Academic Reference Standards (ARS)
for
PhD in Pharmaceutical Sciences
(*Medicinal chemistry*)

Medicinal Chemistry Department

ARS

Academic Year: 2021/2022

رئيس القسم
أ.د/ محمد احمد احمد مصطفى

PhD in Pharmaceutical Sciences (Medicinal chemistry)

Academic Reference Standards (ARS)

(Department Council Approval on 28/11/2021

Faculty Council Approval on / /

Mansoura University
Faculty of Pharmacy
Quality Assurance Unit
Academic Reference Standards for
Postgraduate Programs

Attributes of the graduate:
The graduates of the PhDdegree of pharmaceutical science (Medicinal Chemistry) shouldbe capable of:

- Mastering the basics and methodologies of scientific research in the fields of drugdesign and/or drug analysis.
- Introducing novel concepts, methods and techniques in the field of drug developmentand/or drug analysis to the scientific literatures.
- Adopting the critical and analytical thinking approaches in subjects relevant toadvanced medicinal chemistry.
- Integrating the knowledge in the field of medicinal chemistry with other relevantsubjects.
- Generating and disseminating new knowledge that contributes to prevention andtreatment of diseases.
- Showing considerable awareness regarding the current problems and the recenttheories and trends in the field of drug design and/or drug analysis.
- Identifying challenging professional problems and finding innovative solutions.
- Providing the ability to critically analyze the impact and outcomes of research results.
- Mastering of all new techniques used in the field of drug development and/or druganalysis.
- Training in ethical and legal aspects of scientific inquiry.
- Mastering of advanced knowledge base, professional research skills, attitudes andvalues.
- Making the appropriate professional and scientific decision in light of the availableinformation.
- Utilizing effectively available professional and scientific resources of drugdevelopment and/or drug analysis and plan for and develop new resources.
- Showing awareness about the role of the graduate in community development.
- Communicating effectively and leading team professionally.
- Demonstrating commitment to the transfer knowledge to others.
- Showing commitment for self-development and life-long learning.

1. Knowledge and Understanding

Upon completion of The PhD program (Medicinal Chemistry), the graduate should be able to:

1.1. Explain the basictheories and principles of drug design and/or drug analysis and theirrelevant subjects.
1.2. Identify recent advances in the fields of advanced medicinal chemistry.
1.3. State the legal and ethical principles for practicing research in drug synthesis and/ordrug analysis and implementing guideline of experiments.
1.4. Recognize the effect of his/her professional practice on the environment and methodsof environmental development and maintenance.
1.5. Define the basic and advanced research concepts in the field of medicinal chemistry

2. Intellectual Skills

Upon completion of this program the graduate should be able to:

2.1. Develop deductions and conclusions based on provided information in the fields ofdrug design and/or drug analysis.
2.2. Solve problems related to drug development and/or quality control according toaccompanying circumstances and underlining causes.
2.3. Demonstrate the knowledge of drugs used in disease treatment.
2.4. Frame professionally a scientific paper in the fields of drug development and/or druganalysis
2.5. Evaluate professional and scientific risks in practicing laboratory experiments.
2.6. Plan for performance development in the fields of drug development and/or druganalysis.
2.7. Take professional decisions and create scientific innovation regarding the design andanalysis of drugs
2.8.Direct proofs and evidence based scientific and professional dialogues anddiscussions.

3. Professional and Practical Skills

Upon completion of this program the graduate should be able to:

3.1. Master a wide range of the basic and recent professional skills in the fields ofmedicinal chemistry.
3.2. Write professional reports regarding drug quality control.
3.3. Evaluate available methodologies and materials in drug development and/or druganalysis.
3.4. Deduce new methods in drug design and/or drug analysis based on available data.
3.5. Evaluate the information in the field of advanced trends in medicinal chemistry forbetter understanding of diseases and drugs used for treatment.

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3.6. Operate advanced technological research tools and equipmentin professional practicerelevant to drug development and/or drug analysis.
3.7. Assess professional and scientific risks in practicing laboratory experiments.
3.8. Handle safely the material used in research regarding their physical and chemicalproperties, including any specific hazards associated with their use.
3.9.Preform scientific research.

4. General and Transferable Skills:

Upon completion of this program the graduate should be able to:

4.1. Communicate effectively with research team members.
4.2. Utilize effectively information technology in professional development.
4.3. Manipulate computer programs, software, online database and other resources to getinformation and analyze the obtained research data
4.4. Transfer knowledge and experience to others and evaluate their performance.
4.5. Criticize scientific lectures and relevant workshops.
4.6. Anticipate needs and risks in scientific research.
4.7. Interpret data available from scientific research.
4.8. Perform self-assessment and continuous learning skills.
4.9. Manage the time properly.
4.10. Develop presentation skills, give seminars and defend thesis in public.

