



UNIVERSIDAD AUTÓNOMA DE MADRID

## 33203 - TECHNIQUES IN EXPERIMENTAL PHARMACOLOGY

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

### Information of the subject

**Code - Course title:** 33203 - TECHNIQUES IN EXPERIMENTAL PHARMACOLOGY

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

**Faculty:** 106 - Facultad de Medicina

**Academic year:** 2023/24

### 1. Course details

#### 1.1. Content area

In this course, the main experimental techniques used in pharmacological research are displayed from a theoretical and practical perspective. Special emphasis will be given to in vitro and in vivo experimental models and different techniques running from vascular reactivity on isolated organs to molecular and cellular biology at vascular, cardiac and neuronal level both in physiology and in disease. The student will be familiar with the different techniques used to clarify the basic mechanisms of neuronal and cardiovascular communication. This aspect will provide the student with a better knowledge on such mechanisms and its relationship with the different drugs used in clinics or under research and development. Lectures might be complemented with the critical lecture and presentation by the students of scientific articles that were relevant in the development of each specific experimental technique. Moreover, the students will have the opportunity of attending practical demonstrations of some specific experimental techniques described in the program.

#### 1.2. Course nature

Compulsory

#### 1.3. Course level

Máster (EQF/MECU 7)

#### 1.4. Year of study

1

#### 1.5. Semester

Second semester

#### 1.6. ECTS Credit allotment

5.0

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## 1.7. Language of instruction

English

## 1.8. Prerequisites

Previous attendance to the General Module of the Master

## 1.9. Recommendations

There are no recommendations.

## 1.10. Minimum attendance requirement

Attendance to lectures and practical classes is mandatory. The student must attend at least 80% of these activities in order to be evaluated.

## 1.11. Subject coordinator

Ana Belen Garcia Redondo, Ana Maria Briones Alonso, Silvia Magdalena Arribas Rodriguez

<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**

T4 - Possess a high sense of responsibility, on a personal, professional and social level in the fields of the University, the company and public administrations.

T3 - Ability to take the initiative at work, work as a team, cooperate with internal and external elements, organize and properly manage the work and direct it to specific objectives.

#### **SPECIFIC**

ES-6 - Know and apply the most common experimental techniques and models, both in research in Cardiovascular Pharmacology or in research in Psychoneuropharmacology.

ES-9 - To know from an eminently practical point of view, the different phases of the experimental work in Pharmacology, including experimental design, the choice and use of experimental techniques and animal models, as well as the processing and analysis of results, together with their presentation and discussion.

### 1.12.2. Learning outcomes

In this course, students will learn practical aspects of different approaches and experimental techniques used in pharmacological research at the molecular, cellular and organ levels.

### 1.12.3. Course objectives

The subject analyzes in a theoretical and practical manner, some of the more frequently used

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experimental techniques in pharmacological research in cell culture, isolated organs, experimental animal models and human research. Techniques studied will include protein and gene expression, enzymatic activities and function and structure of the cardiovascular and central nervous systems, among others.

### 1.13. Course contents

#### Theoretical classes

Histological techniques. Immunostaining.  
 Techniques to measure intracellular calcium  
 Measurement of oxidative stress  
 Measurement of mitochondrial function and biogenesis  
 Confocal microscopy principles and applications in biomedical research  
 Electrophysiological techniques  
 Techniques for measuring exocytosis and neurotransmitters release  
 Transfection and RNAi techniques  
 Proteomics  
 Clinical pharmacokinetics: analytical techniques and pharmacokinetics analysis.  
 Microarrays  
 Next generation sequencing  
 Neuroimaging and cerebral function  
 Behavioral studies in animals  
 Isolation and characterization of extracellular vesicles

#### Practical demonstrations and seminars

Evaluation of cell viability and proliferation  
 Evaluation of vascular function  
 Evaluation of vascular structure  
 Protein and gene expression by western blot and PCR  
 Applications of the patch-clamp set up  
 Measurement of intracellular calcium  
 Data analysis and representation in pharmacological research  
 Clinical pharmacokinetics: analytical techniques and pharmacokinetics analysis.

Some minor changes in classes, seminars and practical demonstrations on specific techniques may take place.

### 1.14. Course bibliography

Bibliographic references will be original research studies or recent reviews, distributed by the teachers or obtained by the students after the corresponding search in PubMed.

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

### 2.1. Contact hours

TOTAL HOURS			
		Nº of hours	%
Presencial	Theoretical lessons	17 h	30,4
	Practical Demonstrations	20 h	
	Tutorials	3h	

2.2. List of training

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TOTAL HOURS			
		Nº of hours	%
Non presencial	Task elaboration	50 h	69,6
	Study Time	32 h	
<b>Total amount of hours: 25 hours x 5 ECTS</b>		125.	

activities

### THEORETICAL CLASSES

Lectures will provide organized and structured information elaborated by the teacher. The lecture content will include an initial general explanation of the technique. Lectures will take 50 minutes, with an additional time for discussion with the students.

### PRACTICAL DEMONSTRATIONS and SEMINARS

Some of the techniques will be complemented by a practical demonstration performed by the students and/or the teacher in different laboratories. Practical demonstrations will have variable duration depending on the experimental techniques. Seminars will introduce the student in the data analysis and representation of some of the experimental techniques.

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

#### 3.1. Regular assessment

1. Attendance
2. Written summary of the practical demonstrations
3. Analysis and representation of data
4. Students presentations

##### 3.1.1. List of evaluation activities

#### 1) CONTINUOUS EVALUATION (10 % of the total mark).

Assistance and the active participation in the academic activities.

#### 2) PRESENTATION WITH A SUMMARY AND DISCUSSION OF THE DIFFERENT PRACTICAL TECHNIQUES STUDIED IN THE COURSE (90 % of the total mark).

The student will elaborate a written report for each practical demonstration that will be given on time and with a specified format to the respective lecturer. We could request the students to analyse some data to be included in the practical demonstration report. Also, the students will perform an oral presentation of experimental techniques that would be useful to answer a specific hypothesis.

Each lecturer will evaluate the work performed by the student and at the end of the course, a mean mark of the evaluations of the different tasks will be performed.

#### 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

Week	Contents	Contact hours	Independent study time
1	Theoretical lessons Practical Demonstrations Study hours	6 6	10
2	Theoretical lessons Practical Demonstrations Study hours	6 6	10
3	Theoretical lessons Practical Demonstrations	5 6	

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	Study hours		10
4-6	Study hours		21
	Tutorials	3	
	Elaboration of the written reports		36

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

*\*This chronogram is orientative*

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