Academic Reference Standards (ARS)
for
Diploma in Pharmaceutical Sciences
(*Drug Design*)

Medicinal Chemistry Department

ARS

Academic Year: 2020/2021

رئيس القسم

أ.د. محمد أحمد مصطفى

Diploma in Pharmaceutical Sciences (Drug Design)

Academic Reference Standards (ARS)

(Department Council Approval on 04/06/2016)

(Faculty Council Approval on 21/08/2016)

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

I.Attributes of the graduate:

The graduates of the diploma of "Drug Design" should be capable of applying the gained knowledge in the field of medicinal chemistry in the professional practice. Applying the basics and methodologies of scientific research and manipulating various tools in drug synthesis and/or quality control. Defining the process of drug design and approval by regulatory authorities, Identifying the problems facing drug design and its solving. Mastering the professional skills in design and synthesis of drugs. Applying the suitable technological tools that serve the professional practice. Communicate and leadership team to work through the professional work. Making the decision through the information available. Showing Commitment for self development and continuous learning.

II.General Standards

1. Knowledge and Understanding:

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

1.1 . Define the theories and fundamentals in the design, synthesis and quality control of drugs as well as the other relevant subjects.

1.2 . Recognize the legal and ethical principles for practicing research in design and quality control of drugs.

1.3 . Recall the fundamentals and principles of quality control in professional practice

1.4 . Identify the recent topics in the field of drug design.

2. Intellectual Skills

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

2.1 . identify and solve the problems in the fields of drug design and/or drug analysis according to information available.

2.2 . Frame professionally a scientific essay in the fields of drug design and synthesis

2.3 Evaluate professional and scientific risks in practicing laboratory experiments.

2.4 . Develop deduction, conclusions and right decisions based on the provided information.

3. Professional and Practical Skills

Upon completion of the program, graduates should be able to

3.1 . Manipulate data interpretation and write professional research essay in the design.

3.2 . Maestra and/or wide range of information and professional skills in the fields of drug field of medicinal chemistry.

3.3 . Evaluate the available methodologies and deduce new methods in the field of drug synthesis and analysis of drugs as well as the other relevant subjects.

3.4 . Apply the standard pharmaceutical lab and IT skills including basic and the recent ones in the field of medicinal chemistry.

4. General and transferable skills:

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

4.1 . Communicate effectively by verbal and written means.

4.2 . Implement self-assessment procedures.

4.3 .Utilize effectively the different available information resources related to medicinal chemistry.

4.4 . Work in a professional team effectively and apply time management principles.

4.5 . Implement lifelong self learning.

4.6 . Promote critical thinking, problem-solving and decision-making capabilities.

4.7 . Develop presentation skills and give seminars.

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 Mostafa

Program: Diploma in Drug Design

Department of Medicinal Chemistry

Program Specification

Academic Year: *2020/2021*

رئيس القسم

أ.د/ محمد أحمد مصطفى

A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**Diploma in Drug Design (Medicinal Chemistry)**
3	**Program Type:**	**Multiple**
4	**Department (s):**	**Department of Medicinal Chemistry**
5	**Final award:**	**Diploma in Drug design**
6	**Coordinator:**	**Head of Department**
7	**External Evaluator(s):**	--
8	**Date of Program Specification Approval:**	***Department council: 04/06/2016,*** ***Faculty council: 21/08/2016***

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 *specialization*.

1.1	-- Mastering of advanced knowledge, professional research skills, attitudes and values in the field of medicinal chemistry and integrating with the relevant subjects in his/her professional practice.
1.2	Applying the basics and methodologies of scientific research and manipulating its various tools in the field of medicinal chemistry.
1.3	Master practical research procedures according to the good laboratory practice (GLP) basics in chemistry labs and perform experiments with safety guidelines.
1.4	Mastering of all traditional and new techniques used in the field of drug design and/or synthesis.
1.5	Applying the scientific thinking approaches and problem based learning in subjects relevant to drug development and/or drug analysis.
1.6	--Designing and conducting research projects.
1.7	Analyze and interpret results and information acquired from primary literature sources.
1.8	Manipulate online database, software and other IT skills to get information and analyze the obtained research data.
1.9	Attaining communication skills, research ethics, time management, decision-making, and team-working.

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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 in the field of design, synthesis and analysis of drugs.
A2	Explain the basic theories and principles of targeting, metabolism and interaction of drugs.
A3	Recognize the recent and advanced scientific development of drug design.
A4	Utilize effectively all basic and recent techniques and technological tools used in the field of drug synthesis and/or quality control of drugs.
A5	Identify the legal and ethical issues of drug regulation.
A6	Define the principles and the basics in the elucidation of the chemical structure of drugs.
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 drug targeting, metabolism and interaction.
B2	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems in drug design and drug regulation.
B3	Demonstrate creativity and innovative scientific and professional approaches and write a scientific article in the field of medicinal chemistry.
B4	Utilize the available professional and scientific resources and research skills to solve problems.
B5	Assess professional and scientific risks in practicing drug synthesis and/or quality control of drugs
B6	Apply the principles and theories of IR, ^{1}HNMR, ^{13}C NMR and mass spectroscopy in elucidation of drug structure.

C. Professional and Practical Skills

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

C1	Develop different research methodologies and good experimental and reporting skills in the design, synthesis, analysis, regulation and elucidation of structure of pharmaceutically-relevant organic compounds.
C2	Manage safely and efficiently advanced technological research tools and equipments relevant to

	drug synthesis, and quality control research.
C3	Carry out essay and contribute to the knowledge in the field of medicinal chemistry.
C4	Apply the standard pharmaceutical lab and IT skills including basic and the recent ones in the field of medicinal chemistry.
C5	Interpret and validate the obtained data regarding structural elucidation of drugs.
C6	Utilize the information in the field of targeting, metabolism and interaction of drugs for better understanding of biological activity of drugs.

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	Manipulate online database, software and other IT to get information and analyze the obtained research data.
D3	Practice self- assessment and learning needed for continuous professional development.
D4	Utilize different available information resources relevant to medicinal chemistry.
D5	Promote critical thinking, problem-solving and decision-making capabilities.
D6	Deal with obstacles and problems.
D7	Work effectively in a team and offer expertise and advice to others
D8	Develop creativity and time management abilities.
D9	Evaluate and criticize scientific work, literature and research data.
D10	Adopt ethical, legal, professional responsibilities and safety guidelines.
D11	Develop presentation skills, give seminars and defend essay in public.