Reference:
National Academic reference Standard (NARS) for postgraduate studies issued by NAQAAE 2009

Program Coordinator: Head of Department

Head of Department: Prof. Dr. Mohamed Ahmed Moustafa

Program: PhD in Pharmaceutical Sciences (Medicinal Chemistry)

Medicinal Chemistry Department

Program Specification

Academic Year: *2021/2022*

رئيس القسم

أ.د/

محمد أحمد أحمد مصطفى

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD in Pharmaceutical Sciences (Medicinal Chemistry)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Department ofMedicinal Chemistry**
5	**Final award:**	**Ph D degree in Medicinal Chemistry**
6	**Coordinator:**	**Prof.Dr/ Mohamed mostafa**
7	**External Evaluator(s):**	Prof.dr/ Mohamed Baraka
8	**Date of Program Specification Approval:**	***Department council: 28/11/2021***

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 Medicinal Chemistry

1.1	Mastering the basics and methodologies of the scientific research in the fields of medicinal chemistry.
1.2	Recognizing novel concepts, methods and/or techniques in the fields of therapeutic drug monitoring and sample preparation.
1.3	Adopting the critical and analytical thinking approaches in drug pharmacodynamics, advanced trends in medicinal chemistry, and molecular modeling.
1.4	Generating and disseminating new knowledge that contributes to therapeutic drug monitoring sample preparation.
1.5	Showing considerable awareness regarding the current problems and the recent theories and trends in the field of molecular modeling.
1.6	Identifying challenging professional problems and finding innovative solutions.
1.7	Identifying challenging professional problems and finding innovative solutions.
1.8	Providing the ability to critically analyze the impact and outcomes of research results.

1.9 Mastering of all new techniques used in the fields of drug development and drug analysis.
1.10 Training in ethical and legal aspects of scientific inquiry.
1.11 Mastering of the advanced knowledge base, professional research skills, attitudes, and values.
1.12 Making the appropriate professional and scientific decision in light of the available information.
1.13 Utilizing effectively available professional and scientific resources of medicinal chemistry.
1.14 Showing awareness about the role of the graduate in community development.
1.15 Attaining communication skills, research ethics, time management, decision-making, and team-working.
1.16 Demonstrating commitment to the transfer knowledge to others.
1.17 Showing commitment for self-development and life-long learning.

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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 molecular
A2	Identify the basic principles of therapeutic drug Sa one and drug pharmacodynamics
A3	Describe phases of sample preparation
A4	List the methods of sample preparation and the laboratory techniques.
A5	Define the principle and new data in the field of advanced trends in medicinal chemistry.
A6	Define the validation parameters in analytical chemistry.
A7	Describe the mechanisms of drug pharmacodynamics and monitoring
A8	Demonstrate the uses of software in molecular modeling.
A9	State the legal and ethical principles for practicing research in medicinal chemistry and implementing guidelines of experiments.
A10	Estimate the importance of professional practice in medicinal chemistry research on the environmental development and maintenance.
A11	Define the basic and advanced research concepts in design, synthesis evaluation and analysis of drugs.

B. Intellectual Skills

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

B1	Develop deductions and conclusions based on the information in the field of advanced trends in medicinal chemistry.
B2	Propose schemes and procedures for the synthesis of the target compounds.
B3	Apply molecular modeling techniques in data interpretation
B4	Demonstrate the pharmacodynamic properties of the drugs used in disease treatment.
B5	Select the proper methods and techniques in sample preparation and solve the related problems.
B6	Invent methods of drug synthesis and monitoring.
B7	Select the proper experimental methods and evaluate the scientific risks in practicing laboratory experiments
B8	Interpret the drug pharmacodynamic data.
B9	Analyze statistically the obtained results
B10	Modify existing parameters for amelioration of analytical methods
B11	Frame professionally a scientific paper in the fields of drug development and/or drug analysis

B12	Present research results in peer-reviewed publications and in a dissertation.
B13	Plan for amelioration of traditional techniques in drug development and/or drug analysis.
B14	Participate in professional discussion and decisions by evidence-based argument in drug development and/or analysis.

C. Professional and Practical Skills

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

C1	Utilize computer software in molecular modeling
C2	Use properly the instruments in drug analysis and sample preparation.
C3	Apply new methods of purification and separation of organic compounds.
C4	Implement new methods of therapeutic drug monitoring.
C5	Analyze drugs in biological fluids by selecting the suitable analytical techniques.
C6	Interpret and justify pharmacodynamic data.
C7	Utilize the information in the field of advanced trends in medicinal chemistry in better understanding of the biological activity of drugs used in treatment of selected diseases
C8	Summarize data in publication form.
C9	Assess professional and scientific risks in practicing laboratory experiments in the fields of drug synthesis and/or analysis.
C10	Select suitable and safe techniques for handling of research materials in drug development and/or analysis.
C11	Carry out scientific research and write professional Reports and contribute to the knowledge in the field of medicinal chemistry
C12	write thesis in scientific and precise way
C13	Manipulate different laboratory tools in the fields of drug development and/or drug analysis.

d. General and Transferable Skills

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

D1	Direct and work effectively in a team.
D2	Manage the time properly.
D3	Transfer knowledge and experience to others and evaluate their performance.
D4	Develop written and oral communication skills.
D5	Organize and manage research schedule.
D6	Communicate research results effectively through oral presentations at scientific seminar

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	conferences, and other venues.
D7	Perform self and continuous education skills.
D8	Deal with obstacles and problems and finding the proper solution.
D9	Prepare lucid reports on their own research, as well as the research of others.
D10	Accept responsibility t0 organize department and faculty scientific meetings.
D11	Utilize effectively computer programs, online database, and differentinformation resources relevant to drug development and/or analysis.
D12	Analyze data and facts available for scientific research.

3-Academic Reference Standards (ARS):

Approved by both the Department and Faculty Councils

Department council Approval Date: 4/6/2016.

