Thesis Specification

Academic Year: 2021/2022

Head of Department

Prof. Dr. Irhan Ibrahim Abu Hashim

A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD in Pharmaceutical Sciences (*Pharmaceutics*)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Pharmaceutics Department**
	Total credits of the Thesis	**42 C. H.**
	Total credits of the Program	**50 C.H.**
5	**Final award of the Program:**	**PhD degree of Pharmaceutical Sciences (Pharmaceutics)**
6	**Coordinator:**	**Prof. Dr. Irhan Ibrahim Abu Hashim**
7	**External Evaluator(s):**	
8	**Date of Program Specification Approval:**	***Department council: 15/5/2022***

B-Professional Information

1-Aims

The overall aims of the thesis:

1.1 Recognizing novel concepts, methods and/or techniques in the field of pharmaceutics.

1.2 Adopting the critical and analytical thinking approaches in drug delivery systems, pharmaceutical dosage forms formulation, and stability.

1.3.Integrating the knowledge in the field of advanced trends of pharmaceutical technology, bioavailability, and targeted drug delivery with other relevant subjects.

1.4.Identifying challenging professional problems and finding innovative solutions.

1.5 Providing the ability to critically analyze the impact and outcomes of research results.

1.6 Training in ethical and legal aspects of scientific inquiry.

1.7 Mastering of advanced knowledge base, professional research skills, attitudes, and values.

1.8 Utilizing effectively available professional and scientific resources in the field of pharmaceutics.

1.9 Showing awareness about the role of the graduate in community development.

1.10 Attaining communication skills, research ethics, time management, and team-working.

Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

Upon successful completion of the thesis, the graduate should be able to efficiently demonstrate the essential knowledge and understanding of:

a1	Recognize the basic techniques and the principles of clinical pharmacokinetics.
a2	Describe the role of pharmaceutics to enhance bioavailability of drugs.
a3	Define the research ethics and regulations with professional practice in pharmaceutics.
a4	Illustrate the importance of professional practice in pharmaceutical field on the environmental development and maintenance.
a5	Distinguish different drug delivery system according to needs and challenges.
a6	Explain the theories and fundamentals of pharmaceutics.

2- Intellectual Skills

By the end of this thesis, the graduate should be able to:

b1	Analyse clinical and laboratory problems effectively and correctly interpret and explain results simply and effectively.
b2	Specify important approaches to enhance the therapeutic efficacy and bioavailability of pharmaceutical dosage forms.
b3	Conduct the proper experimental methods and evaluate the scientific risks in practicing laboratory experiments.
b4	Analyze statistically the obtained results.
b5	Formulate the research results in peer-reviewed publications and in a dissertation.
b6	Organize professionally a scientific paper in the fields of Microbiology and Immunology
b7	Interpret the research results and discuss them with other researchers

b- Professional and Practical Skills

By the end of this thesis, the graduate should be able to:

c1	Complete laboratory reports.
c2	Examine research data and employ them for statistical processing.
c3	Perform professional reports and contribute to the knowledge in the field of pharmaceutics.
c4	Analyse and interpret laboratory data relevant.
c5	Design data in publication form.

c6	Complete thesis in a scientific and precise way.

d. General and Transferable Skills

By the end of this thesis, the graduate should be able to:

d1	Perform self and continuous education skills.
d2	Analyze data and facts available for scientific research.
d3	Deal with obstacles and problems and finding the proper solution.
d4	Use computer programs, online database, and different information resources relevant to microbiological techniques
d5	Communicate research results effectively through oral presentations at scientific seminars, conferences, and other venues.
d6	Implement written and oral communication skills.
d7	Work effectively in a team and independently.
d8	Organize and manage research schedule.
d9	Demonstrate time management ability
d10	Transfer knowledge and experience to others and evaluate their performance.