3-Academic Reference Standards (ARS):

Approved by both the department and faculty councils
Department Council Approval Date: 4/6/2016
Faculty Council Approval Date: 21/08/2016

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

3b-Comparison of provision to External References

Achievement of academic reference standards via program Intended Learning Outcomes.

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ILOs	ARS	Program
1. **Knowledge and Understanding**	**1.1**	A1, A2, A6
	1.2	A5
	1.3	A4
	1.4	A3
	2.1	B2, B4
2. **Intellectual Skills**	**2.2**	B3
	2.3	B5
	2.4	B1, B2, B4, B6
	3.1	C3, C5
	3.2	C1, C2, C4. C6
	3.3	C1, C2
3. **Professional and Practical Skills**	**3.4**	C4
	4.1	D1
	4.2	D3
	4.3	D4
	4.4	D7
4. **General and Transferable Skills**	**4.5**	D3
	4.6	D5
	4.7	D11
	1.1	A1, A2, A6
	1.2	A5
	1.3	A4
	1.4	A3

4-Curriculum Structure and Contents

4A. Program duration: 1 year.

4B. Program structure:

a- The program consists of 24 credit hours of study divided over two semesters. A graduation project is included with 2 credit hours.

b- All courses possess the code number [100], According to Faculty By-Law..

c. A scientific graduation project of 2 credit hours represents a main component of the program. It is achieved in a subject assigned by the academic supervisor, endorsed by the department council, the committee of graduate studies & research and the faculty council.

4C. Program Components

1- Courses according to the By-law

Code number	Name of the course	Type	Credit Hours	Semester
PDD-101	***Principles of drug design***	Compulsory	**3**	Fall
PDD-102	***Drug targeting***	Compulsory	**3**	Fall
PDD-103	***Drug metabolism***	Compulsory	**3**	Fall
PDD-104	***Drug regulation***	Compulsory	**3**	Fall
PDD-105	***Drug quality control***	Compulsory	**3**	Spring
PDD-106	***Drug synthesis***	Compulsory	**3**	Spring
PDD-107	***Advanced topics in drug design***	Compulsory	**2**	Spring
PDD-1EC	***Drug interaction***	elective	**2(E)**	Spring
PDD-1EC	***Elucidation of chemical structure***	elective	**2(E)**	Spring
Total (Courses)			22	
PDD-1SE	***Scientific article***		2	
Total			24	

2- Achievement of Program Intended Learning Outcomes by its components

Course	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
First Semester *(12 C.H.)*					
Principles of drug design (PDD-101)	**3**	A1, A3	B2	C1, C4	D2, D3, D4, D5
Drug targeting (PDD-102)	**3**	A2	B1	C4, C6	D2, D3, D4, D5
Drug metabolism (PDD-103)	**3**	A2	B1	C4, C6	D2, D3, D4, D5
Drug regulation (PDD-104)	**3**	A5	B2	C1, C4	D2, D3, D4, D5
Total (courses)	**12**				

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Second Semester *(12 C.H.)*					
Drug quality control (PDD-105)	**3**	A1, A4	B5	C1, C2, C4	D2, D3, D4, D5
Drug synthesis (PDD-106)	**3**	A1, A4	B5	C2, C4	D2, D3, D4, D5
Advanced topics in drug design (PDD-107)	**2**	A1,A3	B2	C1, C4	D2, D3, D4, D5
Drug interaction (PDD-1EC) (elective)	**2(E)**	A2	B1	C4, C6	D2, D3, D4, D5
Elucidation of chemical structure (PDD-1EC) (elective)	**2(E)**	A6	B6	C1, C4, C5	D2, D3, D4, D5
Scientific article (PDD-1SE)	**2**	A7	B3, B4	C3, C4	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11
Total (courses)	**12**				
Total	**24**				

* ***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	A5	A6	A7	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
PDD-101	*Principles of drug design*	√		√						√					√			√					√	√	√	√						
PDD-102	*Drug targeting*		√						√									√		√			√	√	√	√						
PDD-103	*Drug metabolism*		√						√									√		√			√	√	√	√						
PDD-104	*Drug regulation*					√				√					√			√					√	√	√	√						
PDD-105	*Drug quality control*	√			√								√		√	√		√					√	√	√	√						
PDD-106	*Drug synthesis*	√			√								√			√		√					√	√	√	√						
PDD-107	*Advanced topics in drug design*	√		√						√					√			√					√	√	√	√						
PDD-1EC	*Drug interaction*		√						√									√		√			√	√	√	√						
PDD-1EC	*Elucidation of chemical structure*						√							√	√			√	√				√	√	√	√						
PDD-1SE	*Scientific article*							√			√	√					√	√				√	√	√	√	√	√	√	√	√	√	√

* ***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*

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6- Student Assessment Methods

6.1- Written exam	To assess Knowledge and Understanding and Intellectual Skills
6.2- Oral exam	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6-3- Practical exam	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6-4- Graduation Project (Written exam)	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6.5- Graduation Project (Presentation and discussion)	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

7- Program Admission Requirements

7.1- The candidate should hold a bachelor degree in pharmacy from any Faculty of Pharmacy in Egypt, Arab or foreign countries recognized by the Supreme Council of Universities with minimum general grade of **"Good"**. It is possible to enroll foreign students with general grade **"Good"** according to the rules determined 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 study period is one year of two semesters in addition to the Summer semester according to schedules determined by the faculty council.

8.2- The student has to pass the assigned courses included the graduation project for complete fulfilment of the diploma degree.

8.3- The faculty council should cancel the student enrollment if he does not gain the diploma degree in 3 years.

8.4- 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 Education and Research:

9.1- Suitable halls for lectures containing computers, internet and data show.

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 *specialization*.

9.5- Sufficient number of staff members, demonstrators and technicians.

10- Graduation project

A graduation project should be prepared by the student for complete fulfillment of the Diploma certificate.

