



COURSE TITLE: Interaction Drug Organism  
Code: 32506  
Place: Department of Pharmacology. School of Medicine  
Degree: Master in Pharmacological Research  
Level: Master  
Type: Compulsory subject  
Credit allotment: 2 ECTS  
Academic course: 2017-2018

## 1. COURSE TITLE

### INTERACTION DRUG ORGANISM

#### 1.1. Course number

32506

#### 1.2. Content area

Basic pharmacological concepts

#### 1.3. Course type

Compulsory subject

#### 1.4. Course level

Master Degree

#### 1.5. Year

First

#### 1.6. Semester

First semester

#### 1.7. Imparting language

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 read literature of reference.

#### 1.9. Minimum attendance requirement

It will be mandatory to attend at least 80% of the sessions.



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## 1.10. Faculty

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**Contact hours:** Previous e-mail appointment is required

### 1.11. Course objectives

1. To get an overview of pharmacology from a molecular perspective.
2. To obtain essential knowledge of the principles of drug action.
3. To know the most current experimental approaches to study the mechanisms of action of drugs, at the molecular and cellular level, and to identify new therapeutic targets.
4. To understand how different drug families show biological activity based on their chemical structure
5. To acquire a general understanding of the various pharmacokinetic processes
6. To understand the general mechanisms of production of drug adverse reactions as well as the production of drug-drug interactions.
7. To acquire basic concepts of pharmacogenetics and its importance in drug response.
8. To develop communication skills by presenting a problem or a drug case in a later discussion at the seminar.

### 1.12. Course contents

General aspects of the pharmacology, but essential to acquire the necessary skills to enable the students to follow the teachings of either specialization modules offered, will be studied. The program will consist of a theoretical and a practical part. The theory will cover advanced aspects of pharmacokinetics, the main biological targets with which drugs interact, adverse effects, drug interactions and pharmacogenetics concepts. The practical part will take place in the form of seminars to be prepared by the students and where they will discuss issues and cases that will illustrate and supplement the contents of the theoretical part.

#### 1. Pharmacokinetics (2 h)



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- 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

## **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
- 4.5. Polymorphisms in genes of transport enzymes.
- 4.6. Polymorphisms in receptors and drug targets.

## **Practical program (6 h)**

1. Calculation of pharmacokinetic parameters (maximum concentration, dosing interval, half-life, clearance, steady-therapeutic range and therapeutic guidelines). Computer simulations.
2. Calculation of basic parameters in drug-receptor interaction (maximum effect and EC50, affinity, potency) and the effects of the antagonists (PA2).
3. Identification of polymorphisms, primer design and reading results: identification of polymorphisms \* 2, \* 3A, B and C of TPMT enzyme and MutationDiscovery HapMap, search frequency of this mutation and



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design of primers. Identification of the mutation in 5 samples (direct sequencing and d-HPLC).

4. Influence of CYP2C9 and VKORC in kinetics and dynamics of acenocumarol (AUC, CL, INR in 15 patients).

### 1.13. Course bibliography

- **Goodman and Gilman´s: The Pharmacological Basis of Therapeutics.** LL Brunton, B Chabner, B Knollman, 12th Edition, McGraw-Hill, 2011.
- **Spanish Edition: Las bases farmacológicas de la terapéutica. Goodman Gilman.** LL Brunton, B Chabner, B Knollman, 12ª Edición. McGraw-Hill Interamericana, 2012.
- **Farmacología Humana.** J Flórez, JA Armijo y A Mediavilla, 5ª Edición, Elsevier 2008.
- **Rang and Dale´s. Pharmacology.** HP Rang, MM Dale, JM Ritter, RJ Flower, G Henderson, 7th Edition, Elsevier, 2012.
- **Spanish Edition: Rang y Dale. Farmacología** HP Rang, MM Dale, JM Ritter, RJ Flower, G Henderson, 7ª Edición, Elsevier, 2012.
- **Fundamentos de Farmacología Básica y Clínica.** Fernández-Alfonso MS, Gallo M. Ed. Medica Panamericana, 2013.
- **Velázquez. Farmacología Básica y Clínica.** Lorenzo P, Moreno A, Leza JC, Lizasoain I, Moro MA. 18ª Edición. Panamericana, 2008.

## 2. Teaching methodology

**Lectures: 10 hours**, in the form of lectures on topics included in the program.

**Seminars: 6 hours**, exhibition by students of problems and case studies prepared by them and included in the program. It will be followed by group discussions supervised by the tutor.



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### 3 Student workload

		N° of hours	Percentage
Contact hours	Lectures	10 h	18 h (36%)
	Practical classes		
	Tutorials scheduled throughout the semester	1 h	
	Seminars	6 h	
	Other (specify by adding as many rows as activities have been included in the teaching methodology)	--- h	
	Final examination	1 h	
Independent study time	Practical activities	--- h	32 h (64 % )
	Weekly study	26 h	
	Exam Preparation	6 h	
<b>Total charge of working hours: 25 hours x 2 ECTS</b>		<b>50</b>	

### 4 Evaluation procedures and weight of components in the final grade

- Continuous evaluation based on information obtained through personal tutorials, active participation in classes and seminars and skills and interest shown in class: 10%.
- Final written exam: 70%
- Evaluation of the preparation and presentation of specific topics and discussion after their presentation by students in seminars: 20%



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## 5 Course calendar

Week	Contents	Contact hours	Independent study time
1	Theoretical classes (1-5) Seminars 1 y 2	8	13
2	Theoretical classes (6-10) Seminars 3 y 4	8	13
	Tutor	1	
	Preparation of exam and exam	1	6