

## Course Syllabus

|    |                                                      |                                                                                                                  |  |
|----|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--|
| 1  | Course title                                         | Pharmacokinetics                                                                                                 |  |
| 2  | Course number                                        | 1203475                                                                                                          |  |
| 3  | Credit hours                                         | 2 (theory)                                                                                                       |  |
|    | Contact hours (theory, practical)                    | 2 (theory)                                                                                                       |  |
| 4  | Prerequisites/corequisites                           | 1203741 (Biopharmaceutics)                                                                                       |  |
| 5  | Program title                                        | Pharmacy and PharmD                                                                                              |  |
| 6  | Program code                                         |                                                                                                                  |  |
| 7  | Awarding institution                                 | The University of Jordan                                                                                         |  |
| 8  | School                                               | Pharmacy                                                                                                         |  |
| 9  | Department                                           | Biopharmaceutics & Clinical Pharmacy                                                                             |  |
| 10 | Course level                                         | Undergraduate                                                                                                    |  |
| 11 | Year of study and semester (s)                       | 4 <sup>th</sup> , 2 <sup>nd</sup> semester                                                                       |  |
| 12 | Other department (s) involved in teaching the course |                                                                                                                  |  |
| 13 | Main teaching language                               | English                                                                                                          |  |
| 14 | Delivery method                                      | X Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online                   |  |
| 15 | Online platforms(s)                                  | <input type="checkbox"/> Moodle   X Microsoft Teams <input type="checkbox"/> Skype <input type="checkbox"/> Zoom |  |
| 16 | Issuing/Revision Date                                | Oct, 08, 2023                                                                                                    |  |

### 17 Course Coordinator: Mutasim Al-Ghazawi

Name: Dr. Mutasim Al-Ghazawi, Prof.

Contact hours:

1- Sun, Tue ((12:30-13:30)

2- Mon, Wed ((10:30-11:30)

Office number: 138

Phone number: 23352

Email :alghazam@ju.edu.jo

### 18 Other instructors:

## 19 Course Description:

Study of the pharmacokinetic concepts, terminology, models, factors affecting drug absorption, distribution, metabolism, excretion and its importance in drug activities and side effects. Emphasis will be placed upon the prediction of plasma levels of drugs under varying conditions applying different pharmacokinetic parameters.

## 20 Course aims and outcomes:

### A. Aims:

- B. To understand and estimate pharmacokinetic parameters.
- C. To predict concentrations at different times.
- D. To design dosing regimens by relating plasma concentration of drugs to their pharmacological and toxicological action,
- E. To understand the concept of therapeutic drug monitoring.
- F. To design bioequivalence studies.
- G. To evaluate the results of bioequivalence studies.

## B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

| Disriptors   | CLO No. | SLOs of the program (PLOs)                                                                                                                                 | Learner | Care giver | Professional |
|--------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|--------------|
|              |         | SLOs of the course (CLOs)                                                                                                                                  |         |            |              |
| Knowledge    | K1      | <b>To describe</b> absorption, distribution, metabolism, and excretion (ADME) processes in pharmacokinetics                                                |         |            |              |
|              | K2      | <b>To explain</b> what is meant by the order of a reaction and <b>compare</b> and contrast a first-order and a zero-order process                          |         |            |              |
|              | K3      | <b>To describe</b> the physiological determinants of the primary pharmacokinetic parameters of clearance and volume of distribution.                       |         |            |              |
|              | K4      | <b>To identify</b> different types of pharmacodynamic models                                                                                               |         |            |              |
|              | K5      | <b>To determine</b> primary and secondary pharmacokinetic parameters from concentration-time data.                                                         |         |            |              |
|              | K6      | <b>To understand</b> the concept of bioequivalence and the different guidelines for its evaluation                                                         |         |            |              |
| Skills       | S1      | <b>To design and monitor</b> a pharmacokinetically-based dosage regimen for an individual patient.                                                         |         |            |              |
|              | S2      | <b>To formulate and asses</b> the effect of both dose and elimination half-life on the duration of activity                                                |         |            |              |
|              | S3      | <b>To Evaluate</b> bioequivalence according to the different guidelines                                                                                    |         |            |              |
| Competencies | C1      | <b>To apply</b> pharmacokinetic concepts to a particular drug therapy to satisfy the trust given to the profession by patients and physicians.             |         |            |              |
|              | C2      | <b>To lead</b> any Modification in a dosage regimen for a patient based on the physiological changes brought about by disease or concomitant drug therapy. |         |            |              |
|              | C3      | To <b>show</b> responsibility, accountability and commitment by complying with tutor's instructions and relevant university regulations                    |         |            |              |

