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

**Course Syllabus**

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| **Course Title:** Drug design | **Course code:** 1101412 |
| **Course Level:** 4th year | **Course prerequisite (s) and/or co requisite (s):** Pharmaceutical Medicinal Chemistry (3) |
| **Lecture Time :**1:00 hr | **Credit hours:** 2 hours |

**Academic Staff Specifics**

| Name | Rank | Office Number and Location | Office Hours | | | | E-mail Address& Website |
|---|---|---|---|---|---|---|---|
| Dr. Suhaib Ibrahim Alkhamaiseh | Assistant Prof. | 406 Pharmacy Building | Sun | Mon | Tues | Wed | s.alkhamaiseh@gmail.com |
| | | | 2-3 | | 2-3 | | |

## 1 Course module description:

The subject deals with the most commonly used approaches in the design and development of new pharmaceutical agents based on the available information related to the structure activity relationships, the physicochemical characteristics, pharmacokinetic, Pharmacodynamic properties of drugs. Also describes the importance of studying the receptor and enzyme structure in the design of suitable chemical scaffolds for agonist and antagonist activity. The rest of the course will focus on the use of different modeling software and chemical drawing to study the drug-target interaction. Part of the class will focus on drug metabolism and its role in drug design, as well as the prodrug concept.

## 2 Course objectives

Student will be able to have full knowledge of the recently and widely used methods for the design of new drugs to tackle certain illness such as cancer, bacterial infection, diabetes and many others. Furthermore, the student will be able to utilize computer software such as ChemDraw and Biological receptors visualizer to draw drug structures in 3D view, in addition to study the binding of drugs to the receptors active sites. At the end of the course, student will be able to design and propose suitable drug interties for a given target enzyme or receptor.

## 3 Course/ module components

The reference textbooks are arranged by relevance

- The organic chemistry of drug design by Richard B. Silverman. Second edition, Elsevier, 2004

## 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*

a. Understanding the common concepts of computer aided drug design techniques

b. Building a relationship between drug structure and Pharmacological action

c. Demonstrate knowledge about drug chemical structure and lead optimization to improve activity

d. Interpret data obtained from bioassays to improve pharmacokinetic and Pharmacodynamic properties of drugs

e. Recognize structural moieties essential for drug target interactions and predict possible structural changes to improve binding

f. Get familiarize with different modeling softwares for drawing chemical compounds as well as drug binding simulation

g. Study biological targets at molecular level, their 3D structure, binding energy and kinetics

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

a. Identify parameters and building blocks for drug molecules based on their biological target
b. Use information obtained from virtual screening of targets to design different drug molecules
c. Highlights the importance of simulation softwares in predicting drug target interactions to improve activity
d. Understanding the importance of continuous development of new drugs to overcome resistance tolerance and failure of therapy
e. Develop critical thinking and problem solving.

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

a. Communicate with colleges for studying biological targets using special softwares

b. Gain the spirit of working in groups and two-way discussion

c. Express ability to interpret data obtained by the team and make conclusions

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

a. Use the different concepts and procedures used for drug design to develop methods and platforms helping in design of new drug entities
b. Use results obtained from drug comparison at the biological level to improve patient as well as physician knowledge on the best drug selection and possible outcomes expected of the use
c. Demonstrating ability to work with others in teams.
d. Demonstrate ability to search and use the literature in both printed and electronic formats

## 6 Assessment instruments

| Assessment method | Mark |
|---|---|
| First exam | **20%** |
| Second exam | **20%** |
| Final exam | **40%** |
| Quizzes, reports, classroom questions | **20** |
| Total | **100** |

Make up exam well 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 be exceeded 15%. Students who exceeded the 15% limit without a medical or emergency excuse acceptable and approved by the Dean of the relevant college/faculty shall not be allowed to take the final exam and shall receive a mark of zero for the course. If the excuses were approved by the Dean, the number of absence should not be exceeded 20% limit otherwise 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) | Introduction to drug design and discovery | |
| (2) | Advanced Organic chemistry | |
| (3-4) | Structure and Mechanism | |
| (5-6)<br>1st Exam | Stereochemistry | 1st Exam<br>As per time table |
| (7-8) | Organic Reactions | |
| (9-10)<br>2nd exam | Study of the lead compound | 2nd exam<br>As per time table |
| (11-12) | Lead modification and lead optimization | |
| (13-15) | Drawing chemical compounds using computer software | |
| (15) | Concept of computer aided drug design | **Last lecture** |
| (16)<br>Final Exam | Final Exam | Final Exam Week |