3- Thesis Contents:

Part	Topics
1	Abstract (Arabic and English)
2	Introduction
3	Aims, Objectives and Rational of the work
4	Results and Discussion, covering all fields
5	Methodology and Experimental Work of all fields
6	Conclusion
7	References

4- Matrix of knowledge and skills of the Thesis:

Part	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
2	Introduction	a1, a3	b1, b3	c2, c3, c4	d1, d3, d5
3	Objectives/Rational	a2, a4	b2, b4	c2, c5	d2, d3, d4
4	Results and Discussion	a1, a3, a4	b1, b3, b4, b7	c1, c6	d6, d7, d8
5	Experimental Work	a2, a3, a4, a6	b2, b3, b4, b6	c1, c2, c3, c4	d2, d3, d4
6	Conclusion	a2, a5, a6	b2, b5, b6	c5, c6	d7, d8, d9, d10

* ***K**nowledge and **U**nderstanding* *****I**ntellectual **S**kills* ******P**rofessional and **P**ractical **S**kills* *******G**eneral and **T**ransferable **S**kills*

5. Student Assessment:

A written Thesis	To assess Knowledge and Understanding, Intellectual Skills and Professional and practical Skills
Published Research Paper(s)	To assess Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
Public Defense	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
Committee-in-Charge Report	Assess and evaluate thesis
Dept Council Approval	To approve thesis

Guidelines of the Thesis (according to By-Law).

1- The minimum period for obtaining a PhD is two years from the date of approval of the University's Graduate Studies Council for registration.

2- The maximum limit for obtaining a doctoral degree is five years from the date of registration, taking into account cases of suspension of registration, and registration may be extended upon the request of supervisors and the approval of the relevant department council, the Graduate Studies and Research Committee, and the College Board for an academic year with a maximum of two years.

3- The student must pass the English Language Examination with the minimum score specified by the University Studies Board to approve the PhD defense date.

4- The total number of credit hours for obtaining a doctoral degree is 50 credit hours (8 course hours, 42 credit hours per thesis).

5- The student conducts a research on a topic determined by the supervisory committee and approved by the relevant department council and the college, graduate studies and research councils.

6- The researcher submits, before registering for the academic degree, the research plan in a public discussion in the department to discuss the topic of the thesis, determine the objectives of the research, the extent of its application, potential problems and how to overcome them.

7- After the approval of the Graduate Studies and Research Committee and the College Board, the scientific departments develop specialized courses from code (300) whose number of credit hours does not exceed 8 hours, and their average points are not less than 2.00, and these hours are calculated within the hours prescribed for the program.

8- The scientific thesis is the responsibility of the relevant department council and is accomplished scientifically and technically under the responsibility of the supervisory committee. Scientific, technical and administrative support must be provided to the researcher for its completion, and the supervision committee is formed as follows:

9- The College Council, upon the proposal of the relevant Department Council, appoints a professor who supervises the thesis (principal supervisor). The council may entrust the supervision of the thesis to one of the assistant professors.

10- It is permissible for the supervisors to be many professors or assistant professors, and teachers may participate with a maximum of one in the same specialty.
11- A member from abroad who has experience in the specialty to which the dissertation belongs may be joined to the supervision committee.
12- The student should meet his main supervisor at least once monthly and a semi-annual report must be provided by the supervisor(s) on the progress of student to the department council and the Graduate Studies Committee and the graduate should be given a copy of the report. The annual report must be submitted to the college council in October each year.
13- A postgraduate student registered to obtain a master's degree or a doctorate degree, after completing the thesis preparation, holds a public discussion session on the thesis summary and the results he reached, during which the supervisors determine the extent to which the student fulfills the research point before submitting the thesis to the department council.
14- The principal supervisor submits an application that includes a proposal to form a discussion committee and judge the thesis after preparing it and preparing it for discussion in preparation for presentation to the Postgraduate Studies and Research Committee and then the College Board for approval and is supported by the following:
15- The report on the validity of the dissertation for discussion, signed by the majority of the members of the supervisory committee, one of whom is the main supervisor.
16- A copy of the thesis prepared according to the instructions for writing scientific theses in the faculty.
17- At least one research published in a scientific refereed journal.
18- The committee for discussion and judgment on the dissertation is formed of three members based on the proposal of the relevant department council, the graduate studies and research committee, and the approval of the college council, one of whom is the main supervisor or two members with one vote. And two other members from among the professors or assistant professors, at least one of them is from outside the college for master's theses, and at least one of them is from outside the university for doctoral theses (the two are from outside the college) according to the text of Article 153 of the Universities Organization Law.