Faculty council Approval Date: 12/8/2016

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,A3,A4,A5
	1.2	A5
	1.3	A9
	1.4	A10
	1.5	A11
2. **Intellectual Skills**	**2.1**	B1
	2.2	B5
	2.3	B4
	2.4	B11,B12
	2.5	B7
	2.6	B10,B13
	2.7	B9,B14
	2.8	B3
3. **Professionaland Practical Skills**	**3.1**	C1,C2,C3,C4,C7
	3.2	C11
	3.3	C3, C4, C10, C13
	3.4	C3, C4, C10, C13
	3.5	C7
	3.6	C1, C2, C3, C5,C13
	3.7	C9
	3.8	C10
	3.9	C8,C11,C12

4. **General and Transferable Skills**	**4.1**	D1
	4.2	D11
	4.3	D11
	4.4	D3
	4.5	D6
	4.6	D8,D13
	4.7	D12
	4.8	D7
	4.9	D2
	4.10	D4

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
(PDP-301)	Drug pharmacodynamics	Compulsory	2	Fall
(PDP302)	Advanced trends in medicinal chemistry	Compulsory	2	Fall
(PDP-303)	Therapeutic drug monitoring	Compulsory	2	Spring
(PDP-304)	Molecular modeling	elective	2	Spring
(PDP-305)	Sample preparation	elective	2	Spring
Total (Courses)			8	
	Thesis		42	
Total			50	

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2- Achievement of Program Intended Learning Outcomes by its components

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					
Drug pharmacodynamics (PDP-301)	**2**	A1,A7,A9	B4,B8,B14	C6	D6,D8,D11
Advanced trends in medicinal chemistry (PDP302)	**2**	A1,A2,A5	B1,B4,B9	C7,C8	D4,D6,D8
Second Semester					
Therapeutic drug monitoring (PDP-303)	**2**	A1,A2,A7,A106	B6,B13	C4,C13	D4.D8
Molecular modeling (PDP-304) (E)	**2(E)**	A1,A8,A11	B3,B8,B9	C1,C8,C10	D4,D8,D11
Sample preparation (PDP-305) (E)	**2(E)**	A3,A4	B5	C2	D3,D7
Total	**8**				
Thesis	**42**	A6, A9, A10, A11	B2, B6, B7, B9, B10, B11, B12, B13, B14	C2, C3, C5, C8, C9, C10, C11, C12, C13	D1, D2, D3, D4, D5, D6, D8, D9, D10, D11, D12.
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	A8	A9	A10	A11	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14
(PDP-301)	Drug pharmacodynamics	✓						✓		✓						✓				✓						✓
(PDP302)	Advanced trends in medicinal chemistry	✓	✓			✓							✓			✓					✓					
(PDP-303)	Therapeutic drug monitoring	✓	✓					✓			✓							✓							✓	
(PDP-304)	Molecular modeling (E)								✓			✓			✓					✓	✓					
(PDP-305)	Sample preparation (E)			✓	✓												✓									
	Thesis						✓			✓	✓	✓		✓				✓	✓		✓	✓	✓	✓	✓	✓

* *Knowledge and Understanding*
** *Intellectual Skills*
*** *Professional and Practical Skills*
**** *General and Transferable Skills*
E *Elective course*

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Code	Course title	P.P.S***													G.T.S****											
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
(PDP-301)	Drug pharmacodynamics						✓													✓		✓			✓	
(PDP302)	Advanced trends in medicinal chemistry							✓	✓									✓		✓		✓				
(PDP-303)	Therapeutic drug monitoring				✓													✓				✓				
(PDP-304)	Molecular modeling (E)	✓							✓		✓							✓				✓			✓	
(PDP-305)	Sample preparation (E)		✓														✓				✓					
	Thesis		✓	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

* *Knowledge and Understanding*
** *Intellectual Skills*
*** *Professional and Practical Skills*
**** *General and Transferable Skills*
E *Elective 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 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 scientifc research thesis for complete fulfilment of the PhD degree.

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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 medicinal chemistry.

9.5- ---

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

Program Coordinator: Head of Department

Head of Department: Prof. Dr. Mohamed A. Moustafa

Signature:

Annex 1

Attach courses and thesis specifications.

Program: PhD in Pharmaceutical Sciences (*Medicinal Chemistry*)

Department of Medicinal Chemistry

PhD Thesis Specification

Academic Year: 2021/2022

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhDof Pharmaceutical Sciences (*Medicinal Chemistry*)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Medicinal Chemistry**
	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 (Medicinal Chemistry)**
6	**Coordinator:**	**Head of Department Prof. Dr / Mohamed Ahmed Moustafa**
7	**External Evaluator(s):**	**Prof. Dr. mohamed baraka (a faculty member of the same specialty)**
8	**Date of Program Specification Approval:**	***Department council: 28/11/2021, Faculty council:***

B-Professional Information

1-Aims

The overall aims of the thesis:

1.1 Emphasizing real problems in the field of specialization through intensive reviewing of literature
1.2 Introducing original research work to scientific community
1.3 Explaining the conclusion that has been reached from the undertaking research project.
1.4 Contributing to the advancing of knowledge through dissemination of results in the peer reviewed international journals

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

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

A6	a1	Demonstrate comprehensive understanding of the validation parameters in analytical .chemistry
A9	a2	Identify the legal and ethical principles for conducting research in medicinal chemistry and applying guidelines of experiments
A10	a3	Recognize the importance of professional practice in medicinal chemistry research on the environmental progress and maintenance.
A11	a4	Associate the basic and advanced research technologies inthe design, synthesis evaluation and analysis of drugs.