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
Supervisor and defence committee of graduation project	Evaluation Sheet	Evaluation sheet of staff members of committee

Program Coordinator: Head of Department

Head of Department: Prof. Dr. Mohamed Ahmed Mostafa

Signature:

Annex 1

Attach courses specifications.

Dept. of Medicinal Chemistry	Course Specification Drug Regulations	Drug Design Diploma program

Drug Design Diploma

Course Specification

Academic year: 2020/2021

Dept. of Medicinal Chemistry

المستوى دراسات عليا دبلوم تصميم الأدوية	توصيف مقرر قواعد ترخيص الدواء Drug Regulations
رئيس القسم أ د. محمد أحمد أحمد مصطفى	منسق المقرر أ.د. محمود بكر

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	----
Program on which the course is given	Drug Design Diploma Program
Academic Level	Postgraduate
Academic Year	2020/2021 First Semester
Date of course specification approval	Dept. Council Approval: 24/02/2021 Faculty Council Approval: 20/03/2021

A. Basic Information : Course data :

Course Title	Drug Regulations
Course Code	PDD-104
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	2
Total Credit Hours	3

B. Professional Information

1- Overall Aims of Course:

1- Providing knowledge on the role of regulatory authorities on the drug approval process.
2- Getting a professional experience on the method of drug regulation.
3- Proposing search engines and official websites that would facilitate looking for available information on drugs.
4- Tracking off newly approved drugs and recently recalled ones.

2- Intended Learning Outcomes (ILOs)

3.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

	a1	Define the *historical events* that necessitated the evolution of special regulation for drug manipulation and recognize the agencies involved in drug approval.
	a2	Explain both the preclinical and clinical studies that should be performed on a drug candidate before being introduced to market and clarify the involvement of the official documents, as IND, NDA and BLA; in the process of drug regulation.
	a3	Discuss the process of drug reviewing for marketing and post-marketing surveillance, with model drugs withdrawn after marketing; and Express the regulatory affairs of some procedures of special nature, as generic and orphan drugs, and fast track process.
	a4	Describe the role and functions of the Egyptian Drug Authority.

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3.2. *Intellectual Skills*

After completion of the course, graduates will be able to

	b1	Differentiate the necessary studies involved in preclinical process in drug development
	b2	Compare the three phase of clinical studies involved in drug development
	b3	Analyze the role of both the Investigational New Drug (IND) application and the New Drug Application (NDA) in the process of development.
	b4	Estimate the process and consequences of the post-marketing surveillance

3.3. *Professional and Practical Skills*

After completion of the course, graduates will be able to

	c1	Organize necessary documentation for registration of drugs
	c2	Interpret the possible results of each step guided by the regulatory body.
	c3	Estimate the importance of fast track and orphan drug in drug licensing.
	c4	Evaluate the process of drug registration in the Egyptian market.

3.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

	d1	Practice self-learning and self-assessment principles needed for continuous professional development
	d2	Apply search engines and analyze available data on newly approved drugs
	d3	Promote effective critical thinking, problem-solving and decision-making abilities
	d4	Collaborate effectively with other colleagues, and implement time-management skills.

3. Course Contents

	Topics	**L Hrs**	**T Hrs**
Part I Before drug Approval (4 weeks)	<u>Introduction</u>: Definitions and Historical background: Definition(s) of Drug and the *historical events* and reasons that necessitated the evolution of special regulation for drug manipulation.	4	4

	Regulatory Agencies: Highlighting the agencies that are involved in the process of drug approval; worldwide as FDA, and Egyptian as EDA		
	Pre-clinical studies, and IND application Role of FDA in the drug discovery process. Describing the studies that should be performed on a drug candidate before being introduced to clinical trials. Definition of IND and clarifying its contents and role in the process of drug regulation.	2	2
	Clinical Research and NDA Description of the process as a whole and the different protocols and phases that are involved. Definition of NDA and clarifying its contents and role in the process of drug regulation.	2	2
Part II After Drug approval (4 weeks)	Drug approval and Post-Marketing Possible results of NDA and Marketing. Post marketing surveillance: Describing the process of Phase IV studies, Pharmacovigilance and MedWatch program Examples of drugs withdrawn after marketing.	3	3
	Special Issues in the drug regulation process Generic drugs / Fast track / Orphan drugs	1	1
	Examples of newly approved drugs Collecting information about drugs that are approved in 2020.	4	4
Part III EDA (3 weeks)	Egyptian Drug Authority (EDA) Duties and functions of the EDA and other administrations and centers.	6	6
11 weeks		22	22

L = Lecture; T = Tutorial

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	Definitions and Historical background	a1			
3	Pre-clinical studies & Investigational New Drug application	a2	b1, b3	c1, c2	
4	Clinical trials & New Drug Application	a2	b2, b3	c1, c2	
5	Drug approval & Post-Marketing	a3	b4	c2	d1
6	Special Issues in the regulation process.	a3		c3	d1
7-8	Examples of newly approved drugs	a3			d2, d3, d4
9-11	Egyptian Drug Authority	a4		c4	

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

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5- Teaching and Learning Methods:

5.1	Lectures using Power Point (PPT) presentations
5.2	Lectures using whiteboard
5.3	Video-recorded lectures, uploaded to the University Portal for Online learning
5.4	Activities and tasks required to develop students' self-learning skills.
5.5	Tutorial, Class Activity and Group Discussion to explain what has not been understood
5.6	Interactive Sessions using Microsoft Teams
5.7	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	weeks 14-15	70 %
Assessment 2	Tutorial assignments & Semester work. Assignments prepared by students and sent to the supervisor electronically for evaluation. To assess professional skills	weeks 7-13	20 %
Assessment 3	Oral Exam. To assess understanding, intellectual skills, personal skills	weeks 14-15	10 %
			100 %

7- List of References

	Reference	Type
1	An Introduction to Medicinal Chemistry. 6th Edition, By Graham L. Patrick (Author) Publisher: Oxford University Press, Oxford; 2017	Essential Book
2.	http:// www.fda.gov http://www.drugs.com http://www.eda.mohp.gov.eg	websites

8. Facilities Required

Laptop computers

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Mahmoud Bakr	Prof Dr. Mohamed A. A. Moustafa	24/02/2021

* Date of the Dept. Council Approval

Mansoura University
Faculty of Pharmacy
Postgraduate Studies
Drug Design Diploma Program
Drug metabolism
Course Specification

Dept. of Med. Chem.	Course Specification	Drug Design Diploma

Drug Design Diploma

Course Specification

Academic year: 2020/2021

توصيف مقرر **الأيض الدوائي** **Drug metabolism**	**البرنامج** **دبلوم**
منسق المقرر **ا. د. علي الامام**	**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	Drug Design Diploma Program
Academic Level	Postgraduate
Academic year	2020/2021 - First semester
Date of course specification approval	Dept. Council Approval: 24/02/2021 Faculty Council Approval: 20/03/2021

A. Basic Information : Course data :

Course Title	Drug metabolism
Course Code	PDD-103
Prerequisite	------
Teaching Hours: Lecture	2 C.H. /week
Practical:	2 C.H
Total Credit Hours	24 C.H.

