



33203 - TECHNIQUES IN EXPERIMENTAL PHARMACOLOGY

Syllabus Information

Code - Course title: 33203 - TECHNIQUES IN EXPERIMENTAL PHARMACOLOGY

Degree: 721 - Máster en Investigación Farmacológica (2018)

Faculty: 106 - Facultad de Medicina

Academic year: 2019/20

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 (MECES 3)

1.4.Year of study

1

1.5.Semester

Second semester

1.6.ECTS Credit allotment

5.0

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URL Verification:		Page:	1/7	

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.Faculty data

Lecturer(s) ANA MARÍA BRIONES ALONSO (Coordinator)

Department of Pharmacology

Faculty of Medicine

Office Pharmacology – L-4

Phone: +34 91 497 53 99

Email: ana.briones@uam.es

Lecturer(s) LUIS GANDÍA JUAN

Department of Pharmacology

Faculty of Medicine

Office Pharmacology –L-7

Phone: +34 91 497 5396

Email: luis.gandia@uam.es

Lecturer(s) CONCEPCIÓN PEIRÓ VALLEJO

Department of Pharmacology

Faculty of Medicine

Office Pharmacology – L-5

Phone: +34 91 497 24 09

Email: concha.peiro@uam.es

Lecturer(s) ANA BELEN GARCÍA REDONDO

Department of Pharmacology

Office Pharmacology – L-4

Teléfono / Phone: +34 91 497 53 79

Email: ana.garcia@uam.es

Lecturer(s) JAVIER BLANCO RIVERO

Department of Physiology

Faculty of Medicine

Office C - 13

Phone: +34 91 497 54 46

Email: javier.blanco@uam.es

Lecturer(s). SILVIA M ARRIBAS RODRIGUEZ

Department of Physiology

Faculty of Medicine

Office C - 22

Secure Verification Code:		Date:	28/11/2019	
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URL Verification:		Page:	2/7	

Phone: +34 91 497 69 95
Email: silvia.arribas@uam.es

Lecturer(s) ANGEL LUIS GARCIA VILLALON
Department of Physiology
Faculty of Medicine
Office C - 20
Phone: +34 91 497 54 24
Email: angeluis.villalon@uam.es

Lecturer(s) MIRIAM GRANADO GARCIA
Department of Physiology
Faculty of Medicine
Office C - 20
Email: miriam.granado@uam.es

Lecturer(s) MERCEDES FERRER PARRA
Department of Physiology
Faculty of Medicine
Office C - 20
Phone: +34 91 497 31 12
Email: mercedes.ferrer@uam.es

Lecturer(s) MARÍA FRANCISCA CANO ABAD
Department of Pharmacology
Faculty of Medicine
Office Clinical Pharmacology – Hospital Universitario de la Princesa
Phone: +34 91 5202425
Email: maria.cano@uam.es

Lecturer(s) ALMUDENA ALBILLOS MARTÍNEZ
Department of Pharmacology
Faculty of Medicine
Office Pharmacology Building I-5
Phone: +34 914975348
Email: almudena.albillos@uam.es

Lecturer(s) SEBASTIÁN Cerdán GARCÍA-ESTELLER
Instituto de Investigaciones Biomédicas Alberto Sols
Office 2.12
Phone: +34 91 585 4444
Email: scerdan@iib.uam.es

Lecturer(s) SUSANA VALLEJO FERRÁN
Department of Pharmacology
Faculty of Medicine
Office Pharmacology – L-5
Phone: +34 91 497 24 09
Email: susana.vallejo@uam.es

Lecturer(s) MARIA FERNANDEZ-VELASCO
Instituto de Investigación Hospital Universitario La PAZ/ Research Institute La Paz Hospital
Email: mvelasco@iib.uam.es

Lecturer(s) ANTONIO MARTINEZ RUIZ

Secure Verification Code:		Date:	28/11/2019	
Signed by:	This teaching guide is not SVC signed because is not the final version			
URL Verification:		Page:	3/7	

Instituto de Investigación Hospital Universitario La Princesa/ Research Institute Santa Cristina Hospital

Email: amartinezruiz@salud.madrid.org

Lecturer(s) MARIA MONSALVE

Instituto de Investigaciones Biomédicas Alberto Sols/ Research Institute Alberto Sols

