جامعة الإسراء
ISRA UNIVERSITY

# COURSE Syllabus

# Course Name: Special topics in chemistry

# Course Number: 11014271

## General Course Information:

| | |
|---|---|
| Course title | Special topics in chemistry |
| Course number | 11014271 |
| Credit hours (theory, practical) | 3 |
| Contact hours (theory, practical) | (3 hrs.) per week |
| Prerequisites/corequisites | 11012241 |
| Academic Program | Bachelor in Chemistry |
| Program code | 01 |
| Awarding institution | Al-Isra university |
| Faculty | Science |
| Department | Chemistry |
| Level of course | fourth year |
| Academic year /semester | 2020/2021- First semester |
| Awarded qualification | Bachelor degree in Chemistry |
| Other department(s) involved in teaching the course | - |
| Language of instruction | English |
| Date of production/revision | |

## Course Coordinator:

**Coordinator's Name: Dr. Samer Al-Awaidah Office**
**No.: 4231**
**Office Phone:**
**Office Hours: 1-2 Sunday, 9:30-11 Monday, 2-3 Tuesday, 11-12:30 Wednesday.**
**Email:** Samerawaideh@yahoo.com

## Course Description:

Introduction in medicinal chemistry, kinetic parameters, structure and ADME, drug binding and intermolecular forces, metabolism: (phase 1 and phase 2), prodrug, and drug kinetic.

## Text Book: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Richard B. Silverman Mark W. Holladay, The Organic Chemistry of Drug Design and Drug, 3rd edition. 2014

## References: *Author(s), Title, Publisher, Edition, Year, Book website.*

## Course Educational Objectives (CEOs):

| | |
|---|---|
| **1.** | Understanding basic concepts, drug parts, and drug action . |
| **2.** | Understanding the behavior of drug in body and its relation with structure. |
| **3.** | Performing ADME properties of drug . |
| **4.** | Understanding metabolism biochemistry and its enzymes. |
| **5.** | Applying metabolism reactions and suggest the structure of metabolites. |
| **6.** | Understanding the meaning of binding strength and its relationship with intermolecular forces. |
| **7.** | Understanding the kinetic problems and solving it by using prodrug principles. |
| **8.** | Performing rates law calculations and calculate all kinetic parameters of drug inside body. |

## Intended Learning Outcomes (ILO's):

| | Intended Learning Outcomes (ILO's) | **Relationship to CEOs** | **Contribution to PLOs** |
|---|---|---|---|
| **A** | **Knowledge and Understanding:** | | |
| A1 | Student be able to interpret drug behavior in body based on its structure. | 1 | a |
| A2 | Student be able to understand the basics principles of metabolism. | 4 | a |
| **B** | **Intellectual skills:** | | |
| B1 | Student be able to solve problems related to kinetic parameters. | 8 | d |
| B2 | Student be able to drug behavior with writing its structure. | 2 | c |
| B3 | Student be able to solve problems related to drug ionization and its relation with absorption. | 2 | d |
| B4 | Student be able to expect the percentage of absorption and excretion of any drug depending on its structure. | 3 | d |
| B5 | Student be able to expect the metabolism pathways and the structure of metabolite. | 5 & 6 | d |
| B6 | Student be able to perform the reasons of using prodrug and the methods to convert it to a drug. | 7 | c |
| B7 | Student be able to perform the results of kinetic calculations and its relation with the structure. | 8 | c |