b- Intellectual Skills

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

B2	b1	Execute, independently, advanced point of research schemes and procedures for the synthesis of the target compounds.
B6	b2	Generate methods of drug synthesis and monitoring.
B7	b3	Deduce the appropriate experimental methods and evaluate the scientific hazards in practicing laboratory experiments
B9	b4	Assess statistically the obtained results
B10	b5	Review existing parameters for improvement of analytical methods
B11	b6	Compose professionally a scientific paper in the fields of drug development and/or drug analysis
B12	b7	Publish research results in peer-reviewed publications and formulate a dissertation.
B13	b8	Supportthe improvement of traditional techniques in drug development and/or drug analysis.
B14	b9	Collaborate in professional debates and decisions by evidence-based argument in drug development and/or analysis.

c- Professionaland Practical Skills

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

C2	c1	Handle accurately the instrumentationsused in drug analysis and sample preparation
C3	c2	Develop original methods of purification and separation of organic compounds.
C5	c3	Choose suitable analytical techniques for analysis of drugs in biological fluids.
C8	c4	Summarize data in manuscript form
C9	c5	Validate professional and scientific risks in conducting laboratory experiments in the area of drug synthesis and/or analysis.
C10	c6	Employ suitable and safe techniques for management of research materials in drug development and/or analysis.
C11	C7	Apply scientific research and write scientificreports and share the knowledge in the field of medicinal chemistry
C12	c8	Write thesis in scientific and precise mode according to approved guidelines
C13	c9	Manipulate diverse laboratory materials in the fields of drug development and/or drug analysis.

d. General and Transferable Skills

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

D1	d1	Show leadership and work effectively in a team.
D2	d2	Manage work timetable according to approved schedule.
D3	d3	Contribute to theTransfer knowledge and experience to others and appraise their performance.
D4	d4	Adapt correct written and verbal communication skills.
D5	d5	Design and manage research schedule.
D6	d6	Illustrate research results efficiently through oral presentations at scientific seminar conferences, and other venues.
D8	d7	Solve complicated problems related to the field of medicinal chemistry
D9	d8	Review and prepare lucid reports on own research, as well as the research of others.
D10	d9	Organize department and faculty scientific meetings.
D11	d10	Operate effectively computer programs, online database, and different resources of knowledge relevant to drug development and/or analysis.
D12	d11	Retrieve available scientific research and analyze data and facts.

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, a2, a3, a4	b6	c8	d4, d8, d9, d11
3	Objectives/Rational	a4	b5, b6, b8, b9	c7, c8	d4, d5, d7, d10
4	Results and Discussion		b4, b6, b7, b9	c7, c8	d2, d4, d5, d6, d7, d10, d11
5	Experimental Work	a2, a3, a4	b1, b2, b3, b6, b8	c1, c2, c3, c5, c6, c7, c8, c9	d1, d2, d3, d5, d7, d10
6	Conclusion		b6, b9	c4, c7, c8	d4, d6, d11

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

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Part	Topics	K.U*				IS**									
		a1	a2	a3	a4	b1	b2	b3	b4	b5	b6	b7	b8	b9	
2	Introduction	✓	✓	✓	✓						✓				
3	Objectives/Rational				✓					✓	✓		✓	✓	
4	Results and Discussion		✓	✓	✓				✓		✓	✓		✓	
5	Experimental Work					✓	✓	✓			✓		✓		
6	Conclusion										✓			✓	

* ***K**nowledge and **U**nderstanding* ** ***I**ntellectual **S**kills*

Part	Topics	P.P.S***								G.T.S****									
		c1	c2	c3	c4	c5	c6	c7	c8	c9	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11
2	Introduction								✓					✓				✓	✓		✓
3	Objectives/Rational							✓	✓					✓	✓		✓			✓	
4	Results and Discussion							✓	✓			✓		✓	✓	✓	✓			✓	✓
5	Experimental Work	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		✓			✓	
6	Conclusion				✓			✓	✓					✓		✓					✓

******P**rofessional and **P**ractical **S**kills* *******G**eneral and **T**ransferable **S**kills*

5. Student Assessment:

A written Thesis	
Published Research Paper(s)	
Public Defense	
Committee-in-Charge Report	
Dept Council Approval	

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.

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PhD Thesis Specification
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Postgraduate Studies

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	**Will equipped laboratory with necessary safe environment**
Library	**EKB**
Others	**Software in drug design and development**

Thesis Coordinator	Head of Department	Date*
Prof. Dr. Mohamed Ahmed Moustafa	**Prof Dr. Mohamed Ahmed Amed Moustafa**	**28 / 11 / 2021**

* Date of Dept. Council Approval

Dept. of Med. Chem.	Course Specification	PhD

PhD program

Course Specification

Academic year: 2021/2022

توصيف مقرر
Advanced trends in medicinal chemistry

البرنامج
دكتوراه

منسق المقرر
أ د. علي عبد الرحمن الإمام

رئيس القسم
أ د. محمد أحمد أحمد مصطفى

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	PhD program
Academic Level	Postgraduate
Academic year	2021/2022 - first semester
Coordinator:	Prof. Dr/ Ali A. El-Emam
External Evaluator(s):	Prof. Dr/ Magda Elsherbiny
Date of course specification approval	Department council: 28/11/2021

A.Basic Information: Course data :

Course Title	Advanced trends in medicinal chemistry
Course Code	PDP-302
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1. Adopting the critical and analytical thinking approaches in drug pharmacodynamics and advanced trends in medicinal chemistry.
2. Showing considerable awareness regarding the current problems and the recent theories and trends in the field of pharmacodynamics and drug-like properties.
3. Providing the ability to critically analyze the impact and outcomes of research results

