

**COURSE DATA****Data Subject**

Code	43087
Name	Cardiovascular and metabolic differences between men and women
Cycle	Master's degree
ECTS Credits	4.0
Academic year	2023 - 2024

Study (s)

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

Subject-matter

Degree	Subject-matter	Character
2141 - M.U. en Fisiología 12-V.2	4 - Optional subject	Optional

Coordination

Name	Department
HERMENEGILDO CAUDEVILLA, CARLOS	190 - Physiology
VIÑA RIBES, JOSE	190 - Physiology

SUMMARY

In this subject we will study the influence of gender on the various physiological systems, especially on the cardiovascular system. Gender differences will also be emphasized in special situations such as aging or physical exercise.

PREVIOUS KNOWLEDGE**Relationship to other subjects of the same degree**

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



Other requirements

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.
- Have a proactive attitude towards possible changes that may occur in their professional and/or investigative work.
- Know how to write and prepare presentations to present and defend them later.
- To prepare a clear and concise memory of the results of your work and the conclusions obtained.
- Use the different exhibition techniques oral, written, presentations, panels, etc., to communicate the knowledge, proposals and positions.
- 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.
- Describe the main functional differences between men and women, as well as the specific mechanisms of disease production, the basis of therapeutics, and the means for maintaining and preventing health.

LEARNING OUTCOMES

- To understand and describe the functions of the systems and apparatus of the healthy human organism in their different levels of organization, as well as their modifications associated with differences in gender.



- To understand the common and different characteristics that occur between men and women in the pathophysiology and the mechanisms of disease production, the bases of therapeutics and the means for the maintenance and prevention of health.
- To carry out different approaches to research on physiological gender differences.
- To assess the physiological differences between the sexes.
- To incorporate in the reasoning processes that the physiology of men and women may be different.

DESCRIPTION OF CONTENTS

1. Introduction to gender differences in Physiology

A detailed summary of the main human functions and the differences between the two sexes.

2. Sex differences and aging

Regulation of longevity-related gene expression.

Why do women live longer than men?

Estrogens and phytoestrogens induce the expression of longevity genes.

3. Sex differences in the cardiovascular system

Estrogens and atherosclerosis: A genomic approach.

Gender differences in vascular reactivity.

Regulation of vascular tone and gonadal function.

Sex hormone receptors and cardiovascular function.

4. Other physiological sex differences

Physiology and pathophysiology of the female reproductive system.

Gender differences in metabolism and nutrition.

Gender differences in the physiology and pathophysiology of the central nervous system.

Genetic factors of gender and risk of osteoporosis.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	24,00	100
Tutorials	3,00	100
Other activities	2,00	100
Development of group work	20,00	0
Study and independent work	15,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	6,00	0
Resolution of case studies	10,00	0
TOTAL	100,00	

TEACHING METHODOLOGY

- Theoretical classes of participative master lesson.
- Conferences of experts in the subjects.
- Debate and guided discussion on the work carried out.
- Face-to-face and electronic tutorials with teachers.

EVALUATION**Evaluation system:**

- Written exam consisting of questions with short answer: evaluation up to 10 points.

Minimum passing grade: 5 points.

REFERENCES**Basic**

- Blair ML (2007) Sex-based differences in physiology: what should we teach in the medical curriculum? Adv Physiol Educ 31: 2325.



- Legato MJ, ed. (2004) Principles of gender-specific medicine. Elsevier Academic Press, New York.
- Miller V, Hay M (2004) Principles of sex-based differences in physiology. En: Advances in Molecular and Cell Biology, vol. 34. Elsevier Academic Press, New York.
- Mechanistic Pathways of Sex Differences in Cardiovascular Disease. Regitz-Zagrosek V, Kararigas G. *Physiol Rev.* 2017; 97(1): 1-37. doi: 10.1152/physrev.00021.2015. PMID: 27807199.
- Cardiovascular Disease in Women: Clinical Perspectives. Garcia M, Mulvagh SL, Merz CN, Buring JE, Manson JE. *Circ Res.* 2016; 118(8): 1273-93. doi: 10.1161/CIRCRESAHA.116.307547. PMID: 27081110; PMCID: PMC4834856.
- Sex differences in epigenetics mechanisms of cardiovascular disease. Novella S, Paes AB, Hermenegildo C. 2021. In: *Epigenetics in Cardiovascular Disease* (Vol. 24, 1st ed. pp. 213-234). Y. Devaux & E. Robinson (Ed.). Elsevier.

Additional

- Kublickiene K & Luksha L (2008) Gender and the endothelium. *Pharmacol Rep.* 60:49-60.
- Torgrimson BN, Minson CT (2005) Sex and gender: what is the difference? *J Appl Physiol* 99:785787.
- Miller VM (2010) Sex-based differences in vascular function. *Women's Health* 6:737752.