19- The department council approves the individual reports, the group report, and what indicates that the student has made the proposed amendments from the discussion and judgment committee and submitted them to the Graduate Studies and Research Committee and the College Board in preparation for presentation to the University Council.
20- The date of awarding the academic degree is the date on which the University Council approved the College Board's recommendation for grants.
21- The college council, based on the proposal of the discussion and judgment committee, may return the message to the student to correct the errors and complete what the committee deems short of or submit another message in case the thesis is rejected.

6 – Facilities Required:

Laboratory	Magnetic stirrers, HPLC, UV-visible spectroscopy, Rotary evaporator, probe sonicators, centrifuges, viscometers, sensitive electric balances, ovens, incubators, pH meters, sonicating water

	baths, refrigerators, hot plates, freeze dryer, ……. etc
Library	British Pharmacopeia, USP Pharmacopeia, Encyclopedia of pharmaceutical technology, Published research articles, ……etc
Others	-------

Thesis Coordinator	Head of Department	Date
Prof. Dr. Irhan Ibrahim Abu Hashim	**Prof. Dr. Irhan Ibrahim Abu Hashim**	15/ 5 / 2022

* Date of Dept. Council Approval

Dept. of Pharmaceutics	Course Specification	PhD Program

Ph.D. Program

Course Specification

Academic year: 2021/2022

البرنامج **الدكتوراه**	**توصيف مقرر** **الإنتشار** **Diffusion**
رئيس القسم **أ د. ارهان إبراهيم أبو هاشم**	**منسق المقرر** **أ.م.د. إلهام عبد المنعم السعيد**

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Pharmaceutics
Department supervising the course	----
Program on which the course is given	Ph.D. Program
Academic Level	Postgraduate
Academic year	2021/2022 - Second semester
Date of course specification approval	15/5/2022

A. Basic Information: Course data:

Course Title	Diffusion
Course Code	PTP-303
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	-
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

Introduction to solid state diffusion, atomistics of diffusion, Fick's first and second laws; thin film solution and tracer diffusion measurements, semi-infinite and infinite diffusion couples - diffusion in a concentration gradient; temperature effects; surface, grain boundary and dislocation pipe diffusion; diffusion in ionic solids, interdiffusion and the Kirkendall effect, measurement of variable diffusion coefficients.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A1	a1	Define diffusion and describe relevant examples in the pharmaceutical sciences and the practice of pharmacy.
A2	a2	Differentiate the processes of dialysis, osmosis, and ultrafiltration as they apply to the pharmaceutical sciences and the practice of pharmacy.

A4	a3	Identify the steady state diffusion profiles and interpret experimental data to determine diffusion and permeability coefficients.
A7	a4	Describe multilayer diffusion and calculate component permeability.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

B4	b1	Assess the mechanisms of transport in pharmaceutical systems and identify which ones are diffusion based.
B6	b2	Interpret Fick's laws of diffusion and their application.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

C1	c1	Measure the diffusion rate of drugs, apply different method of the calculation including diffusion rate, flux and permeability
C4	c2	Analyze diffusion coefficient, permeability, and lag time.
C5	c3	Analyze drug release from homogenous solid.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

D1	d1	Present data clearly in oral and written forms
D2	d2	Implement writing and presentation skills
D4	d3	Identify and solve problems