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A1	**a1**	Explain the advantages and fundamentals of good drug-like properties
A5	**a2**	Discover the new capabilities as new fundamental knowledge, methods, technologies and strategies that result in changes in the discovery process.
A2	**a3**	Discuss structure modification strategies for solubility, pKa, lipophilicity, absorption, dissolution rate and bioavailability optimization

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2.2. *Intellectual Skills*

After completion of the course, graduates will be able to

B1	**b1**	Apply fundamentals of good drug-like properties on newly discovered compounds.
B9	**b2**	Analyze results from methods, technologies and strategies in drug discovery.
B4	**b3**	Apply the structural modifications for enhancing metabolic stability and optimization the target receptors and enzyme interactions with drugs.

2.3. *Professional and Practical Skills*

After completion of the course, graduates will be able to

C7	**c1**	Apply the newly obtained information in the field of advanced trends in medicinal chemistry to understand the drug-receptor interactions.
C8	**c2**	Summarize data in publication form.

2.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

D4	**d1**	Present information clearly in written, electronic forms.
D8	**d2**	Promote critical thinking to solve the problem
D6	**d3**	Prepare oral presentation for some selected topics of the course

3. Course Contents

Week No	Topics	No.of hours	Lecture (hr.)
1-8	**Nitric Oxide** • Introduction • The Structure of Nitric Oxide • The Chemical Properties of Nitric Oxide • The Cellular Production and Role of Nitric Oxide • General Mode of Action • Suitability of Nitric Oxide as a Chemical Messenger • Metabolism of Nitric Oxide • The Role of Nitric Oxide in Physiological and Pathophysiological States • The Role of Nitric Oxide in the Cardiovascular System • The Role of Nitric Oxide in the Nervous System • Nitric Oxide and Diabetes • Nitric Oxide and Impotence	16	16 hrs

	• Nitric Oxide and the Immune System • Therapeutic Possibilities • Compounds that Reduce Nitric Oxide Generation • Compounds that Supply Nitric Oxide		
9-12	**Computational Approachesfor COVID-19 Drug Discovery** • A brief survey of COVID-19 drug discovery • Computational studies on drug repurposing against COVID-19 • Targets for antiviral drug discovery for SARS-CoV-2 • Structure-based drug discovery approaches • Ligand-based antiviral drug discovery approaches • Knowledge mining tools for COVID-19 drug discovery • The importance of computational and experimental approaches to COVID-19 drug discovery	6	6 hrs
13.	**Final written & oral exam**		

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

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1	**Nitric Oxide** • Introduction • The Structure of Nitric Oxide • The Chemical Properties of Nitric Oxide • The Cellular Production and Role of Nitric Oxide • General Mode of Action • Suitability of Nitric Oxide as a Chemical Messenger • Metabolism of Nitric Oxide • The Role of Nitric Oxide in Physiological and	1-8	A1, A2	B1	C1	D2, D3

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	Pathophysiological States • The Role of Nitric Oxide in the Cardiovascular System • The Role of Nitric Oxide in the Nervous System • Nitric Oxide and Diabetes • Nitric Oxide and Impotence • Nitric Oxide and the Immune System • Therapeutic Possibilities • Compounds that Reduce Nitric Oxide Generation • Compounds that Supply Nitric Oxide					
2	**Computational Approachesfor COVID-19 Drug Discovery** • A brief survey of COVID-19 drug discovery • Computational studies on drug repurposing against COVID-19 • Targets for antiviral drug discovery for SARS-CoV-2 • Structure-based drug discovery approaches • Ligand-based antiviral drug discovery approaches • Knowledge mining tools for COVID-19 drug discovery • The importance of computational and experimental approaches to COVID-19 drug discovery	9-12	A1, A3	B3	C1	D2, D3

5- Teaching and Learning Methods:

5.1	**Lecturesusing Power Point**(PPT) presentations
5.2	**Video-recorded lectures**, uploaded to the University Portal for Online learning
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	**Interactive Sessions** using Microsoft Teams
5.6	Internet search and Research Assignments to design **Formative Assignments**
5.7	**Case study**
5.8	**Role play**

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		90
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills		10
				100 %

7- List of References

	Reference	Type
1.	**Nitric Oxide:** Biology and Pathobiology, Louis Ignarro& Bruce Freeman, 3rd Edition - July 2017, Elsevier, ISBN: 9780128042731.	**Text Books**
2.	**A critical overview of computational approaches employed for COVID-19 drug discovery**. Eugene N. Muratov*et al.Chemical Society Reviews***2021**, Volume *50*, pp.9121-9151. Royal Chemical Society, London, UK, DOI: 10.1039/d0cs01065k	**Review article**

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8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Laboratory facilities	**Microscopes, equipment, tools**
Library	**Text Books, Review Article**
Online learning	**Microsoft Teams**

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Ali A. El-Emam	Prof Dr. Mohamed A. A. Moustafa	28/11/2021

* Date of Dept. Council Approval

Dept. of Med. Chem.	Course Specification	M.Sc.

