Course specification
2018- 2019
Faculty of Pharmacy
Mansoura University

Fourth Level

Medicinal Chemistry 1

University: Mansoura University (MU)
Faculty: Pharmacy
Department: Medicinal Chemistry
Course title: Medicinal Chemistry 1
Course code: PD 411

Program on which the course is given	B. Pharm
Academic Level	Fourth Level, First semester, 2018-2019
Date of course specification approval	10/9/2018

1. Basic Information: Course data:

Course title:	**Medicinal Chemistry 1**	**Code: PD 411**
Specialization:	**Pharmaceutical**	
Prerequisite:	**Pharmaceutical organic chemistry 2**	
Teaching Hours:	**Lecture: 3**	**Practical: 2**
Number of units: (credit hours)	**4**	

2. Course Aims:

2.1. Introducing students to medicinal chemistry topics and domain.
2.2. Studying physicochemical properties of drugs.
2.3. Explaining the different phases of drug metabolism and the enzymes involved.
2.4. Understanding the mode of action of drugs affecting autonomic nervous system (ANS), cardiovascular drugs and diuretics.
2.5. Knowing the chemistry, synthesis, nomenclature and structure activity relationship (SAR) of drugs affecting ANS, cardiovascular drugs and diuretics.

3. Intended learning outcomes (ILO_S):

a- Knowledge and understanding

a1	Identify the physicochemical properties of drugs.
a2	Recognize the possible metabolic pathways for different drug molecules.
a3	List the pharmacological properties of drugs, including mechanism of action, clinical uses, drug interactions, contra-indications, adverse drug reactions (ADRs) and SAR.

b- Intellectual skills

b1	Predict absorption and distribution behavior of drug molecules based on drug chemistry.
b2	Predict pathways of metabolic degradation based on vulnerability of drug functional groups to metabolizing enzymes.
b3	Assess drug interactions and ADRs.

c- Professional and practical skills

c1	Infer physicochemical properties from examination of drug structure.
c2	Apply the given information to evaluate the activity of related compounds within a pharmaceutical class based on structural similarities and dissimilarities.
c3	Model and simulate structure of drugs using laboratory software.
c4	View chemical structures on computer softwares.
c5	Make decisions on studied cases.

d- General and transferable skills

d1	Practice independent learning needed for continuous professional development.
d2	Work effectively in a team.
d3	Implement writing and presentation skills.
d4	Demonstrate creativity and time management abilities.

4. Contents:

Week No	Topics	No. of hours	Lecture credit hours	Practical credit hours
1.	- Introduction to medicinal chemistry and physicochemical properties and drug action	3	3 hours	
2.	- Hydrophilic / lipophilic properties of drugs - Electronic and steric effects of substituents. - Drug receptor interaction - Isosterism and bioisosterism	3	3 hours	
3.	- Introduction to drug metabolism and phase I reactions: Oxidation reactions. - Phase I reactions: Reduction reactions	3	3 hours	

4.	- Phase I reactions: Hydrolysis reactions. Phase II reactions: conjugation reactions - Factors affecting drug metabolism	3	3 hours	
5.	- Adrenergic agonists - Cholinergic agonists	3	3 hours	
6.	- Adrenergic agonists - Cholinergic agonists	3	3 hours	
7.	**Mid-term Exam**			
8.	- Adrenergic antagonists - Cholinergic antagonists	3	3 hours	
9.	- Adrenergic antagonists - Cholinergic antagonists	3	3 hours	
10.	- Diuretics	3	3 hours	
11.	- Antihypertensive drugs	3	3 hours	
12.	- Antiarrhythmic drugs - Antianginal drugs	3	3 hours	
13.	- Anticoagulant drugs - Antihyperlipidemic drugs	3	3 hours	
14.	**Final written and oral exams**			
	Practical topics			
Week No	**Topics**	**No. of hours**	**Lecture credit hours**	**Practical credit hours**
2.	Introduction to ChemDraw (2D): Identifying the main tool bar and the content of the view menu. Drawing straight chain, cyclic structures, identifying the content of the structure menu and drawing of heterocyclic structures.	2		1 hour
3.	Drawing chemical equations and viewing 3D models of some selected drugs. Predicting ^{1}H-NMR and stereochemistry of some selected drugs and showing their chemical properties and analysis windows.	2		1 hour
4.	Drawing the metabolic pathways of	2		1 hour