## Topic Outline and Schedule:

| Topic | Weeks | Achieved ILOs |
|---|---|---|
| **Chapter 1**<br>**Introduction:**<br>1.1 Drug discovery<br>1.2 Human body physiology | 1 | A1 |
| 1.3 ADME<br>1.4 Pharmacodynamic part<br>1.5 Pharmacokinetic part<br>1.7 Henderson equation<br>1.8 Functional groups and acid base properties | 2 | A1 &B1 |
| 1.9 Percent of ionization<br>1.10 Absorption and ionization<br>1.11 Bioavailability of oral drug | 3 | A1 |
| 1.12 Lepenski's rule<br>1.13 Structure and bioavailability | 4 | B1 |
| **Chapter 2:**<br>**ADME and structure**<br>2.1 Structure and distribution<br>2..2 Structure and protein binding | 5 | B2 |
| 2.3 Structure and elimination<br>2.4 Structure and excretion<br>2.5 Structure and bile elimination | 6 | B3 |
| **Chapter 3:**<br>**Drug receptor binding**<br>3.1 Intermolecular forces<br>3.2 Hydrogen bond donor and acceptor<br>3.3 Key and lock theory | 7 | B4 |
| 3.4 Drug and receptor binding complex and potency constant<br>3.5 Optical isomers, geometric isomers, stearic effect and binding.<br>3.6 Entropy cost and regidification | 8 | B5 |
| **Chapter 4:**<br>**Metabolism**<br>4.1 Phase 1 : oxidation<br>4.2 Phase 1 : reducion<br>4.3 Phase 1 : hydrolysis | 9 | B5 |
| 4.4 Phase 2<br>4.5 Metabolism and elemination | 10 | B5 |
| **Chapter 5:**<br>**Prodrug**<br>5.1 Uses of prodrug<br>5.2 Linked carrier prodrug<br>5.3 Precursor prodrug | 11 | B6 |

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| | | |
| 5.4 bioisoesterism | 12 | B6 |
| **Chapter 6:**<br>**Drug kinetic**<br>6.1 Volume of distribution<br>6.2 drug concentration , elimination rate constant . | 13 | B7 |
| 6.3 Elimination and exertion calculation | 14 | B7 |
| 6.4 kidney failure and dose calculation | | |
| **Final exam** | 16 | |

## Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Lectures

## Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

First Exam and second exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learningsystem.
- Examswillbe markedwithin72hoursandthemarkedexampaperswillbehandedtothestudents. F-

Available university services that support achievement in the course: **Labs,Library.**

## Required equipment:

## Assessment Tools implemented in the course:

□First WrittenExam.
□Second WrittenExam.
- ✓ Midterm Written Exam
- ✓ Final WrittenExam.
- ✓ Quizzes.
- ✓ Homework.
- □ IntegrativeProjects.
- □ CaseStudy.
- □ WrittenReports.
- ✓ Participation inLecture.
- □ Practice in theLab.
- □ IllustrativePresentations.
- □ OralExams.

## Program Learning Outcome (PLOs):

| **Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the () program will demonstrate** | |
|---|---|
| **a.** | Describe the fundamental scientific principles and theories across the four subfields of chemistry (Organic, inorganic, analytical and physical). |
| **b.** | Identify and confirm chemical compounds structures as well as determine chemical composition. |
| **c.** | Establish and concludes mechanisms of physical and chemical processes in addition to the ability of mastering qualitative and quantitative determination. |
| **d.** | Solve the scientific problems using different mechanisms and procedures based on critical thinking. |
| **e.** | Conduct scientific experiments in chemistry. |
| **f.** | Commitment and interest in lifelong learning, and collaborate effectively with other people in a team. |
| **g.** | Prepare logical, organized and concise written reports, and oral and poster presentations that effectively communicate chemical content to other scientists. |
| **h.** | Commitment to the ethical principles of chemical research. |
| **i.** | Find information about chemistry through databases and information |
| **j.** | Evaluation of calculations in chemistry experiments and information analysis using computer software. |
| **k.** | Demonstrate safety laboratory techniques. |

## Responsible Persons and their Signatures:

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|---|---|---|---|
| **Course Coordinator** | **Dr. Samer Al-Awaidah** | **Completed Date** | |
| | | **Signature** | **Dr. Samer Al-Awaidah** |

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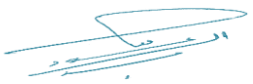
|---|---|---|---|
| **Received by** (Department Head) | **Dr. Alaa Al-Ma'abreh** | **Received Date** | |
| | | **Signature** |  |