Program: Master in Pharmaceutical Sciences

Course Specification

Academic year: 2021/2022

توصيف مقرر
حركيه الدواء
Drug Pharmacokinetics

البرنامج
ماجستير

منسق المقرر
ا.د. محمد احمد مصطفى

رئيس القسم
أ د. محمد أحمد مصطفى

Mansoura University
Faculty of Pharmacy
Quality Assurance Unit
M. Sc. Program Specification
2021/2022
Postgraduate Studies

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	M. Sc. program
Academic Level	Postgraduate
Academic year	2021/2022 - second semester
Coordinator:	Prof.Dr/ Mohamed A. Moustafa
External Evaluator(s):	Prof.Dr/ Eman El-Bendary
Date of course specification approval	Department council: 6/12/2021 Faculty council: 5/2022

A. Basic Information :Course data :

Course Title	Drug Pharmacokinetics
Course Code	PDM-202
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Total Credit Hours	٢

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 *Medicinal Chemistry*

1.1 Acquiring advanced knowledge in the field of drug pharmacokinetics.
1.2 Studying the concepts of drug absorption, distribution, biotransformation and execretion and their optimization to increase drug discovery success.
1.3 Relating specialized knowledge in the field of drug pharmacokinetics and its integration with the relevant subjects in his/her professional practice

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

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

a1	Explain the theories and fundamentals of drug pharmacokinetic.
a2	Recognize the relationship between drug-likeproperties and bioavailability.
a3	Define the structure modification strategies, to guide property optimization.
a4	Explain basic concepts in drug metabolism and its impacts on drug bioavailability.

b- Intellectual Skills

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

b1	Analyze and evaluate the information in the field of drug pharmacokinetics.
b2	Interpret the structural features of a given drug in relation to its drug-like properties.
b3	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
b4	Utilize metabolic concepts to control drug properties and drug interactions.

c- Professionaland Practical Skills

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

c1	Prescribe structure-property relationship (SPR) case studies, to see how structure affects proprties.
c2	Specify the structural features that affect pharmacokinetic and pharmacological properties of a drug.
c3	Justify therapeutic recommendations based on understanding of drug chemistry and pharmacokinetics characters.
C4	Integrate drug properties into drug discovery research.

d. General and Transferable Skills

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

d1	Practice self-learning needed for continuous professional development.
d2	Utilize different available information resources relevant to medicinal chemistry.
d3	Promote critical thinking, problem-solving and decision-making capabilities.
d4	Work effectively in a team and offer expertise and advice to others.
d5	Evaluate and criticize scientific work, literature and research data.

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3-Academic Reference Standards(ARS):

Approved by both the department and faculty councils
Department Council Approval Date: 6/12/2021,
Faculty Council Approval Date:

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, a3
	1.2	a3, a4
	1.1	a1, a2, a3
2. **Intellectual Skills**	**2.1**	b1
	2.2	b2, b3, b4
	2.3	b5, b7
	2.4	b6, b8
3. **Professionaland Practical Skills**	**3.1**	c1,c2, c3
	3.2	c4, c5, c6
	3.3	c7
4. **General and Transferable Skills**	**4.1**	d1
	4.2	d2
	4.3	d3

4-Curriculum Structure and Contents

4.1 The candidate gains his master degree after 46 credit hours of study (16 credit hours of courses and 30 credit hours for thesis).

4.2 The candidate should study at least 16 credit hours of graduate courses. The courses will possess the code [200]. These courses include 8 credit hours of general required courses of the faculty requirement, in addition to 8 credit hours of special required (6 credit hours) and special elective (2 credit hours) courses.

4.3 The candidateshould perform research thesis (30 credit hours) in a subject assigned by the supervision committee, endorsed by the department council, the committee of graduate studies & research and the faculty council.

4.4 The candidate should publish at least one scientific research paper in scientific journals before the approval of a committee of discussion and judgment.

	Weeks	Topic	Hours
Drug Pharmacokinetics	1-12	Introduction to drug pharmacokinetics.	2
		Rules for drug-like properties. Lipophilicity, pKa and pharmacokinetic parameters. Pharmacokinetics and clearance.	
		Solubility and permeability. Permeability and permeability structure modification strategies.	2
		Transporters and blood brain barrier.	2
		Metabolic stability and plasma protein binding.	2
		Metabolic stability and its employment in drug design.	2
		Structural modification strategies to improve solution stability.	2
		Drug design based on metabolic considerations Toxicity mechanisms.	12
		Total	**24 h**

5- Program Courses

1- Achievement of Program Intended Learning Outcomesvia the courses

Course	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
First Semester -*General Courses (8C.H.)*					
Instrumental Analysis (GCM-201)	2	a1			
Statistics and biostatistics (GCM-202)	2	a1			
Physical chemistry (GCM-203)	1	a1			
Bioinformatics (GCM-204)	1	a1			
Research Methodology & Ethics (GCM-205)	1	a5			
Scientific writing and Seminar (GCM-206)	1	a7			

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Total	**8**				
Second Semester- *Special Courses (8 C.H.)*					
PDM-201	**2**	a1, a2, a3, a4	b1, b2, b3	c1, c2, c3	d1, d2
PDM-202	**2**	a1, a2, a3, a4	b1, b2, b3, b4	c1, c2,c3,c4	d1, d2, d3, d4
PDM-203	**2**	a1, a2, a3	b1, b2, b3	c1, c2, c3, c4	d1, d2, d3, d4
PDM-204 (E)	**2(E)**	a1, a2, a3	b1, b2, b3	c1, c2, c3	d1, d2, d3, d4
Total	**8**				
Thesis	**30**				
Total	**46**				

* ***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**				P.P.S***				G.T.S****			
		a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
PDM-201	Drug Development	√	√	√	√	√	√	√		√	√	√		√	√		
PDM-202	Drug Pharmacokinetics	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√
PDM-203	Structure Elucidation of Drugs	√	√	√		√	√	√				√	√	√	√	√	√
PDM-204	Synthetic Chemistry of Drugs (E)	√	√	√		√	√	√		√	√	√		√	√	√	√

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***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).
6.2- Oral exam (special courses).
6.2- Published scientific research paper.
6.3- Public presentation and discussion of the Thesis.

