



## 33199 - PHYSIOLOGICAL BASIS OF THERAPEUTICS

### Syllabus Information

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

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

**Faculty:** 106 - Facultad de Medicina

**Academic year:** 2019/20

### 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 (MECES 3)

#### 1.4.Year of study

1

#### 1.5.Semester

First semester

#### 1.6.ECTS Credit allotment

4.0

#### 1.7.Language of instruction

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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).

### 1.10.Minimum attendance requirement

Minimum assistance 80% (theoretical and practical classes)

### 1.11.Faculty data

Dr. Silvia Arribas Rodríguez (coordinator)

Physiology Department, C-22

Medicine Faculty

Telephone: 914976995

E-mail: [silvia.arribas@uam.es](mailto:silvia.arribas@uam.es)

Dr. Javier Blanco Rivero

Physiology Department, C-13

Medicine Faculty

Telephone: +34 91 497 5446

E-mail: [javier.blanco@uam.es](mailto:javier.blanco@uam.es)

Dr. Miriam Granado García

Physiology Department, C-25

Medicine Faculty

Telephone: +34 91 497 6974

E-mail: [miriam.granado@uam.es](mailto:miriam.granado@uam.es)

Dr. M<sup>a</sup> Carmen Iglesias de la Cruz

Physiology Department, C-23

Medicine Faculty

Telephone: +34 91 497 6973

E-mail: [mc.cruz@uam.es](mailto:mc.cruz@uam.es)

Dr. Ignacio Monedero Cobeta

Physiology Department, C-22

Medicine Faculty

Telephone: +34 91 497 6995

E-mail: [ignacio.monedero@uam.es](mailto:ignacio.monedero@uam.es)

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

### 1.12.Competences and learning outcomes

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#### 1.12.1.Competences

#### BASIC AND GENRAL

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

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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.

### 1.13.Course contents

The course is divided into the following thematic blocks:

- I. **Cellular physiology**
- II. **Nervous system physiology**
- III. **Blood and immune system physiology**
- IV. **Cardiovascular system physiology**
- V. **Respiratory system physiology**
- VI. **Excretory system physiology**
- VII. **Digestive system physiology**
- VIII. **Endocrine system physiologyl.**

## CELLULAR PHYSIOLOGY

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

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## II. NERVOUS SYSTEM PHYSIOLOGY

8. General organization of the nervous system. Autonomic nervous system.
9. Motor nervous system: reflexes and voluntary movement.
10. Somatosensory system: touch and pain.
11. Special senses: vision, hearing, olfaction and taste.
12. Language, learning and memory.
13. Emotions. Sleep.

**Seminar. S-1:** Temperature Control (1h).

## III. BLOOD AND IMMUNE SYSTEM PHYSIOLOGY

14. Blood. Hematopoiesis.
15. Erythrocytes.
16. Hemostasis.
17. Innate immunity.
18. Acquired immunity.

## IV. CARDIOVASCULAR SYSTEM PHYSIOLOGY

19. Introduction to cardiovascular system. Cardiac muscle.
20. Cardiac electrical activity and cardiac mechanics.
21. Cardiac function.
22. Systemic circulation.
23. Capillary circulation. Special circulations
24. Blood pressure regulation

**Seminar. S-2:** Cardiovascular system regulation (1h).

## V. RESPIRATORY PHYSIOLOGY

25. Structure and functions of the respiratory system.
26. Mechanics of ventilation: Spirometry
27. Pulmonary ventilation and perfusion.
28. Exchange and transport of gases.

**Seminar. S-3:** Respiratory regulation (2h).

## VI. EXCRETORY SYSTEM PHYSIOLOGY

29. Renal function. Glomerular filtration and renal blood flow.
30. Tubular processes: reabsorption and secretion.
31. Countercurrent mechanism. Bidirectional transport. Plasma clearance.
32. Renal control of extracellular volume and osmolarity.
33. Renal control of plasma pH.

**Seminar. S-4:** Renal function (1h).

## VII. DIGESTIVE SYSTEM PHYSIOLOGY

34. Introduction to digestive function. Mastication, salivation and deglutition.

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35. Stomach motility and secretion.
36. Small and large intestine motility and secretion.
37. Digestion and nutrients absorption. Liver Function

#### VIII. ENDOCRINE SYSTEM PHYSIOLOGY

38. Hypothalamus-pituitary axis.
39. Thyroid hormones.
40. Regulation of calcium metabolism.
41. Endocrine pancreas.
22. Suprarenal gland.
43. Sex hormones.

**Seminar. S-5:** Intake and weight regulation (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

##### 2.1.Contact hours

TOTAL HOURS OF PHYSIOLOGICAL BASIS OF THERAPEUTICS			
		Nº OF HOURS	%
Activities	Lectures	43	43%
	Seminars	7	7%
	Exams	3	3%
Student work	Weekly study and exam preparation	50	50%
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.

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### 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 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

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

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

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Week	Contents	Contact hours	Independent study time
12	FINAL EXAM	3	3

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