3. Course Contents

Week No.	Topics	Lecture Hours
1,2	Diffusion and related processes. Diffusion and Dissolution	4
3,4	Diffusion theories. the concepts of steady state, sink conditions, membrane, and diffusion control	4
5,6	Diffusion Fick's law and applying to calculate diffusion rate, flux and permeability	4
7,8	Procedures and apparatus for assessing the drug diffusion.	4
9,10	Applications of diffusion in pharmaceutics	4

Total: 10 weeks		**20**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1,2	Diffusion and related processes. Diffusion and Dissolution	a1,a2	b2	c3	d1, d2
3,4	Diffusion theories. the concepts of steady state, sink conditions, membrane, and diffusion control	a2, a3	b1	c2	d2
5,6	Diffusion Fick's law and applying to calculate diffusion rate, flux and permeability	a4	b2	c3	d3
7,8	Procedures and apparatus for assessing the drug diffusion.	a4	b2	c2	d3
9,10	Applications of diffusion in pharmaceutics	a4	b2	c3	d2

** Knowledge and Understanding* ***Intellectual Skills* ****Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	Lectures with different tools: power point data show program, and white board
5.2	Problem solving

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	14th week	**90 %**
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	14th week	**10 %**
				100 %

7- List of References

	Reference	Type
1.	Martin's: Physical pharmacy and pharmaceutical sciences" 6th Ed., Wolters Kluwer, Lippincott Williams and Wilkins, New delhi, Philadelphia, (2011).	Essential Book **(Text Books)**
2.	"Remington's: The science and practice of pharmacy" 21st Ed., Gennaro, A. R., ed., Mack publishing C., Lippincott Williams and Wilkins, Philadelphia, (2006).	Essential Book **(Text Books)**
3.	Applied physical pharmacy, Mansoor M. Amiji, Beverly J. S., eds., Grow-Hill Companies INC., (2003).	Essential Book **(Text Books)**
4.	**-http://www.elsevier.comdescription** **-http://www.sciencedirect.com**	Internet sources

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Library	**Books**

9. Signature

Course Coordinator	Head of Department	Date
Dr. **Elham Abdelmonem Mohamed**	**Prof. Dr.** **Irhan Ibrahim Abu Hashim**	15/5/2022

* Date of Dept. Council Approval

Dept. of Pharmaceutics	Course Specification	PhD Program

PhD Program

Course Specification

Academic year: 2021/2022

البرنامج الدكتوراه	توصيف مقرر التحبيب والضغط Granulation and compaction
رئيس القسم ا. د. ارهان ابراهيم أبو هاشم	منسق المقرر ا. د. ارهان ابراهيم أبو هاشم

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Pharmaceutics
Department supervising the course	----
Program on which the course is given	Ph.D. Program
Academic Level	Postgraduate
Academic year	2021/2021 - first semester
Date of course specification approval	15/5/2022

A.Basic Information : Course data :

Course Title	Granulation and compaction
Course Code	PTP-302
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	- عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- Show the principles of established granulation techniques and give a deeper insight into how to influence product properties.
2- Know how processing parameters influence product properties is essential for obtaining a product which meets the quality specification and requirements for further processing.
3- Know the importance of the granulation process in producing good quality tablets.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A1, A4	a1	Recognize the fundamental principles of granulation and the advantages, disadvantages and potential of the various granulation methods.
A2, A3	a2	Recognize the techniques and processes available for granulation in relation to controlled release products.
A3, A6, A7	a3	Identify how to select a particular machine and granulation method by using strict scientific or cost-benefit criteria and how this selection influence product

		properties.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

B5	b1	Assess the factors that should be taken into consideration when selecting granulation and compression equipment.
B2, B4	b2	Adapt some of the compression problems that can arise and how they can be overcome.
B3, B6	b3	Evaluate the techniques available and their limitations for granulation control.
B1	b4	Conclude the reasons for granulation.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

