COURSE DATA

Data Subject	
Code	43083
Name	Special techniques in cardiovascular research
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2141 - M.U. en Fisiología 12-V.2	Faculty of Medicine and Odontology	1	First term

Subject-matter

Degree	Subject-matter	Character
2141 - M.U. en Fisiología 12-V.2	2 - Cardiovascular physiology	Obligatory

Coordination

Name	Department
HERMENEGILDO CAUDEVILLA, CARLOS	190 - Physiology

SUMMARY

In this Master subject, the main available techniques for cardiovascular research will be presented, from cell models, through animal models, to human research.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

There are no prerequisites for taking the subject.

OUTCOMES

2141 - M.U. en Fisiología 12-V.2

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Know how to write and prepare presentations to present and defend them later.
- To acquire a critical attitude that allows you to make reasoned judgments and defend them with rigor and tolerance.
- Search, order, analyze and synthesize scientific information (databases, scientific articles, bibliographic repertoires), selecting the pertinent to focus current knowledge on a topic of scientific interest in Physiology.
- Assess the need to complete the scientific training, in languages, computer science, ethics, etc., attending conferences or courses and/or carrying out complementary activities, self-evaluating the contribution that the performance of these activities implies for their comprehensive training.
- To acquire specific skills to develop laboratory work in cardiovascular research.

LEARNING OUTCOMES

To know the up-to-date techniques to solve, using a multidisciplinary approach, the main topics of cardiovascular research.

To know the possibilities and limitations offered by current techniques.

To improve the skills in managing and interpreting the results of cardiovascular research

To plan and select the most appropriate techniques to perform research on a cardiovascular topic.

DESCRIPTION OF CONTENTS

1. In vitro studies

In silico, biochemical and molecular biology techniques and histological techniques.
Cell culture techniques. Theoretical background and laboratory practice.

2. Ex-vivo studies

Vascular reactivity in isolated organ. Theoretical background and laboratory practice.

3. Animal research

Animal models in cardiovascular research: Description and classification, choice criteria, legislation.

4. Human research

Cardiovascular research in humans: cardiac catheterization and related techniques.

WORKLOAD

ACTIVITY	Hours	% To be attended
Laboratory practices	12,00	100
Theory classes	6,00	100
Tutorials	2,00	100
Other activities	2,00	100
Development of individual work	12,00	0
Study and independent work	10,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	11,00	0
Preparing lectures	3,00	0
Preparation of practical classes and problem	2,00	0
Resolution of case studies	10,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

– Theoretical master classes with active alumni participation.

– Practical laboratory classes, including introductory seminars, conducting internships with the teacher follow-up and support, and writing a scientific report or written test.

– Conferences of experts in the different subjects.

– Discussion about the work and practices carried out.

– Face-to-face and electronic tutoring with teachers.

EVALUATION

Evaluation system:

- Preparation of an experimental protocol: evaluation up to 8 points.

- Oral presentation of the experimental protocol: evaluation up to 2 points.

Attendance at 80% of the practices is compulsory.

Minimum passing grade: 5 points.

REFERENCES

Basic

- DHEIN S, MOHR FW, DELMAR M (eds). Practical methods in cardiovascular research. Springer, Heidelberg. 2005.
- GUYTON AC, HALL JE. Tratado de Fisiología Médica. 12ª ed. Madrid. Ed. McGraw-Hill. 2011.
- POSTERKAMP G, KLEIJN D (eds). Cardiovascular Research: New technologies, methods and applications. Springer, New York. 2006.

Additional

- AIRD WC (ed). Endothelial cells in health and disease. Taylor & Francis group, Boca Ratón. 2005.
- AIRD WC (ed). Endothelial biomedicine. Cambridge University Press, Cambridge. 2007.
- DE CATTERINA R, LIBBY P (eds). Endothelial dysfunctions and vascular disease Blackwell Publishing, Oxford. 2007.
- BEVERUNG S, WU J, STEWARD R. Lab-on-a-Chip for Cardiovascular Physiology and Pathology. Micromachines 2020, 11, 898; doi: 10.3390/mi11100898
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- LIU N, YE X, YAO B, ZHAO M, WU P, LIU G, ZHUANG D, JIANG H, CHEN X, HE Y, HUANG S, ZHU P. Advances in 3D bioprinting technology for cardiac tissue engineering and regeneration. Bioact Mater 2021, 6, 13881401; doi: 10.1016/j.bioactmat.2020.10.021
- SACCHETTO C, VITIELLO L, DE WINDT LJ, RAMPAZZO A, CALORE M. Modeling Cardiovascular Diseases with hiPSC-Derived Cardiomyocytes in 2D and 3D Cultures. Int J Mol Sci. 2020 May 11;21(9):3404. doi: 10.3390/ijms21093404.
- ZHANG Y, KUMAR P, LV S, XIONG D, ZHAO H, CAI Z, ZHAO X. Recent advances in 3D bioprinting of vascularized tissues. Materials & Design 2021, 199, 109398; doi: 10.1016/j.matdes.2020.109398
- ZHAO D, LEI W, HU S. Cardiac organoid - a promising perspective of preclinical model. Stem Cell Res Ther. 2021 May 6;12(1):272. doi: 10.1186/s13287-021-02340-7.