B. Professional Information

1- Overall Aims of Course:

1- The course concern with the basic principles of drug metabolism and the role of drug metabolism in the design of prodrug, drug delivery system, and soft drug design.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Understanding the basics of drug, drug interaction, drug regulation.
a2	Demonstrate the basic knowledge of the properties of biologically significant molecules.
a3	Understand how their chemical, physical, and biochemical behavior affect their invivo and in vitro properties.

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Drug Design Diploma Program
Drug metabolism
Course Specification

2.2. *Intellectual Skills*

After completion of the course, graduates will be able to

b1	Predict potential drug drug, and food drug interaction and potential side effect and toxicity.
b2	Think how to design new drug based on the knowledge of their metabolism, and drug receptor interaction.
b3	Discuss possible roles and application of drug targets.

2.3. *Professional and Practical Skills*

After completion of the course, graduates will be able to

c1	Apply principles and theory of drug metabolism in different classes.
c2	Examine drug structure and deduce possible drug receptor interactions, and metabolic vulnerability.

2.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

d1	Present information clearly in written, electronic and oral forms.
d2	Promote critical thinking to solve the problem
d3	Solve problems related to determination of certain drugs unstability.
d4	Prepare oral presentation for some selected topics of the course.

3. Course Contents

Week No.	Topics	Lecture Hours	Practical / Tutorial hr.
1.	✓ Introduction to drug metabolism.	2	2 hrs
2. 3. 4.	✓ Phase 1 reactions: • Oxidation reactions. • Reduction reactions. • Hydrolysis reactions.	6	6 hrs
5. 6. 7. 8. 9.	✓ Phase 2 reactions: • Glucuronide conjugation. • Sulfate conjugation. • Amino acid conjugation. • Glutathione conjugation. • Acetylation. • Methylation.	10	10 hrs

10. 11. 12.	✓ Pharmacologically active metabolites ✓ Reactive metabolites ✓ Factors affecting drug metabolism	6	6 hr
Total: 12 weeks		**24**	**24**

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

No	Topics	Study Week	ILOS			
			K.U*	IS**	P.P.S***	G.T.S****
1	✓ Introduction to drug metabolism	1	a1, a2	b3	c1, c2	d2, d3
2	✓ Phase 1 reactions: • Oxidation reactions. • Reduction reactions. • Hydrolysis reactions.	2-4	a1, a3	b3	c1, c2	d2, d3
3	✓ Phase 2 reactions: • Glucuronide conjugation. • Sulfate conjugation. • Amino acid conjugation. • Glutathione conjugation. • Acetylation. • Methylation.	5-9	a1, a3	b2	c1, c2	d1, d3
4	✓ Pharmacologically active metabolites ✓ Reactive metabolites ✓ Factors affecting drug metabolism	10-12	a1, a2, a3	b2, b3	c1, c2	d1, 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**

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Postgraduate Studies
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5.3	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams
5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	**Practical Training / Laboratory**
8.9	**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	13th week	70%
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	13th week	20%
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	13th week	10%
				100 %

7- List of References

	Reference	Type
1.	Foye, W. O., Williams, D. A., & Lemke, T. L. (2002). Foye's principles of medicinal chemistry (5th ed.). Philadelphia: Lippincott Williams & Wilkins	Essential Book **(Text Books)**
2.	Wilson, Charles Owens, Ole Gisvold, and Robert F. Doerge. 2011. Wilson and Gisvold's Textbook of organic medicinal and pharmaceutical chemistry. Philadelphia: Lippincott.	Essential Book **(Text Books)**

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Laboratory facilities	**Microscopes, equipment, tools** ……
- Library	**……**

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Ali El-Emam	Prof Dr. Mohamed A. A. Moustafa	24/02/2021

* Date of Dept. Council Approval

Dept. of Medicinal Chemistry	Course Specification Principles of drug design	Drug Design Diploma program

Drug Design Diploma program

Course Specification

Academic year: 2020/2021

البرنامج دبلوم	توصيف مقرر اساسيات تصميم الدواء
رئيس القسم أ د. محمد احمد مصطفي	منسق المقرر أ د محمد احمد مصطفي

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	Drug Design Diploma. Program
Academic Level	Postgraduate
Academic year	2020/2021
Date of course specification approval	Dept. Council Approval: 24/02/2021 Faculty Council Approval: 20/03/2021

A.Basic Information : Course data :

Course Title	Principles of drug design
Course Code	PDD101.
Prerequisite	.....
Teaching Hours/week : Lecture	2 C.H. /week
Practical:	2
Total Credit Hours	: 24 C.H

B. Professional Information

1- Course Aims:

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1.1 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of medicinal chemistry and integrating with the relevant subjects in his/her professional practice.

1.2 Mastering of all traditional and new techniques used in the field of drug design and/or synthesis.

1.3 Manipulate online database, software and other IT skills to get information and analyze the obtained research data..

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Principles of drug design (PDD101)
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2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Define the theories and principles of drug design, metabolism and interactions.
a2	Explain the newly emerged theories of drug development such as QSAR analysis and bonds involved in drug-receptor interaction.

b. Intellectual Skills

After completion of the course, graduates will be able to

(B2)	b1	Apply logic and critical thinking to solve scientific problems in drug design and development.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

(C3)	c1	Apply different research methodologies and reporting skills in drug design and development.
(C4)	c2	Utilize and apply pharmaceutical IT skills in molecular modeling and docking.

d. General and Transferable Skills

After completion of the course, graduates will be able to

(D4)	d1	Manipulate online database and drug design programs to get information and analyze the obtained results.
(D5)	d3	Promote self-learning skills needed for continuous professional development.
	d4	Utilize available data resources in the field of drug design and development.
	d5	Promote critical thinking and decision-making abilities.

