



UNIVERSIDAD AUTÓNOMA DE MADRID

33198 - INTERACTION DRUG-ORGANISM

This is a non-sworn translation intended to provide students with information about the course

Information of the subject

Code - Course title: 33198 - INTERACTION DRUG-ORGANISM

Degree: 721 - Máster en Investigación Farmacológica (2018)

Faculty: 106 - Facultad de Medicina

Academic year: 2023/24

1. Course details

1.1. Content area

The biological targets with which drugs interact will be analyzed, reviewing the new classifications of pharmacological receptors and their quantification by pharmacological, molecular and genetic criteria, as well as the molecular basis of drug-receptor interaction. The mechanisms of action of drugs at the cellular level will be extensively studied, with special emphasis on the signaling pathways involved, both at the cellular and molecular levels.

In addition, the pharmacokinetic aspects will also be analyzed, both at a qualitative-physiological level (absorption, distribution, metabolism and elimination processes), and quantitative level (including compartmental and non-compartmental kinetic analysis). On the other hand, the pharmacogenetic bases that underlie the individual responses to drugs will be studied, analyzing the genetic polymorphisms of the metabolizing enzymes, the transporters, the receptors and other pharmacological targets. The bases of the differential response to drugs associated with other physiological and pathological factors (age, sex, pregnancy, environmental factors, previous pathologies, etc) will also be evaluated. Finally, the main mechanisms of production of adverse effects and drug interactions, from the molecular to the clinical aspects will also be identified. The practical part will be carried out in the form of Seminars that will be prepared by the students and where problems and cases will be discussed, and which will help to illustrate and complete the theoretical contents.

1.2. Course nature

Compulsory

1.3. Course level

Máster (EQF/MECU 7)

1.4. Year of study

1

Secure Verification Code:		Date:	26/05/2024	1/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	1/6	

1.5. Semester

First semester

1.6. ECTS Credit allotment

2.0

1.7. Language of instruction

English.

1.8. Prerequisites

Knowledge of Biochemistry and Molecular Biology at the undergraduate level in Biochemistry, Biology, Chemistry, Medicine, Pharmacy, Veterinary Medicine or equivalent degree.
To possess a level of English that allows the student to understand the lectures and read the scientific literature (level B2 or similar).

1.9. Recommendations

English C1 is recommended.

1.10. Minimum attendance requirement

Minimum attendance 80% (theoretical and seminars/resolution of problems).

1.11. Subject coordinator

Maria Francisca Cano Abad

<https://autoservicio.uam.es/paginas-blancas/>

1.12. Competences and learning outcomes

1.12.1. Competences

BASIC AND GENERAL

GE1 - Acquire the knowledge, skills and abilities necessary to carry out an innovative quality research in Pharmacology

CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context

CB8 - The ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments

CB10 - Posses the learning skills that will allow the students to continue studying in a way that will be largely self-directed or autonomous.

TRANSVERSAL

There are no data

SPECIFIC

ES-1 - Know the physiological bases of Pharmacology, the main pharmacological groups and the main known and potential therapeutic targets: receptors, transporters, proteins, genes, and others, which will serve as a starting point in pharmacological research and innovation.

ES-2 - Know the potential of new biological, gene and cell therapies.

ES-3 - Know the basic aspects about the design and obtaining new drugs, both at a chemical and biotechnological level, as well as the scientific, ethical and regulatory aspects that condition it.

1.12.2. Learning outcomes

Through this subject, the student will acquire a series of basic knowledge in the field of drug

Secure Verification Code:		Date:	26/05/2024	2/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	2/6	

research, including the physiological and pharmacological bases of therapeutics, the identification of potential therapeutic targets and new perspectives in pharmacological therapy..

1.12.3. Course objectives

BASIC AND GENERAL

GE1 - Acquire the knowledge, skills and abilities necessary to carry out an innovative quality research in Pharmacology

CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context

CB8 - The ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments

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ES-3 - Know the basic aspects about the design and obtaining new drugs, both at a chemical and biotechnological level, as well as the scientific, ethical and regulatory aspects that condition it.

1.13. Course contents

1. Pharmacokinetics (2 h)

- 1.1. LADME processes. Drug absorption. Step through biological membranes.
- 1.2. Drug delivery.
- 1.3. Drug biotransformation.
- 1.4. Elimination of drugs.

2. Pharmacodynamics (4 h)

- 2.1. Chemical basis of pharmacological interactions: The dose-response curve.
- 2.2. Molecular targets of drugs and associated signaling pathways. Classification of drug receptors:
 - Targets I: Ionic channels
 - Targets II: ionotropic and metabotropic receptors
 - Targets III: Receptors with enzymatic activity and nuclear receptors
 - Targets IV: Enzymes and transporters

3. Adverse effects of drugs (1 h)

- 3.1. General mechanisms of production of drug adverse reactions.
- 3.2. Drug interactions.

