



UNIVERSIDAD AUTÓNOMA DE MADRID

## 33199 - PHYSIOLOGICAL BASIS OF THERAPEUTICS

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

### Information of the subject

**Code - Course title:** 33199 - PHYSIOLOGICAL BASIS OF THERAPEUTICS

**Degree:** 721 - Máster en Investigación Farmacológica (2018)

**Faculty:** 106 - Facultad de Medicina

**Academic year:** 2023/24

### 1. Course details

#### 1.1. Content area

The physiological bases of body function to understand the mechanism of action of the different groups of drugs, and their pharmacological therapeutic and secondary effects will be addressed. The subject will provide the student with advanced knowledge of human physiology and physiopathology, analyzing the functions of the different physiological systems at its different levels of organization (including the cellular and molecular levels) and the processes of integration and regulation that participate in homeostasis. Special emphasis will be taken on the study of the nervous and cardiovascular systems, which will be subject of particular attention in the specialization modules.

#### 1.2. Course nature

Compulsory

#### 1.3. Course level

Máster (EQF/MECU 7)

#### 1.4. Year of study

1

#### 1.5. Semester

First semester

#### 1.6. ECTS Credit allotment

4.0

#### 1.7. Language of instruction

English

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## 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

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## 1.10. Minimum attendance requirement

Attendance to seminars is compulsory

## 1.11. Subject coordinator

Javier Blanco Rivero

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

## 1.12. Competences and learning outcomes

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### 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 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

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## 1.13. Course contents

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The course is divided into the following thematic blocks:

**I. Cellular Physiology**

1. Homeostasis. Transport through membrane.
2. Intercellular communication
3. Resting membrane potential
4. Action potential
5. Synaptic transmission
6. Skeletal and smooth muscle contraction

**II. Physiology of the nervous system**

7. General organization of the nervous system
8. Motor nervous system: reflexes and voluntary movements
9. Somatosensory system: touch and pain
10. Special senses I
11. Special senses II
12. Language, learning and memory
13. Seminar on thermoregulation

**III. Blood and Immune System Physiology**

14. Blood composition and Hematopoiesis
15. Erythrocytes
16. Hemostasis
17. Innate immunity
18. Adaptative Immunity
19. Seminar on Blood and Immune System

**IV. Cardiovascular Physiology**

20. Introduction to cardiovascular system. Cardiac muscle
21. Cardiac Electric Activity and Cardiac mechanics
22. Cardiac Function
23. Systemic circulation
24. Hemodynamics and microcirculation
25. Cardiac output. Venous return
26. Blood pressure regulation.
27. Seminar on cardiovascular function

**V. Physiology of the respiratory system**

28. Structure and function of the respiratory system
29. Mechanics of ventilation and pulmonary resistances
30. Pulmonary ventilation and perfusion
31. Exchange and transport of gases
32. Seminar on regulation of respiration and respiratory adaptations to exercise (2h)

**VI. Physiology of the excretory system**

33. Renal function. Glomerular filtration and renal blood flow
34. Tubular processes: reabsorption and secretion
35. Renal control of extracellular volume and osmolarity
36. Renal control of plasma pH
37. Seminar of renal function

**VII. Physiology of the digestive system**

38. Introduction to digestive function. Mastication, salivation and deglutition
39. Stomach motility and secretion
40. Small and large intestine motility and secretion.
41. Digestion and absorption of carbohydrates and proteins
42. Digestion and absorption of lipids

**VIII. Endocrine Physiology**

43. Hypothalamus-pituitary axis

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- 44. Hormones of the suprarenal glands
- 45. Sex Hormones
- 46. Hormones of the thyroid and parathyroid glands
- 47. Endocrine pancreas
- 48. Endocrine Seminar (2h)

### 1.14. Course bibliography

- Boron WF y Boulpaep, EL "Medical Physiology" (2ª ed.rev) Elsevier- Saunders, 2012
- Constanzo, Linda S. Fisiología. 6ª Ed. Elsevier Saunders, 2018.
- Guyton, AC y Hall, JE, "Tratado de Fisiología Médica" 13ª ed. Elsevier-Saunders, 2016
- Silverthorn, Human Physiology: An Integrated Approach, 7th Edition
- Thibodeau-Patton, "Anatomía y Fisiología", 6ª edición. Elsevier Mosby, 2007.
- Tórtora & Derrickson, "Principios de Anatomía y Fisiología", 15ª edición. Oxford University Press, 2018.
- Tresguerres, JAF y col., "Fisiología Humana" 4ª ed .McGraw-Hill, 2011.

## 2. Teaching-and-learning methodologies and student workload

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### 2.1. Contact hours

TOTAL HOURS OF PHYSIOLOGICAL BASIS OF THERAPEUTICS			
		Nº OF HOURS	%
Activities	Lectures	40	40%
	Seminars	8	8%
	Exams	3	3%
Student work	Weekly study and exam preparation	49	49%
Total work load		100	100%

### 2.2. List of training activities

#### LECTURES

The teacher will expose the theoretical fundamentals of each topic. Audiovisual material will be used.

#### SEMINARS/RESOLUTION OF PROBLEMS

Monographic sessions on specific aspects of the course contents, assigned tasks to the student or case / problem approach in which the student must relate and integrate the acquired knowledge in this course.

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

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### 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 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

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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 the marks obtained in activities performed either during the classes or in 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 content of lectures and other teaching activities will be evaluated continuously through on-site and/or online activities; The final exam will include multiple choice questions and/or open questions

### 4. Proposed workplan

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

Week	Contents	Contact hours	Independent study time
4	CELLULAR PHYSIOLOGY	6	6
5	NERVOUS SYSTEM PHYSIOLOGY	7	7
5	BLOOD AND IMMUNE SYSTEM PHYSIOLOGY	6	6
6	CARDIOVASCULAR SYSTEM PHYSIOLOGY	8	8
6-7	RESPIRATORY SYSTEM PHYSIOLOGY	6	6
7-8	EXCRETORY SYSTEM PHYSIOLOGY	5	5
8	DIGESTIVE SYSTEM PHYSIOLOGY	5	5
9-10	ENDOCRINE SYSTEM PHYSIOLOGY	7	7
12	FINAL EXAM	3	3

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