7- Program Admission Requirements

7.1- The candidate should hold a bachelor degree in pharmacy from any faculty of pharmacy from Egypt or Arabian countries or foreign universities recognized by the Supreme Council of Universities recognized by the Supreme Council of Universities with minimum general grade of "**Good**". Candidates having Diploma in the area of specialty are preferred. It is possible to enroll foreign students with general grade "**Good**".

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 possess at least grade "**Good**" in the subject of the specialty.

7.4- The department council starts the registration process for the candidate after his/her successful passing of the general courses of the first semester.

7.5- 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 master degree is two years from the date of enrollment or 18 months from the date of registration of the master thesis.

8.2- The maximum duration of time to gain the master 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 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 Drug Pharmacokinetics

10-Thesis

A thesis should be prepared by the student for complete fulfillment of the masterdegree.

Program Coordinator: Prof. Dr. Mohammed Ahmed Moustafa

Head of Department:Prof. Dr. Mohammed Ahmed Moustafa
Signature:

Annex 1
Attach courses and thesis specifications.

Dept. of Med. Chem.	Course Specification	Ph. D

Ph. D program

Course Specification

Academic year: 2021/2022

البرنامج دكتوراه	توصيف مقرر Sample Preparation
رئيس القسم أ د. محمد أحمد مصطفى	منسق المقرر د. نورة حمدان

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	PhD program
Academic Level	Postgraduate
Academic year	2021/2022 - second semester
Department council: 6/12/2021	Department council: 6/12/2021

A.Basic Information: Course data:

Course Title	Sample Preparation
Course Code	PDP-305 (E)
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1. Mastering all new techniques used in the field of sample preparation and drug analysis.
2. Showing considerable awareness regarding the current problems and the recent theories and trends in the field of sample preparations.
3. Providing the ability to critically analyze the impact and outcomes of research results

2- Intended Learning Outcomes (ILOs)

2.a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A3	a1	Describe phases of sample preparation.
A4	A2	List of the methods of sample preparation and the laboratory techniques.

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2.b. *Intellectual Skills*

After completion of the course, graduates will be able to

B5	b1	Choose the best methods and techniques in sample preparation and the related problems.

2.c. *Professional and Practical Skills*

After completion of the course, graduates will be able to

C2	c1	Utilize properly the instruments in drug analysis and sample preparation.

2.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

D3	d1	Transfer knowledge and experience to others and estimate their performance.
D2	d2	perform self and continuous education skills.

3. Course Contents

Week No	Topics	No. of hours	Lecture (hr.)
1.	• Analytical Prospective of Sample Preparation	2	2 hrs
2.	• Types of Needed Sample Preparation	2	2 hrs
3.	• Principles of Extraction - Volatilization - Hydrophobicity	2	2 hrs
4.	• Principles of Extraction - Acid-Base Equilibria - Distribution of Hydrophobic Ionogenic Organic Compounds	2	2 hrs
5.	• Liquid-Liquid Extraction	2	2 hrs
6.	• Liquid-Solid Extraction	2	2 hrs
7.	• Solid-Phase Extraction	2	2 hrs
8.	• Solid-Phase Microextraction	2	2 hrs
9.	• Stir Bar Sorptive Extraction	2	

10.	• Supercritical Fluid Extraction	**2**	2 hrs
11.	• Techniques for the Extraction, Isolation and Purification of Nucleic Acids	**2**	2 hrs
12.	• Micro-Fabricated Devices for Nucleic Acids Analysis. - Sample Preparation on Microchip	**2**	2 hrs
13.	**Final written & oral exam**		

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

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1	• Analytical Prospective of Sample Preparation. • Types of Needed Sample Preparation.	1-2	A3, A4	B5	C2	D3, D7
2	• Principles of Extraction: - Volatilization. - Hydrophobicity. • Principles of Extraction: - Acid-Base Equilibria. - Distribution of Hydrophobic Ionogenic Organic Compounds.	3-4	A3, A4	B5	C2	D3, D7
3	• Liquid-Liquid Extraction • Liquid-Solid Extraction • Solid-Phase Extraction • Solid-Phase Microextraction • Stir Bar Sorptive Extraction	5-9	A3, A4	B5	C2	D3, D7
4	• Supercritical Fluid Extraction. • Techniques for the Extraction, Isolation and Purification of Nucleic Acids. • Micro-Fabricated Devices for Nucleic Acids Analysis. - Sample Preparation on Microchip.	10-12	A3, A4	B5	C2	D3, D7

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5- Teaching and Learning Methods:

5.1	**Lectures using Power Point** (PPT) presentations
5.2	**Video-recorded lectures**, uploaded to the University Portal for Online learning
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	**Interactive Sessions** using Microsoft Teams
5.6	Internet search and Research Assignments to design **Formative Assignments**
5.7	**Applications**
5.8	**Role play**

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		90
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills		10
				100 %