C3	c1	Manipulate the reasons why problems arise in the granulation and compression processes and how these problems can be avoided.
C3	c2	Perform detailed knowledge on compression machinery.
C3	c3	Utilize a comprehensive and sound understanding of the practice of tablet granulation and compression and to appreciate the various processes batch or continuous, that are available

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

D3	d1	Use information technology tools to retrieve information regarding technology of preparation, stability and storage cosmetic products.
D2	d2	Practice independent self-learning skills.
D1	d3	Develop written and oral communication skills.
D1, D6	d4	Direct and work effectively in a team.

3. Course Contents

Week No.	Topics	Lecture Hours	Practical / Tutorial hr.
1,2	Types of granulation techniques.	4	-
3,4	Theory of granulation and compaction.	4	-
5,6	Reasons for granulation.	4	-
7,8	Significance of granulation and compaction in drug delivery systems.	4	-
9,10	Influence of the granulation technique on the granulate properties.	4	-
11,12	Pharmaceutical application	4	-
Total: 12 weeks		**24**	**-**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1,2	Types of granulation techniques.	a1,a2	b3	c3	d1,d2,d4
3,4	Theory of granulation and compaction	a1	b1,b2,b3	c1,c2	d3
5,6	Reasons for granulation	a1	b4	c3	--
7,8	Significance of granulation and compaction in drug delivery systems	a2	--	c3	d4
9,10	Influence of the granulation technique on the granulate properties	a3	b1,b3	c3	d2
11,12	Pharmaceutical applications	a3	--	c3	d4

** Knowledge and Understanding* ***Intellectual Skills* ****Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	Lectures using Power Point (PPT) presentations
5.2	Lectures using whiteboard
5.3	Activities and tasks required to develop students' self-learning skills.
5.4	Tutorial, Class Activity and Group Discussion to explain what has not been understood
5.5	Internet search and Research Assignments to design Formative Assignments

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	week 12	**90 %**
Assessment 2	**Tutorial / or Practical** assignments **and Semester work**	Assignments prepared by students and sent to the supervisor electronically for evaluation. To assess professional skills	----	**0 %**
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	week 12	**10 %**
				100 %

7- List of References

	Reference	Type
1.	Handbook of Pharmaceutical Granulation Technology (by Dilip M.Parikh) ,3rd edition (2015).	Essential Book **(Text Books)**
2.	Handbook of Pharmaceutical Granulation Technology (by James Swarbrick),2nd edition, (2005).	Recommended Books
3.	Granulation techniques and technologies: recent progresses: Bio Impacts (BI)	websites

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Library	**Books**

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Irhan Abu Hashim	**Prof. Dr. Irhan Abu Hashim**	15/5/2022

* Date of Dept. Council Approval

Dept. of Pharmaceutics	Course Specification	PhD Program

Ph.D. Program

Course Specification

Academic year: 2021/2022

البرنامج **الدكتوراه**	**توصيف مقرر** **العناصر المشعة** **Radiopharmaceuticals**
رئيس القسم **أ.د/ ارهان ابراهيم ابو هاشم**	**منسق المقرر** **أ.د. يسري السعيد إبراهيم**

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Pharmaceutics
Department supervising the course	----
Program on which the course is given	Ph.D. Program
Academic Level	Postgraduate
Academic year	2021/2022 - second semester
Date of course specification approval	15/5/2022

A.Basic Information: Course data:

Course Title	Radiopharmaceuticals
Course Code	PTP-305
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	-
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1. Know the clinical effect of radioactive pharmaceutical products, i.e., using the most effective radionuclide for the scanning, diagnosis and treatment of the diseases.
2. Good knowledge about preparation and handling of the radiopharmaceutical products.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A3	a1	Recognize the different applications of radiation and radioactive compounds in medical diagnosis.
A4	a2	Recognize the steps of the manufacturing of the radioactive compounds.
A7	a3	Identify the different methods of preparation, quality control of radioactive compounds and official examples of radiopharmaceuticals.
	a4	Outline the basic principles of producing radionuclides.
	a5	State the different methods of dose calculation and unit utility.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