Teléfono / Phone: 91 585 4471

Email: mpmonsalve@iib.uam.es

Docente / Lecturer: TANYA ROMACHO ROMERO

Despacho / Office: Farmacología - L-5 / Pharmacology - L-5

Teléfono / Phone: 91 497 2409

Correo electrónico / Email: tanya.romacho@uam.es

Docente / Lecturer: RAQUEL RODRIGUES DIEZ

Despacho / Office: Farmacología - L-4 / Pharmacology - L-4

Teléfono / Phone: 91 497 5379

Correo electrónico / Email: raquel.rodrigues@inv.uam.es

Docente / Lecturer: RAFAEL LEON MARTÍNEZ

Despacho / Office: IFTH, Instituto-Fundación Teófilo Hernando. Hospital La Princesa

Teléfono / Phone: 91 497 2766

Correo electrónico / Email: rafael.leon@inv.uam.es

Docente / Lecturer: ANTONIO MIGUEL GARCIA DE DIEGO

Despacho / Office: IFTH, Instituto-Fundación Teófilo Hernando. Dpto. Farmacología-Lab L1.

Teléfono / Phone: 914975384

Correo electrónico / Email: antoniomiguel.garcia@dnsneuroscience.es

Contact hours: Previous e-mail appointment is required

1.12.Competences and learning outcomes

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.

Secure Verification Code:		Date:	28/11/2019	
Signed by:	This teaching guide is not SVC signed because is not the final version			
URL Verification:		Page:	4/7	

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 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).

1.13.Course contents

Theoretical clases

1. Cell cultures
2. Histological techniques. Immunostaining.
3. Techniques to measure intracellular calcium
4. Measurement of oxidative stress
5. Measurement of mitochondrial function and biogenesis
6. Confocal microscopy principles and applications in biomedical research
7. Heterologous expression of receptors in oocytes of *Xenopus laevis*
8. Electrophysiological techniques
9. Techniques for measuring exocytosis and neurotransmitters release
10. Transfection and RNAi techniques
11. Proteomics
12. Analytical techniques for the monitoring of drugs.
13. Microarrays
14. Next generation sequencing
15. Neuroimage and Brain function
16. Flow cytometry
17. Protein and gene expression by western blot and PCR

Practical clases

1. Cell culture (primary culture in cardiovascular and central nervous systems; organotypic culture)

Secure Verification Code:		Date:	28/11/2019	
Signed by:	This teaching guide is not SVC signed because is not the final version			
URL Verification:		Page:	5/7	

2. Evaluation of cell viability and proliferation
3. Evaluation of vascular function
4. Evaluation of vascular structure
5. Evaluation of cardiac function
6. Evaluation of protein expression by western blot
7. Applications of the patch-clamp set up
8. Measurement of intracellular calcium
9. Mass spectrometry

Additional seminars and tutorials on specific techniques will also 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 OF PHYSIOLOGICAL BASIS OF THERAPEUTICS			
		Nº of hours	%
Presencial	Theorical lessons	17 h	30,4
	Practical lessons	20 h	
	Tutorials	3h	
Non presencial	Task ellaboration	50 h	69,6
	Study Time	32 h	
Total amount of hours: 25 hours x 5 ECTS		125.	

2.2.List of training activities

THEOR ETICAL

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 LESSONS

Some of the techniques will be complemented by a practical part performed by the student and/or by the teacher in the different laboratories. Practical lessons will have variable duration depending on the experimental techniques. Different teaching methodologies will be used, such as visual presentations that can be available in the teaching web page.

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

3.1.Regular assessment

1. Attendance
2. Written summary of the practical lessons
3. Analysis and representation of data

3.1.1.List of evaluation activities

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

Assistance and the active participation in the academic activities.

Secure Verification Code:		Date:	28/11/2019	
Signed by:	This teaching guide is not SVC signed because is not the final version			
URL Verification:		Page:	6/7	

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

We could request the students to analyse and process the 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 a 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.

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 Classes Study hours	6 6	10
2	Theoretical lessons Practical Classes Study hours	6 6	10
3	Theoretical lessons Practical Classes Study hours	5 6	10
4-6	Study hours Tutorials Elaboration of the written reports	3	21 36

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

**This chronogram is orientative*

Secure Verification Code:		Date:	28/11/2019	
Signed by:	This teaching guide is not SVC signed because is not the final version			
URL Verification:		Page:	7/7	