	the selected drugs and showing the effect of the metabolism on the physicochemical properties of the drug.			
5.	Revision	2		1 hour
6.	**ChemDraw Exam**	2		1 hour
7.	**Mid-term Exam**			
8.	Case study about physicochemical properties of drugs	2		1 hour
9.	Case study about physicochemical properties of drugs	2		1 hour
10.	Case study about physicochemical properties of drugs	2		1 hour
11.	**Case study Sheet**	2		1 hour

5. Teaching and learning Methods:

5.1	Lectures using whiteboard
5.2	Lectures using Data show, PowerPoint presentations
5.3	Research assignments
5.4	Use of computer software for drawing of chemical structures
5.5	Case study

6. Student Assessment:

a- Assessment methods

1. Written exam	To assess understanding, intellectual and professional skills
2. Practical exam	To assess professional and practical skills
3. Oral	To assess knowledge, understanding, intellectual skills, general skills and confidence
4. Case study	To assess the skills of problem-solving and date presentation

b- Assessment schedule

Assessment 1	Practical	6th week and 11th week
Assessment 2	Mid-term	7th week
Assessment 3	Oral	14th week
Assessment 4	Written	14th week

c- Weighting of assessments

1.	Mid-term examination	10 %
2.	Final-term examination	50 %
3.	Oral examination	15 %
4.	Practical examination and Semester work	25 %
Total		100 %

7. List of References

No	Reference	Type
1.	Practical course notes prepared by the department staff members	Course notes
2.	"Foye's Principles of Medicinal Chemistry", 8th edition, (David A. Williams, Thomas L. Lemke & William O. Foye, Editors), Lippincott Williams & Wilkins, 2017	Book
3.	"Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry" 12th Edition, (J. H. Block and J. M. Beale Jr, Editors), Lippincott Williams & Wilkins, Philadelphia, PA, 2011	Book
4.	Graham L. Patrick; "An Introduction to Medicinal Chemistry" Oxford University Press, USA; 6th Revised edition, 2017	Book
5.	Thomas, Gareth, "Fundamentals of Medicinal Chemistry" Wiley-Blackwell; Kindle Edition (2013).	Book
6.	http://pharmacy.creighton.edu	Website

8. Matrix of knowledge and skills of the course

No	Course contents	Study Week	ILOS			
			Knowledge & understanding	Intellectual skills	Professional and practical skills	General & transferable skills
1.	Introduction to medicinal chemistry. Definitions, objectives, classification of drugs and nomenclature of drugs	1st	a1	b1	c1	d1
2.	The physicochemical properties and drug action. Drug-Receptor interactions and forces involved	2rd	a1	b1	c1	d1
3.	Drug biotransformation	3rd and 4th	a2	b2	------	d1
4.	Drugs affecting the autonomic nervous system: Adrenergic agonists and antagonists; Cholinergic agonists and antagonists.	5th, 6th, 8th and 9th	a3	b3	c2	d1
5.	Antihypertensive drugs, anticoagulant drugs, antianginal drugs, antiarrhythmic drugs, antihyperlipidemic drugs, and	10th -13th	a3	b3	c2	d1

	diuretics					
6.	Practical: Molecular modeling of drug molecules (computer programs) and case study related to the studied topics	2nd -6th and 8th -11th	a1	b1	c1, c3, c4,c5	d1, d2, d3, d4

Course Coordinator:	**Ghada Sameh Hafez Hassan**
Head of Department:	**Azza Rashad Maarof**