



**JERASH UNIVERSITY**  
**FACULTY OF PHARMACY**  
**DEPARTMENT OF PHARMACEUTICAL SCIENCE**

<b>Course Title:</b> Medicinal chemistry (I)	<b>Course code:</b> 1101311
<b>Course Level:</b>	<b>Course prerequisite (s) and/or co requisite (s):</b>
<b>Lecture Time :</b> 1 hr	<b>Credit hours:</b> 2 hours

**Academic Staff Specifics**

Name	Rank	Office Number and Location	Office Hours	E-mail Address & Website
Dr. Mohammed Nooraldeen Al-Qattan	Assist Prof	406 Pharmacy building		<a href="https://sites.google.com/view/alqattan/">https://sites.google.com/view/alqattan/</a>

### 1 Course module description:

The first part of the course deals with setting up principles of molecular dynamics and its correlation with molecular kinetics whether being outside (physical properties) or inside human body (pharmacokinetics), then deducing them from molecular structure (i.e. molecular electronic distribution). The physiochemical properties like lipophilicity, acidity, intermolecular interactions are studied as applications of the previously set principles.

The second part of the course deals with the principles of molecular biotransformation of drug inside the human body (metabolism). The third part of this course includes applications of all the previously discussed principles on drugs affecting cholinergic and adrenergic receptors. Accordingly, intermolecular interactions, mechanism of action, switching receptor on (agonistic) or off (antagonistic), and structure-activity relationship are covered.

### 2 Course objectives

Student will be able to have full knowledge about the drug groups to be studied, including their metabolism in the body, the possible mechanism of action, the relationship between their chemical structure and the pharmacological activity as well as the toxicity and the factors affecting the pharmacokinetic and pharmacodynamic properties of the drug molecule. Also the student will be able to expect some molecular properties of drugs that affect almost all drug aspects inside the body. Student at the end of the course will have the ability to analyze and investigate the effect of structural modification of a given drug on the pharmacological activity as well as the possible toxicity.

### 3 Course/ module components

The reference textbooks are arranged by relevance

- Patrick, Graham L. An introduction to medicinal chemistry. Oxford university press, 2013.

- Wilson, Charles Owens, John Marlowe Beale, and John H. Block. Wilson and Gisvold's textbook of organic medicinal and pharmaceutical chemistry. Lippincott Williams & Wilkins,, 2011.
- Foye, William O. *Foye's principles of medicinal chemistry*. Lippincott Williams & Wilkins, 2013.
- Nogrady, Thomas, and Donald F. Weaver. *Medicinal chemistry: a molecular and biochemical approach*. Oxford University Press, 2005.
- Davis, Andrew, and Simon E. Ward, eds. *The handbook of medicinal chemistry: principles and practice*. Royal Society of Chemistry, 2014.

#### 4 Teaching methods:

Lectures, on-board sketches, tutorials and problem solving.

#### 5 Learning outcome

By the end of this course, students will acquire:

##### 5.1 Knowledge

- Have knowledge about principles of medicinal chemistry including relation of structure to physicochemical properties, dynamical interactions with biological macromolecules and the associated kinetic behavior. Knowing types of drug targets and how drug interact with them, the metabolic pathways of drugs and application of the previous principles on cholinergic and anticholinergic drugs

##### 5.2 Cognitive skills (*Thinking and analysis*).

Relates structures to receptor interaction, stability, physicochemical and pharmacokinetic properties. Thus, the student is able to modify drug molecules for intentional benefits. Difference between drugs act on specific and non-specific receptors. Ways of adjusting drug molecular structure to manipulate drug pharmacokinetic parameters.

##### 5.3 Communication skills (*personal and academic*):

Can explain drug physicochemical properties and pharmacokinetic and pharmacologic behavior of the molecule from its structure.

##### 5.4 Practical and subject specific skills (*Transferable Skills*).

The course can help to understand medicinal chemistry I and II as well as pharmacology.

#### 6 Assessment instruments

Assessment method	Mark
First examination	20
Second examination	20
Final examination	40
Quizzes, reports, classroom questions	20
Total	100

Make up exam will be afford for valid reasons only with consent of dean. Make-up exam may be different from regular exam in content and format.

## 7 Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

## 8 Documentation and academic honesty

Taking headlines/notes from the text book with further elaborated/detailed discussion during the lecture with avoidance of plagiarism. The citation is provided wherever it is required.

## 9 Course/module academic calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
(1,2,3)	Introduction to medicinal chemistry (I) Introduction to Pharmacodynamic Pharmacokinetic	
(4,5,6)	Inter and intra-molecular interactions Structural properties of drug molecule Kinetics of drug molecule outside the body Ionization of drugs (acidity, basicity and solubility) Lipophilicity of drugs Kinetics of drug molecule inside the body Absorption	
(7)	Types of drug targets	
(7)	<b>First examination</b>	
(8,9,10)	Drug metabolism Introduction Phase-I metabolism	
(11,12,13)	Drug metabolism Phase-II metabolism Factors affecting drug metabolism	
(13)	<b>Second examination</b>	
(14,15)	Drugs acting on cholinergic receptors	
(16)	<b>Final exam</b>	

The in-between brackets include the reference textbook as abbreviation and pages numbers ranges. Abbreviations include: MC for McMurry and the other for Hart.