## 21. Topic Outline and Schedule:

| Week | Lecture | Topic                                                                         | Teaching Methods*/platform | Evaluation Methods** | References                   |
|------|---------|-------------------------------------------------------------------------------|----------------------------|----------------------|------------------------------|
| 1    | 1.1     | Introduction                                                                  | Face-to-Face               | Exams, Quizzes       | Shargel                      |
|      | 1.2     | Introduction                                                                  | Face-to-Face               | Exams, Quizzes       | Shargel                      |
| 2    | 2.1     | 1. The one-compartment open model with an intravenous bolus dose; plasma data | Face-to-Face               | Exams, Quizzes       | Shargel<br>Excel simulations |
|      | 2.2     | 2. The one-compartment open model with an intravenous bolus dose; plasma data | Face-to-Face               | Exams, Quizzes       | Shargel<br>Excel simulations |
| 3    | 3.1     | The one-compartment open model with an intravenous bolus dose; Case studies   | Face-to-Face               | Exams, Quizzes       | Shargel<br>Excel simulations |
|      | 3.2     | The one-compartment open model with an intravenous bolus dose; urinary data   | Face-to-Face               | Exams, Quizzes       | Shargel<br>Excel simulations |
| 4    | 4.1     | The one-compartment open model with an intravenous infusion                   | Face-to-Face               | Exams, Quizzes       | Shargel<br>Excel simulations |

|   |     |                                                                            |              |                |                                  |
|---|-----|----------------------------------------------------------------------------|--------------|----------------|----------------------------------|
|   | 4.2 | The one-compartment open model with an intravenous infusion                | Face-to-Face | Exams, Quizzes | Shargel<br><br>Excel simulations |
| 5 | 5.1 | The one-compartment open model with First-order absorption                 | Face-to-Face | Exams, Quizzes | Shargel<br><br>Excel simulations |
|   | 5.2 | The one-compartment open model with First-order absorption                 | Face-to-Face | Exams, Quizzes | Shargel                          |
| 6 | 6.1 | The one-compartment open model with First-order absorption-Urinary data    | Face-to-Face | Exams, Quizzes | Shargel                          |
|   | 6.2 | Multiple dosing-Principle of superposition                                 | Face-to-Face | Exams, Quizzes | Shargel                          |
| 7 | 7.1 | The one-compartment open model with multiple dosing kinetics-IV            | Face-to-Face | Exams, Quizzes | Shargel                          |
|   | 7.2 | The one-compartment open model with multiple dosing kinetics-IV            | Face-to-Face | Exams, Quizzes | Shargel                          |
| 8 | 8.1 | The one-compartment open model with multiple dosing kinetics-Extravascular | Face-to-Face | Exams, Quizzes | Shargel                          |
|   | 8.2 | Designing dosing regimens                                                  | Face-to-Face | Exams, Quizzes | Shargel                          |

|    |      |                                                                |              |                |         |
|----|------|----------------------------------------------------------------|--------------|----------------|---------|
| 9  | 9.1  | Designing dosing regimens                                      | Face-to-Face | Exams, Quizzes | Shargel |
|    | 9.2  | Dosage adjustment in renal failure and hepatic dysfunction     | Face-to-Face | Exams, Quizzes | Shargel |
| 10 | 10.1 | Dosage adjustment in renal failure and hepatic dysfunction     | Face-to-Face | Exams, Quizzes | Shargel |
|    | 10.2 | The two-compartment open model with intravenous administration | Face-to-Face | Exams, Quizzes | Shargel |
| 11 | 11.1 | The two-compartment open model with intravenous administration | Face-to-Face | Exams, Quizzes | Shargel |
|    | 11.2 | Non-linear pharmacokinetics                                    | Face-to-Face | Exams, Quizzes | Shargel |
| 12 | 12.1 | Non-linear pharmacokinetics                                    | Face-to-Face | Exams, Quizzes | Shargel |
|    | 12.2 | Non-linear pharmacokinetics                                    | Face-to-Face | Exams, Quizzes | Shargel |
| 13 | 13.1 | Non-linear pharmacokinetics                                    | Face-to-Face | Exams, Quizzes | Shargel |
|    | 13.2 | Pharmacodynamics                                               | Face-to-Face | Exams, Quizzes | Shargel |
| 14 | 14.1 | Pharmacodynamics                                               | Face-to-Face | Exams, Quizzes | Shargel |
|    | 14.2 | 3. Bioequivalence                                              | Face-to-Face | Exams, Quizzes | Shargel |