3. Course Contents

Week No.	Topics	Lecture Hours	No. of hours hr.
1 2	• Fundamentals of drug design. • Drug metabolism. • Chiral switch	4	4
3 4	• Soft drug design. • Prodrugs	4	, 4
5 6	• Depot forms of prodrugs. • Bio-precursors.	4	4

7 8	• QSAR • Bio-isosteric substitution in drug design.	4	4

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	• Fundamentals of drug design. • Drug metabolism. • Chiral switch	a1, a3	b4	c1, c4	d2, d3, d4, d5
3 4	• Soft drug design. Prodrugs.	a1, a3	b4	c1, c4	d2, d3, d4, d5
5 6	• Depot forms of prodrugs. • Bio-precursors.	a1, a3	b4	c1, c4	d2, d3, d4, d5
7 8	• QSAR Bio-isosteric substitution in drug design.	a1, a3	b4	c1, c4	d2, d3, d4, d5

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

5- Teaching and Learning Methods:

5.1	**Lectures using data show and ZOOM meetings.**
5.2	**Research assignments**
5.3	**Practical demonstration.**
5.4	**Discussion session at the end of each lecture**

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6- Student Assessment:

		Assessment Methods	Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	**To assess understanding, intellectual, professional**	**13th week**	**70%**
Assessment 2	**Tutorial / or Practical assignments and Semester work**	**To assess professional and practical skills**	**13th week**	**20%**
Assessment 3	**Oral Exam**	**To assess Knowledge, understanding, intellectual skills, general skills and confidence**	**13th week**	**10%**
				100 %

7- List of References

	Reference	Type
1.	"An Introduction to Medicinal Chemistry", 5th edition, Graham L. Patrick editor, Oxford university press INC., New York, USA, 2013. ISBN: 9780199697397..	**Text Books**
2.	Foye's Principles of Medicinal Chemistry", 7th edition, (David A.Williams, Thomas L Lemke& ,William O .Foye Editors), Lippincott .Williams&Wilkins, 2014	**Text Books**
3.	"The Organic Chemistry of Drug Design and Drug action" 2nd Edition, Richard. B. Silverman, Editor, Academic Press, 2004. http:// www.Lib.duke.edu/chem/infolist.htm	**Text Books**

8- Facilities required for teaching and learning

Class room	**Data show- Computers, Internet. ……..**
Laboratory facilities	**Microscopes, equipment, tools ……**
Library	**Library supplied by recent scientific books and journals.**
Others	

9- Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Mohammed A. A. Moustafa	Prof Dr. . Mohammed A. A. Moustafa	24/02/2021

* Date of Dept. Council Approval

Dept. of Med. Chem.	Course Specification	Drug Design Diploma

Drug Design Diploma

Course Specification

Academic year: 2020/2021

البرنامج **دبلوم**	**توصيف مقرر** **التهديف الدوائي** **Drug targeting**
رئيس القسم **أ د. محمد أحمد أحمد مصطفى**	**منسق المقرر** **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	Drug Design Diploma Program
Academic Level	Postgraduate
Academic year	2020/2021 - First semester
Date of course specification approval	Dept. Council Approval: 24/02/2021 Faculty Council Approval: 20/03/2021

A.Basic Information : Course data :

Course Title	Drug targeting
Course Code	PDD-102
Prerequisite	------
Teaching Hours: Lecture	2 C.H. /week
Practical:	2 C.H
Total Credit Hours	24 C.H.

B. Professional Information

1- Overall Aims of Course:

1- At the end of this course the students should recognize the main drug targets, know its structure, types and mechanism of action. Using this information in drug design.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A5	a1	Determine the relationship between the chemical structure of biologically active compounds and its biological activities

2.2. *Intellectual Skills*

After completion of the course, graduates will be able to

B16	b1	Investigate the different properties and biological activity of the tested compounds according to its molecular structure.

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Drug targeting
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2.3. *Professional and Practical Skills*

After completion of the course, graduates will be able to

C5	c1	illustrate the causes of some diseases and the target responsible of this defect and its relation with drug chemistry
C19	c2	Identify the main strategies used in drug design of new biologically active compounds.

2.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

D8	d1	Communicate clearly in written, electronic and oral forms
D9	d2	Demonstrate critical thinking, problem-solving, decision-making, and time managing capabilities

3. Course Contents

No.	Topics	Lecture Hours
1.	Protein structure and function	4
2.	Enzyme structure and function	4
3.	Enzymes as drug targets	4
4.	Receptor structure and function	4
5.	Receptor as drug targets	2
6.	Design of agonist and antagonist	2
7.	Nucleic acid as drug targets	4
Total: 12 weeks		24

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

No	Topics	Study Week	ILOS			
			K.U*	IS**	P.P.S***	G.T.S****
1	Protein structure and function	1-2	a1	b1	c1, c2	d1

2	**Enzyme structure and function**	3-4	a1	b1	c1, c2	d1
3	**Enzymes as drug targets**	5-6	a1	b1	c1, c2	d1
4	**Receptor structure and function**	7-8	a1	b1	c1, c2	d1
5	**Receptor as drug targets**	9	a1	b1	c1, c2	d1, d2
6	**Design of agonist and antagonist**	10	a1	b1	c1, c2	d1, d2
7	**Nucleic acid as drug targets**	11-12	a1	b1	c1, c2	d1

** 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	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams
5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	**Practical Training / Laboratory**
8.9	**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	13th week	70%
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	13th week	20%
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	13th week	10%
				100 %

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Drug targeting
Course Specification

7- List of References

	Reference	Type
1.	An Introduction to Medicinal Chemistry, Fifth Edition- Graham L. Patrick Oxford University press 2013	Essential Book **(Text Books)**

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Laboratory facilities	**Microscopes, equipment, tools** …….