4. Individual responses to drugs. Pharmacogenetics (3 h)

- 4.1. Drug administration in special physiological situations (children, elderly, pregnancy, illness)
- 4.2. Pharmacogenetics: Definition and historical development. Basic concepts of genetics applied to pharmacogenetics. Polymorphisms in genes of transporters, receptors and drug targets.
- 4.3. Polymorphisms in genes of metabolizing enzymes
- 4.4. Polymorphisms in genes of transport enzymes

Secure Verification Code:		Date:	26/05/2024	3/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	3/6	

4.5. Polymorphisms in receptors and drug targets.

SEMINARS/RESOLUTION OF PROBLEMS (6 h)

1. Pharmacokinetics (2h)
2. Quantifying drug-receptor interaction (2h)
3. Pharmacogenetics (2h)

1.14. Course bibliography

- **Goodman and Gilman's: The Pharmacological Basis of Therapeutics.** LL Brunton, B Chabner, B Knollman, 13th Edition, McGraw-Hill, 2017
- **Rang and Dale's. Pharmacology, 9th Edition, ELSEVIER.** James Ritter, Rod Flower, Graeme Henderson, Yoon Kong Loke, David MacEwan, Humphrey Rang. eBook ISBN: 9780702074462. Paperback ISBN: 9780702074486
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- **Velázquez. Farmacología Básica y Clínica.** Lorenzo P, Moreno A, Leza JC, Lizasoain I, Moro MA. 19ª Edición. Panamericana, 2010.
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- Edición española: **Principios de Farmacología.** David E. Golan, Armen H. Tahjian, Ehrin J. Armstrong, April W. Armstrong. 5ª Edición, Wolters Kluwer/Lippincott, 2012
-
- Edición española: **Farmacología.** Michelle A. Clark, Richard Finkel, José A. Rey, Karen Whallen, 5ª Edición, Wolters Kluwer/Lippincott, 2012
-
- **Farmacología Humana.** J Flórez, JA Armijo y A Mediavilla, 5ª Edición, Elsevier 2008

2. Teaching-and-learning methodologies and student workload

2.1. Contact hours

TOTAL HOURS OF INTERACTION DRUG-ORGANISM			
		Nº of Hours	%
ACTIVITIES	LECTURES	11	22
	SEMINARS	6	12
	EXAMS	1	2
	TUTOR	1	2
STUDENT WORK		31	62
TOTAL WORK LOAD		50	100

2.2. List of training activities

LECTURES

Lectures will provide organized and structured information elaborated by the Lecturer. The lecture content will include the knowledge already established or in very advanced situation, obtained from textbooks, bibliographic reviews, and relevant original papers. Lectures will take 50 minutes, using audiovisual presentations that can be available in the teaching web page.

SEMINARS/RESOLUTION OF PROBLEMS

Seminars will provide complementary information to Lectures, including practical exercises and

Secure Verification Code:		Date:	26/05/2024	4/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	4/6	

problems to stimulate active student participation, under the supervision of a lecturer. During the Seminars, original research papers, describing classical pharmacological experiments or more recent scientific findings, as well as clinical studies, will be discussed in order to stimulate critical and rigorous scientific analysis by the students. Seminars will take 60 minutes. The content of every Seminar will be previously available in the teaching page web, and the students must work previously on them. Therefore, during the Seminar, the students will expose and discuss the provided solutions. Moreover, the students will answer and review several multiple choice questions, similar to those of the Objective evaluation test.

3. Evaluation procedures and weight of components in the final grade

3.1. Regular assessment

The final mark (for both ordinary and extraordinary evaluations) will be the result of the marks obtained in the final exam (70%) and in the continuous evaluations (30%).

IMPORTANT: To pass the subject it is compulsory to attend 80 % of the scheduled activities and to have a minimum score of 5/10 points in the final exam. If the student does not pass the exam in the ordinary call, he/she will need to attend the extraordinary exam.

3.1.1. List of evaluation activities

Final exam characteristics (70%)

The exam (for both the ordinary and the extraordinary call) will be mainly based on multiple choice questions and it can also include short questions. The type and date of exam will be announced previously by the coordinator.

Continuous evaluation (30%). Includes:

- Attendance to classes and seminars (10%)
- Exercises (20%). These exercises will be performed during the classroom or non-face-to-face through the Moodle platform. These exercises may have different format depending on the lecturer. They may include: short questions, multiple choice or true/false questions, problems or simulations. The lecturer will announce previously the type and the date of each exercise.

3.2. Resit

The same requirements as for the Regular assessment apply in this case.

3.2.1. List of evaluation activities

The same list of evaluation activities as for the regular assessment apply in this case.

4. Proposed workplan

Schedule will be uploaded in Moodle: <https://moodle.uam.es/>

Week	Contents	Contact hours	Independent study time
1	Theoretical classes	6	8

Secure Verification Code:		Date:	26/05/2024	5/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	5/6	

<u>Week</u>	<u>Contents</u>	<u>Contact hours</u>	<u>Independent study time</u>
2	Theoretical classes Seminar 1	4 2	8
3	Seminar 2 Tutorial	2 1	8
4	Seminar 3	2	8

Secure Verification Code:		Date:	26/05/2024	6/6
Signed by:	<i>This teaching guide will not be signed by CSV until the closing of the proceedings</i>			
URL Verification:		Page:	6/6	