|    |      |                             |              |                |                     |
|----|------|-----------------------------|--------------|----------------|---------------------|
| 15 | 15.1 | 4. Bioequivalence           | Face-to-Face | Exams, Quizzes | FDA & EMA Guideline |
|    | 15.2 | Therapeutic Drug Monitoring | Face-to-Face | Exams, Quizzes |                     |

## 22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

| Evaluation Activity | Mark | Topic(s)                                                    | Period (Week) | Platform |
|---------------------|------|-------------------------------------------------------------|---------------|----------|
| Self-Assessment     | 5    | Introduction & one comp. IV bolus                           | 4             |          |
| Self-Assessment     | 5    | The one-compartment open model with an intravenous infusion | 5             |          |
| Midterm             | 30   | All material up to the end of 6 <sup>th</sup> week          | 7-8           |          |
| Quiz                | 10   | Two-Comp model                                              | 12            |          |
| Final               | 50   | All material                                                | 16            |          |

## 23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform...etc):

internet connection, smart device or computer

## 24 Course Policies:

A- Attendance policies:

Attendance: Mandatory.

**First warning** – with 3 absences

**Last warning** – with 4 absences

Failing in the subject – with 5 absences

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

Will result in zero achievement unless health report or other significant excuse is documented.

C- Health and safety procedures:

NA



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

The participation, the commitment of cheating will lead to applying all following penalties together

- 1) Failing the subject he/she cheated at
- 2) Failing the other subjects taken in the same course
- 3) Not allowed to register for the next semester. The summer semester is not considered as a semester

#### E- Grading policy:

Exams and Quizzes.

|                        |            |
|------------------------|------------|
| Mid Exam:              | 30 points  |
| Quizzes and Assessment | 20 points  |
| Final Exam:            | 50 points  |
| Total                  | 100 points |

#### F- Available university services that support achievement in the course:

- 1) Electronic library
- 2) Access Pharmacy
- 3) Internet
- 4) Pharmacokinetics Computer Lab.
- 5) Pharmacokinetic Simulation (software)

## 25 References:

#### A- Required book(s), assigned reading and audio-visuals:

- 1) Applied biopharmaceutics and pharmacokinetics, Shargel and Yu, 8<sup>th</sup> edition, 2022

#### B- Recommended books, materials and media:

- 1) Basic pharmacokinetics by Sunil S. Jambhekar and Philip J. Breen 2<sup>nd</sup> edition, 2012
- 2) Basic Pharmacokinetics and Pharmacodynamics\_ An Integrated Textbook and Computer Simulations by Sara E. Rosenbaum, 2<sup>nd</sup> edition, 2016
- 3) A First Course in Pharmacokinetics and Biopharmaceutics



<http://www.boomer.org/c/p1/>

4) Basic pharmacokinetics

<https://www.boomer.org/c/p4/index.php?Loc=Visitor>

**26 Additional information:**

|  |
|--|
|  |
|--|

|                                                                                        |
|----------------------------------------------------------------------------------------|
| Name of Course Coordinator: Mutasim A. Al-Ghazawi Signature: ----- Date: Oct, 10, 2023 |
| Head of Curriculum Committee/Department: ----- Signature: -----                        |
| Head of Department: ----- Signature: -----                                             |
| Head of Curriculum Committee/Faculty: ----- Signature: -----                           |
| Dean: ----- Signature: -----                                                           |