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Mohamed A. A. Moustafa	Prof Dr. Mohamed A. A. Moustafa	24/02/2021

* Date of Dept. Council Approval

Dept. of Med. Chem.	Course Specification	Drug Design Diploma

Drug design diploma

Course Specification

Academic year: 2020/2021

البرنامج دبلوم تصميم الأدوية (الكيمياء الدوائية)	توصيف مقرر موضوعات متقدمة في تصميم الادوية Advanced topics in drug design
رئيس القسم أ د. محمد أحمد مصطفى	منسق المقرر د. حازم احمد المرسي غبور

General

Mansoura University
Faculty of Pharmacy
Postgraduate Studies
Drug design diploma
Drug quality control Course Specification

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	Drug Design Diploma program
Academic Level	Postgraduate
Academic year	2020/2021 - second semester
Date of course specification approval	Dept. Council Approval: 24/2/2021 Faculty Council Approval: 20/3/2021

A.Basic Information : Course data :

Course Title	Advanced topics in drug design
Course Code	PDD-107
Prerequisite	------
Teaching Hours: Lecture	2 h/ week
Practical	1
Total Credit Hours	2 c.h

B. Professional Information

1- Overall Aims of Course:

At the end of this course the students should recognize the main concepts of drug discovery and development, pharmacophore predication, compounds containing fluorine and main uses and applications of X-ray crystallography.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Recognize in-depth and breadth knowledge of pharmaceutical and biomedical science related to drug action.
a2	Explain drugs' mode of action, therapeutic uses and proper selection of safe and effective drugs

2.2. Intellectual Skills

After completion of the course, graduates will be able to

b1	Adapt concepts of medicinal chemistry used in the systematic approaches applied in drug development.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Adapt principles of medicinal chemistry and pharmacological aspects of drugs, as mode of action, therapeutic uses, proper dosage, unwanted effects and drug interactions.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

d1	Appraise information and analyze data, identify problems and present solutions, participate independently and collaboratively as drug chemistry expert within healthcare team.
d2	Communicate effectively in proper scientific language by verbal and written means in the field of health care related to the studied topics
d3	Practice independent learning to promote continuous professional development and lifelong learning.

3. Course Contents

Week No	Topics	Lecture (hr.)
1	Drug Discovery and drug development	4
2	ADMET	2
3	Active mapping	2
4	Pharmacophore predication	2
5	Unique properties of Fluorine and their relevance to medicinal chemistry and chemical biology.	4
6	Mimic and block effect of Fluorine atom	2
8	Advances in X-ray crystallography	4
14-16	**Final written and oral exam**	

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Drug quality control Course Specification

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.	Protein structure	1-3	a1, a2	b1	c1	d1, d3
2.	Protein functions	4	a1	b1	c1	d1, d3
3.	The Binding and catalytic role of enzymes	5,6	a2	b1	c1	d1
4.	Regulation of enzymes	8	a1	b1	c1	d1
5.	Enzyme inhibitors: reversible and irreversible	9	a1	b1	c1	d1, d3
6.	Enzyme inhibitors: Uncompetitive and non-competitive and transition-state inhibitors	10	a1	b1	c1	d1, d3
7.	**Nucleic acid as a drug targets (self-learning)**	11	a1	b1	c1	d1, d3
8.	**Practical topics**	1-6 8-10	a1, a2	b1	c1	d1, d2, d3

5- Teaching and Learning Methods:

5.1	Computer aided learning: a. Lectures using Data show, power Point presentations b. Distance learning • On line learning through my mans "Mansoura university "as recorded – video lectures Inter active discussion through My Mans
5.2	Self-learning
5.3	Tutorial sessions using Data show, power Point presentations and possible applications of OSQE
5.4	Class Activity: Group discussion offline and online.
5.5	Problem based learning and brain storming.
5.7	Research 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.	14th week	90%
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	14th week	10%
				100 %

7- List of References

No	Reference	Type
1.	Electronic book prepared by staff members	**Course notes**
2.	Recorded videos prepared by stuff members	**Videos on platform**
3.	Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, John Beale & John Block (Editors) Lippincott Williams & Wilkins; 12th Edition **(2015).**	**Book**
4.	Graham L. Patrick, "An Introduction to Medicinal Chemistry" Oxford University Press, USA; 6th edition (2017)	**Book**
5.	M. E. Wolff Burger"s Medicinal Chemistry and Drug Discovery", Donald J. Abraham, David P. Rotella (Editors),Wiley-interscience Publication, New York, 7th edition (2010).	**Book**
6.	https://www.ekb.eg http://www.sciencedirect.com / http://www.google scholar.com /	**websites**

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Laboratory facilities	**Microscopes, equipment, tools**
- Library	**Books**
-Online learning	**Zoom**

9. Signature

Course Coordinator	Head of Department	Date
Dr. Hazem Ahmed Elmorsy Ghabbour	Prof Dr. Mohamed A. A. Moustafa	20/2/2021

* Date of Dept. Council Approval 20/2/2021

Dept. of Medicinal Chemistry	Course Specification Drug Synthesis	Drug Design Diploma program

Drug Design Diploma program

Course Specification

Academic year: 2020/2021

البرنامج **دبلوم تصميم الأدوية (كيمياء دوائية)**	**توصيف مقرر** **تشيد الأدوية**
رئيس القسم **أ د. محمد احمد مصطفي**	**منسق المقرر** **أ د محمد الكرداوي**

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	Drug Design Diploma. Program
Academic Level	Postgraduate
Academic year	2020/2021 – Second Semester
Date of course specification approval	Dept. Council Approval: 24/2/2021 Faculty Council Approval: 20/3/2021

A.Basic Information : Course data :

Course Title	**Drug Synthesis** .
Course Code	PDD-106.
Prerequisite	.....
Teaching Hours/week : Lecture	2 C.H. /week
Practical:	…..
Total Credit Hours	2

B. Professional Information

1- Course Aims:

1.1 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of medicinal chemistry
1.2 Mastering the basics and methodologies of synthetic chemistry and manipulating its various tools in the field of drug synthesis.
1.3 Mastering of all traditional and new techniques and methods used in the field of drug synthesis
1.4 Formulating hypotheses based on current concepts in medicinal chemistry field.

