



Asignatura: Experimental Techniques in pharmacological Research
Código: 32510
Centro: Facultad de Medicina
Titulación: Máster Universitario en investigación Farmacológica
Nivel: Máster
Tipo: Optativa
Nº de créditos: 5
Curso académico: 2017-18

1 COURSE TITLE

Experimental Techniques in Pharmacological Research

1.1. Course number

32510

1.2. Content area

Methodologies and experimental models to evaluate the mechanism of action of drugs

1.3. Course type

Mandatory

1.4. Course level

Master Degree

1.5. Year

First

1.6. Semester

Second

1.7. Language

English

1.8. Prerequisites

Previous attendance to the General Module of the Master



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1.9. Minimum attendance requirement

Attendance to lectures and practical classes is mandatory; the student must attend at least 80% of seminars to be evaluated

1.10. Faculty data

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Contact hours: Previous e-mail appointment is required

1.11. Course objectives

The subject analyzes in a theoretical and practical manner, some of the more frequently used 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. In addition, some of these techniques will be studied within the context of cardiovascular (hypertension, diabetes, etc) and neuropsychological diseases (neurodegenerative diseases, stroke, pain, depression, etc).

ABBILITIES:



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BASIC AND GENERAL

- 1- To have and understand knowledge that provides general support and opportunities to be original in the development and/or application of ideas, often in a research context.
- 2- Students must be able to integrate knowledge and respond to complexity associated to judgments from an information that being incomplete or limited, should include thoughts about social and ethical responsibilities bound to the application of their knowledge and judgments.
- 3- Students should have learning capabilities that allow them to continue investigating in a highly self-sufficient or autonomous way
- 4- Acquire the knowledge, abilities and capabilities needed to carry out an innovative quality research in Pharmacology.

TRANSVERSAL

1. Ability to have self initiative, work in a team, cooperate with internal and external elements and organize and direct the work properly by directing this work to specific objectives
2. To be highly responsible both at personal, professional and social levels at the University, company or public administrations.

SPECIFIC

- 1- To know and use the experimental techniques and models more frequently used in Cardiovascular Pharmacology or Neuropharmacology.
- 2- To know from a practical viewpoint the different phases of pharmacological research including the design of experimental protocols and the election and use of experimental techniques and animal models, the management and analysis of results and the presentation and discussion of the obtained results.

1.12. Course contents

Theoretical clases

1. Cell cultures
2. Histological techniques. Immunostaining.
3. Types of cell death: evaluation techniques.
4. Techniques to measure intracellular calcium
5. Measurement of enzyme activity. Oxidative stress
6. Measurement of mitochondrial function and biogenesis



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7. Confocal microscopy principles
8. Confocal microscopy: applications in biomedical research
9. Heterologous expression of receptors in oocytes of *Xenopus laevis*
10. Electrophysiological techniques
11. Techniques for measuring exocytosis
12. Determination of gene and protein expression by western blot and PCR
13. Transfection and RNAi techniques
14. Proteomics:
15. Analytical techniques for the monitoring of drugs.
16. Microarrays
17. Neuroimage and Brain function
- 18.

Practical clases

- 1) Cell culture (primary culture in cardiovascular and central nervous systems; organotypic culture)
- 2) Evaluation of cell viability
- 3) Evaluation of cell proliferation
- 4) Evaluation of haemodynamic parameters and cardiac function
- 5) Evaluation of vascular function and structure
- 6) Evaluation of protein expression by western blot
- 7) Applications of confocal microscopy
- 8) Applications of the patch-clamp set up
- 9) Measurement of intracellular calcium

1.13. Course bibliography

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

2 Teaching methodology

GENERAL DESCRIPTION AND PRACTICAL LESSONS

Lectures will provide organized and structured information elaborated by the teacher. The lecture content will include an initial general explanation of the technique. Some of the techniques will be complemented by a practical part performed by the student and/or by the teacher in the different laboratories. Lectures will take 60 minutes, with an additional time for discussion with the students. Practical lessons will have variable duration depending on the



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experimental techniques. Different teaching methodologies will be used, such as visual presentations that can be available in the teaching web page.

3 Student workload

		Nº de horas	%
Presencial	Theoretical lessons	19 h	34,4
	Practical lessons	20 h	
	Tutorials	4 h	
No presencial	Task elaboration	50 h	65,6
	Study Time	32 h	
Total amount of hours: 25 hours x 5 ECTS		125	

4 Evaluation procedures and weight of components in the final grade

The evaluation will include two main components:

- 1) First, continuous evaluation will attend assistance and the active participation in the academic activities (10% of the final the final mark).
- 2) The second part will be a summary and discussion of the different practical techniques studied during the course. We could request the students to analyse and process data obtained by the own student or provided by the lecturer. The student will elaborate a written report about these data that will be given on time and with an specified format to the respective lecturer. 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 (90% of the final mark).



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5 Course calendar

Week	Contents	Contact hours	Independent study time
1	Theoretical lessons Study hours	19	20
2	Practical Lessons and Tutorials Tasks	12	20
3	Practical Lessons and Tutorials Tasks	12	20
4	Study hours Tasks		12 10

**This chronogram is orientative*

Timetable will be provided at:

https://www.uam.es/ss/Satellite/Medicina/es/1242667165286/subhome/Master_Universitario_en_Investigacion_Farmacologica.htm