B1	b1	Solve problems related to the decay of radioactive compounds.
B3	b2	Adapt the most suitable types of radioactive compounds and their applications (diagnosis, therapy, industry).
B4	b3	Interpret the expiry date of radiopharmaceuticals.
B5	b4	Specify the different generators and equipment used for the production of radionuclides.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

C2	c1	Manipulate the suitable dosing system required for radioactive compounds.
C3	c2	Manipulate and divide the bulk volumes into small doses.
C4	c3	Evaluate the quality controls of the prepared radiopharmaceuticals.
	c4	Monitor the patient response to radiopharmaceuticals and follow up the fate of such radiopharmaceuticals.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

D1, D2, D3	d1	Use information technology tools to retrieve information regarding technology of preparation, stability and storage cosmetic products.
D4, D5, D6	d2	Practice independent self-learning skills.
D7, D8	d3	Develop written and oral communication skills.
D9, D10	d4	Direct and work effectively in a team.

3. Course Contents

Week No.	Topics	Lecture Hours
1,2	Introduction about radiation and radiopharmaceutical.	4
3,4	Preparation and quality control of radiopharmaceuticals.	4
5,6	Generators and equipment used for the production of radionuclides	4
7,8	The application of radiation and radioactive compounds in medical diagnosis and in industry.	4
9,10	Official examples of radiopharmaceuticals and non-Official examples of radiopharmaceuticals	4
11,12	Rationale for dose calculation and unit utility. Biological effects of various radiations.	4
Total: 12 weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1,2	Introduction about radiation and radiopharmaceutical.	a1	b2	c4	d1, d2
3,4	Preparation and quality control of radiopharmaceuticals.	a3	b3	c3	d2
5,6	Generators and equipment used for the production of radionuclides	a2, a3	b4	c2	d2
7,8	The application of radiation and radioactive compounds in medical diagnosis and in industry.	a4	b2	c4	d2,d3,d4
9,10	Official examples of radiopharmaceuticals and non-Official examples of radiopharmaceuticals	a3	b2	c4	d4
11,12	Rationale for dose calculation and unit utility. Biological effects of various radiations.	a1,a5	b1,b2,b3	c1,c2, c4	d3

** Knowledge and Understanding* ***Intellectual Skills* ****Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	Activities and tasks required to develop students' self-learning skills.
5.2	Tutorial, Class Activity and Group Discussion to explain what has not been understood

5.3	Internet search and Research Assignments to design Formative Assignments

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	week 12	**90 %**
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	week 12	**10 %**
				100 %

7- List of References

	Reference	Type
1.	"Remington's: The science and practice of pharmacy" 21st Ed., Gennaro, A. R., ed., Mack publishing Co., Lippincott Williams and Wilkins, Philadelphia, (2006).	Essential Book **(Text Books)**
2.	Handbook of radiopharmaceutical, Radiochemistry and application, 1st Ed, Michael J. Welch & Carol S, Redvanly (2008).	Essential Book **(Text Books)**
3.	Richard J. Kowalsky Radiopharmaceuticals in Nuclear Pharmacy & Nuclear Medicine, 2nd Ed, (2007).	Essential Book **(Text Books)**
4.	**-http://www.aaps.org** **-http://pslgroup.com** **-http://www.medscape.com** - **http://www.druginfonet.com**	Internet sources

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Library	**Books**

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. **Yousry ELsaied**	**Prof. Dr.** **Irhan Ibrahim Abu Hashim**	15/5/2022