2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Explain the theories and fundamentals of synthetic chemistry in drug synthesis.
a2	Recognize the current problems, the recent and advanced development of drug synthesis.
a3	Utilize effectively all basic and recent techniques and technological tools used in drug synthesis.

b. Intellectual Skills

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Drug Synthesis (PDD-106)
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After completion of the course, graduates will be able to

b1	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes
b2	Assess professional and scientific risks in practicing drug synthesis.
b3	Utilize the available professional and scientific resources and research skills to solve problems.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Develop different research methodologies and good experimental and reporting skills in the design, synthesis of drugs
c2	Manage safely and efficiently advanced technological research tools and equipments relevant to drug synthesis.
c3	Develop scientific research and contribute to the knowledge in the field of drug development and synthesis.

d. General and Transferable Skills

After completion of the course, graduates will 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

3. Course Contents

Week No.	Topics	Lecture Hours
1	1. Introduction to Drug Synthesis 2. Aromatase Inhibitors for breast Cancer	**2**
2	3. Calcium Channel Blockers 4. Amphetamine and Methyl phenidate	**2**
3	5. Quinolone Antibiotics	**2**
4	6. Angiotensin Inhibitors for Hypertension	**2**
5	7. Triazole Antifungals	**2**
6-10	8. Named Organic Reactions	**10**
Total: 10 weeks		**20 h**

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	Introduction to Drug Synthesis	a1, a2	b1, b2	c1, c2	d1, d2, d3, d4, d5
2	Synthesis of examples of different pharmacologically active classes of drugs	a3	b1, b2	c1, c2	d1, d2, d3, d4, d5
3	Named Organic Reactions	a2, a3	b1, b2, b3	c3	d1, d2, d3, d4, d5

** 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	**Discussion**
5.3	**Computers and internet searching**

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	To assess knowledge, understanding, intellectual and professional skills	Week 14th	70%
Assessment 2	**Tutorial / or Practical**	To assess transferable skills		20%
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 14th	10%
				100 %

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Drug Synthesis (PDD-106)
Course Specification
2020/2021

7- List of References

	Reference	Type
1.	The Art of Drug Synthesis, Douglas S. Johnson, Jie Jack Li. Wiley, New York, 2007.	Essential Book **(Text Books)**
2.	An Introduction to Drug Synthesis, Graham L. Patrick, Oxford University, 2014	Recommended Books
3.	http:// www.pubmed.com http:// www.orgsyn.syn http:// www.merck.com http:// www.chemhelper.com http:// www.Lib.duke.edu/chem/infolist.htm	websites

8- Facilities required for teaching and learning

- **Class room**	**Data show- Computers, Internet.**
- **Laboratory**	**Microscopes, equipment, tools**
- **Library**	**Supplied by recent scientific books and journals.**
- **Others**	**Access to research engines for scientific periodicals.**

9- Signature

Course Coordinator	Head of Department	Date
Prof. Dr. Mohammed A. El-Kerdawy	Prof Dr. Mohammed A. A. Moustafa	24/2/2021

* Date of Dept. Council Approval 24/2/2021

Dept. of Med. Chem.	Course Specification	Drug Design Diploma

Drug design diploma

Course Specification

Academic year: 2020/2021

البرنامج	توصيف مقرر
دبلوم تصميم الأدوية (الكيمياء الدوائية)	الرقابة النوعيه الادوية **Drug quality control**
رئيس القسم	منسق المقرر
أ د. محمد أحمد أحمد مصطفى	د. أحمد حلمي

Mansoura University
Faculty of Pharmacy
Postgraduate Studies
Drug design diploma
Drug quality control 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	Drug Design Diploma program
Academic Level	Postgraduate
Academic year	2020/2021 - second semester
Date of course specification approval	Dept. Council Approval: 24/2/2021 Faculty Council Approval: 20/3/2021

A.Basic Information : Course data :

Course Title	Drug Quality control
Course Code	PDD-105
Prerequisite	------
Teaching Hours: Lecture	2 h/ week
Practical	1
Total Credit Hours	24 c.h

B. Professional Information

1- Overall Aims of Course:

1. Understanding the fundamental concepts of functional group analysis and basic degradation pathway of drugs.
2. Providing the different forced depredation pathways used to study the drug stability.
3. Studying the applications and examples of different techniques used in drug degradation and analysis

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Identify Different Functional Groups and their chemical reactivity.
a2	Classify different types of drug degradation techniques.
a3	Describe different theories of drug degradation pathways.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

b1	Predict the suitable analytical method based on molecular structures.
b2	Interpret the factors required to increase the chemical stability of drugs.
b3	Use the knowledge of drug chemistry and relate the specific structural features to decrease its degradation.
b4	Predicting the basic mechanisms of drug degradation pathways.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Apply different analytical methods used to determine the Conc. Of the active principles.
c2	Demonstrate different examples of drug excipients interaction.
C3	Examine a drug chemistry and deduce relative physical and chemical stability.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

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

3. Course Contents

Week No	Topics	No. of hours	Lecture (hr.)
1.	✓ The fundamental concepts of functional group analysis.	2	2 hrs
2-5	✓ Analysis of phenolic compounds. ✓ Analysis of amine containing compounds. ✓ Analysis of thiol containing compounds.	8	8 hrs
6-9	• Micro emulsion HPLC. • Pharmaceutical stress testing predicting drug degradation. • Overview of hydrolytic degradation.	8	8 hrs
10-12	✓ Degradation of common functional groups.	6	6 hr
13.	**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	✓ The fundamental concepts of functional group analysis.	1	a1, a2	b3	c1, c2	d2, d3
2	✓ Analysis of phenolic compounds. ✓ Analysis of amine containing compounds. ✓ Analysis of thiol containing compounds.	2-5	a1, a3	b3	c1, c2	d2, d3
3	• Micro emulsion HPLC. • Pharmaceutical stress testing predicting drug degradation. • Overview of hydrolytic degradation.	6-9	a1, a3	b2	c1, c2	d1, d3
4	✓ Degradation of common functional groups.	10-12	a1, a2, a3	b2, b3	c1, c2	d1, d3

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	13th week	70%
Assessment 2	**Practical exam**	To assess the ability to solve different drug quality issues.	13th week	20%
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	13th week	10%
				100 %