7- List of References

	Reference	Type
1.	Sample Preparation Techniques in Analytical Chemistry. 6th Edition, By Somenath Mitra (Author) **Publisher: John Wiley & Sons, Inc., Hoboken, New Jersey; 2003.**	Essential Book **(Text Books)**
2.	Comprehensive Sampling and Sample Preparation, By Janusz Pawliszyn (Editor), Press is an imprint of Elsevir, USA; 1st edition, 2012.	Essential Book **(Text Books)**
3.	http:// www.ekb.eg http://www.drugs.com	websites

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**.
- Laboratory facilities	**Equipment, tools**
- Library	**Text Books**
Online learning	**Microsoft Teams**

9. Signature

Course Coordinator	Head of Department	Date*
Dr. Noura Hemdan	Prof Dr. Mohamed A. A. Moustafa	6/12/2021

* Date of Dept. Council Approval

Dept. of Med. Chem.	Course Specification	Ph. D

Ph. D program

Course Specification

Academic year: 2021/2022

البرنامج دكتوراه	توصيف مقرر مراقبة الادوية العلاجية Therapeutic drug monitoring
رئيس القسم أ د. محمد أحمد أحمد مصطفى	منسق المقرر ا. م. د. أحمد حلمى ابراهيم حسن

Mansoura University
Faculty of Pharmacy
Postgraduate Studies
PhD Program
Course Specification

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	Ph. D program
Academic Level	Postgraduate
Academic year	2021-2022 – second semester
Date of course specification approval	6, 12, 2021

A.Basic Information : Course data :

Course Title	Therapeutic Drug Monitoring
Course Code	PDP-303
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1. Understanding the basic principle of therapeutic drug monitoring (TDM), some important definitions: pharmacokinetics, pharmacodynamics, bioavailability, biopharmaceutics, bioequivalence.
2. Providing some important definitions: pharmacokinetics, pharmacodynamics, bioavailability, biopharmaceutics, bioequivalence.
3. Studying different analytical methods for determination of drugs *via* TDM as antibiotics, anticonvulsant, immunosuppressant, cardiac medications and tranquilizars.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A1	a1	Identify the basic principles of TDM.
A7	a2	Demonstrate basic concepts in application of TDM in determination of drugs
A2	a3	Memorize the basic knowledge about pharmacokinetics, pharmacodynamics, bioavailability, biopharmaceutics, bioequivalence
A10	a4	Understand role of clinical pharmacy and pharmacist in TDM steps involved in estimation of drugs in biological fluids

2.2. Intellectual Skills

After completion of the course, graduates will be able to

B6	b1	Determine the concentration of drug eliminated by first order kinetics; its half-life time
B13	b2	Calculate the dose of toxicity

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

C4	c1	calculate the bioavailability, half-life of drug, peak plasma concentration, dose of toxicity
C13	c2	Select the most suitable technique in extraction in TDM

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

D4	d1	Present information clearly in written, electronic and oral forms.
D8	d2	Solve problems related to TDM in determination of certain drugs,

3. Course Contents

Week No	Topics	No. of hours	Lecture (hr.)
1. 2.	Introduction: role of clinical pharmacy and pharmacist in TDM	4	4
3. 4.	Important concepts: • pharmacokinetics, distributional phase of the drug, steady state and peak, trough sampling times pharmacodynamics, • bioavailability, protein binding biopharmaceutics.	4	4
5. 6.	• bioequivalence, drug metabolism and elimination.	4	4
7.	• Bioanalysis, estimation of drugs in biological fluids	2	2
8. 9.	• Factors may affect therapeutic drug monitoring	4	4
10.	Application of different analytical methods for TDM of drugs as antibiotics, anticonvulsant, immunosuppressant	2	2
	Final written & oral exam		

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

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1	Introduction: role of clinical pharmacy and pharmacist in TDM	1-3	A1	B1	C1, C2	D1, D2
2	Important concepts	4	A1	B1	C1, C2	D1, D2
3	Factors may affect therapeutic drug monitoring	5-9	A1, A2, A3	B1, B2	C1, C2	D1, D2
4	Application of different analytical methods for TDM of drugs	10	A1, A2, A3, A4	B1, B2	C1, C2	D1, D2

5- Teaching and Learning Methods:

5.1	**Lectures using Power Point** (PPT) presentations
5.2	**Video-recorded lectures**, uploaded to the University Portal for Online learning
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	**Interactive Sessions** using Microsoft Teams
5.6	Internet search and Research Assignments to design **Formative Assignments**
5.7	**Seminar / Workshop**

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		90
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills		10
				100 %

7- List of References

No.	Reference	type
1	Therapeutic Drug Monitoring: Newer Drugs and Biomarkers Amitava Dasgupta; 2012; Elsevier	Essential Book **(Text Books)**
2	Advances in Chromatographic Techniques for Therapeutic Drug Monitoring edited by Amitava Dasgupta 2010; taylor and francis group	Essential Book **(Text Books)**
3	Clinical Challenges in Therapeutic Drug Monitoring: - Special Populations, Physiological Conditions، and Pharmacogenomics.William Clarke and Amitava Dasgupta: 2016 Elsevier	Essential Book **(Text Books)**
4	http:// www.fda.gov http://www.drugs.com http://www.eda.mohp.gov.eg	websites

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Library	**Text Books**
Online learning	**Zoom**

9. Signature

Course Coordinator	Head of Department	Date
Ass. Prof. Ahmed Helmi Ibrahim Hassan	Prof Dr. Mohamed A. A. Moustafa	

* Date of Dept. Council Approval