* Date of Dept. Council Approval

Dept. of Pharmaceutics	Course Specification	PhD Courses

PhD Courses First Semester

Polymers Course Specification

Academic year: 2021/2022

البرنامج تمهيدى دكتوراة	**توصيف مقرر** البوليمرات Polymers
رئيس القسم ا.د/ارهان ابراهيم ابوهاشم	منسق المقرر ا.د/أسامة عبد العظيم سليمان

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Pharmaceutics
Department supervising the course	Pharmaceutics
Program on which the course is given	PhD Courses in Pharmaceutical Sciences
Academic Level	Postgraduate
Academic year	2021/2022 - First semester
Date of Department course specification approval	15/5/2022

A.Basic Information : Course data :

Course Title	Polymers
Course Code	PTP-301
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	0
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- Definition, uses in pharmaceutical field, types (natural, synthetics).
2- Different properties of polymers.
3- Polymer characterization and polymer degradation.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A1	a1	Know the basic concepts of polymers, definitions and descriptive terms.
	a2	State the different applications of polymers
A2	a3	Outline the steps of the manufacturing of synthetic polymers.
A7	a4	Understand the principle of polymer synthesis.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

B1	b1	Recognize the different types of polymers, their properties and applications
	b2	Distinguish the basic principles of homogenous and dispersion polymerization.
	b3	Understand the specific properties of polymers in the presence of liquid media
B5	b4	Recall the relationships between structure of polymers and cohesion of materials

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

C2	c1	Choose the suitable polymer for preparation of dosage forms
	c2	Characterize the different pharmaceutical applications of polymers in various dosage forms.
	c3	Understand the thermal, physical, and mechanical properties of polymers in general.
	c4	Explain the glass transition temperature and factors affecting the Tg.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

D3	d1	Use information technology tools to retrieve information regarding technology of preparation, stability and storage cosmetic products.
D2	d2	Practice independent self-learning skills.
D1	d3	Develop written and oral communication skills.
D6	d4	Direct and work effectively in a team.

3. Course Contents

Week No.	Topics	Lecture Hours
1-2	Polymers introduction: Fundamentals of polymer structure	4
3-4	Classification of polymers.	4
4-5	General characteristics of polymers	4
6-7	Main methods and processes to synthesis polymers	4
8-9	Polymers as rheology modifiers	4
10-11	Special properties of polymers، case studies and detailed examples of applications	4
Total: 11 weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Polymers introduction: Fundamentals of polymer structure.	a1	b2	c4	d1, d2
2	Classification of polymers.	a2, a3	b4	c2	d2
3	General characteristics of polymers.	a4	b2	c4	d4
4	Main methods and processes to synthesis polymers	a4	b2	c2	d4
5	Polymers as rheology modifiers	a4	b2	c3	d2
6	Special properties of polymers، case studies and detailed examples of applications	a4	b1, b3	c1, c2	d3

** Knowledge and Understanding* ***Intellectual Skills* ****Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Power Point** (PPT) presentations
5.2	**Lectures using whiteboard**
5.3	**Data show program**
5.4	**Problem solving**

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	week 14	90%
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	week 14	10%
				100 %

7- List of References

	Reference	Type
1.	Martin's: Physical pharmacy and pharmaceutical sciences" 6th Ed., Wolters Kluwer, Lippincott Williams and Wilkins, New delhi, Philadelphia, (2011)	Course Notes
2.	"Remington's: The science and practice of pharmacy" 22nd Ed., Pharmaceutical Press, Lippincott Williams and Wilkins, Philadelphia, (2012).	Essential Books (Text Books)
	"Aulton's Pharmaceutics: The design and manufacture of medicines" 4th Ed., Michael E.Aulton, Kevin M.G. Taylor, (2013).	Recommended Books
3.	http://www.elsevier.comdescription http://www.sciencedirect.com	websites

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**.

9. Signature

Course Coordinator	Head of Department	Date *
Prof. Dr. Osama A. Soliman	Prof. Dr. Irhan Ibrahim Abu Hashim	15/5/2022

* Date of Dept. Council Approval