7- List of References

	Reference	Type
1.	Organic chemistry of drug degradation, Min Li,2012 .	Essential Book **(Text Books)**
3.	Pharmaceutical stress testing ,predicting drug degradation steven w. Baertschi, Eli Lilly and company, Indianapolis, Indiana, U.S.A. 2005.	Essential Book **(Text Books)**

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Laboratory facilities	**Microscopes, equipment, tools**
- Library	**Books**
-Online learning	**Zoom**

9. Signature

Course Coordinator	Head of Department	Date
Dr. Ahmed Helmy Hassan	Prof Dr. Mohamed A. A. Moustafa	24/2/2021

* Date of Dept. Council Approval 24/2/2021

Dept. of Med. Chem.	Course Specification	Drug Design Diploma

Drug Design Diploma

Course Specification

Academic year: 2020/2021

البرنامج
دبلوم تصميم الأدوية (الكيمياء الدوئية)

توصيف مقرر
إثبات التركيب البنائي للأدوية
Structure Elucidation of Drugs

رئيس القسم
أ.د. محمد أحمد أحمد مصطفى

منسق المقرر
أ.د. نادية صبرى الجوهرى

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Medicinal Chemistry
Department supervising the course	Medicinal Chemistry
Program on which the course is given	Drug Design Diploma Program
Academic Level	Postgraduate
Academic year	2020/2021 - Second semester
Date of course specification approval	Dept. Council Approval: 24/2/2021 Faculty Council Approval: 20/3/2021

A.Basic Information: Course data:

Course Title	Structure Elucidation of Drugs
Course Code	PDD-109
Prerequisite	------
Teaching Hours: Lecture	2 h/week
Total Credit Hours	2 h

B. Professional Information

1- Overall Aims of Course:

1.1. Upgrading the knowledge of spectroscopic methods and techniques used for identification, elucidation and analyses of pharmaceutical compounds.

1.2. Developing the ability of the students to interpret spectra with the study of the principles and advanced techniques of Mass Spectroscopy (MS), Infrared (IR), Nuclear Magnetic Resonance [NMR (^{1}H and ^{13}C, 2D (^{1}H-^{1}H COSY & HETCOR spectrum, ESR, MRI, saturation transfer, collective spectroscopic problems)], and their application in the identification and characterization of organic compounds.

1.3. Practicing problems that involve interpretation of IR, MS and NMR spectra of selected medicinal organic compounds.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Identify and recognize various chemical structure representations of aliphatic, aromatic and heterocyclic compounds as well as pharmacophoric moieties by using spectroscopic analysis.
a2	Describe the basic principles of IR, 1H &13C NMR and mass spectroscopy.
a3	Match the different terms related to 1H NMR, including chemical equivalence, chemical shift and nuclear magnetic moments and basis of mass spectroscopy and infrared absorption process.

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2.2. *Intellectual Skills*

After completion of the course, graduates will be able to

b1	Translate and interpret data from different spectroscopic charts (IR, NMR & Mass spectra).
b2	Apply different data like molecular formula, molecular weight, infrared, NMR, mass spectrum to finally discover the structure of a given compound
b3	Taking scientific decisions based on the spectral data.

2.3. *Professional and Practical Skills*

After completion of the course, graduates will be able to

c1	Categorize different types of functional groups in a given IR Spectrum.
c2	Integrate the different types of proton or carbons in a given ^{1}H NMR and ^{13}C NMR spectrum.
c3	Specify the molecular weight and fragmentation pattern of a given compound and design its structure through its mass spectrum data.
c4	Integrate the different spectroscopic data of organic compound to specify and design the final chemical structure

2.4. *General and Transferable Skills*

After completion of the course, graduates will be able to

d1	Promote critical thinking, problem-solving and decision-making capabilities.
d2	Utilize information in this course for the solution of some problems.
d3	Work effectively in a team and offer expertise and advice to others.
d4	Evaluate and criticize scientific work, literature and research data.
d5	Practice self-learning needed for continuous professional development.

3. Course Contents

Weeks	Topics	Lecture Hours
1-7	NMR spectroscopy [1H and 13C, 2D (1H1H COSY&HETCOR spectrum, ESR, MRI, saturation transfer, Collective spectroscopic problems)]	**13**
7-8	IR spectroscopy	**3**
9-10	The mass spectrometry and exact mass determinations	**4**
Total: 10 weeks		**20**

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

Week	Topic	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1-7	NMR spectroscopy [^{1}H and ^{13}C, 2D (^{1}H-^{1}H COSY&HETCOR spectrum, ESR, MRI, saturation transfer, Collective spectroscopic problems)]	a1,a2,a3	b1,b2,b3	c2,c4	d1,d2,d3, d4,d5
7-8	IR spectroscopy	a1,a2	b1,b2,b3	c1,c4	d1,d2,d3, d4,d5
9-10	The mass spectrometry and exact mass determinations	a1,a2	b1,b2,b3	c3,c4	d1,d2,d3, d4,d5

**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	**Video-recorded lectures, uploaded to the University Portal for Online learning**
5.4	**Activities and tasks required to develop students' self-learning skills.**
5.5	**Tutorial, Class Activity and Group Discussion to explain what has not been understood**
5.6	**Interactive Sessions using Microsoft Teams**
5.7	**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	13th week	90 Marks (90%)
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	13th week	10 Marks (10%)
				100 %

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7- List of References

	Reference	Type
1.	Spectrometric identification of organic compounds (7th Edition) R. M. SILVERSTEIN, G. C. BASSLER AND T. C. MORRILL. Wiley, New York, 2005.	Text Books
2.	2.1. Basic One- and Two-Dimensional NMR Spectroscopy 5th Edition by Horst Friebolin, Wiley-VCH; (2010) 2.2. Understanding NMR Spectroscopy, 2nd Edition by James Keeler, John Wiley and Sons, Inc.; (2010)	Text Books
3.	http:// www.pubmed.com http:// www.orgsyn.syn http:// www.merck.com http:// www.chemhelper.com http:// www.Lib.duke.edu/chem/infolist.htm	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. Nadia S. El-Gohary	**Prof. Dr.** Mohamed A. A. Moustafa	24/2/2021

* Date of Dept. Council Approval 24/2/2021