Teaching guide

IDENTIFICATION DETAILS

Degree:	Biomedicine
Scope	Biology and Genetics
Faculty/School:	Experimental Sciences
Course:	MOLECULAR BASICS OF HEART DISEASE
Type:	Optional
ECTS credits:	3
Year:	4
Code:	2169
Teaching period:	Seventh semester
Subject:	Molecular Aspects of Diseases
Module:	Foundations of Biomedicine
Teaching type:	Classroom-based
Language:	Spanish
Total number of student study hours:	75

SUBJECT DESCRIPTION

The subject Molecular Bases of Heart Diseases is part of the Biomedicine Degree as a fundamental part, a practical continuation of the knowledge obtained from other subjects, including Physiology, Anatomy, Biochemistry, Genetics, Pharmacology and General Pathology. Once physiological knowledge of the cardiovascular system has been acquired, the course focuses on the study of the molecular bases and mechanisms of action, through which pathological processes arise that trigger cardiovascular diseases. In addition, given the nature of the mechanical knowledge of the pathological processes that are intended to be studied, the Molecular Bases of Heart Diseases connects directly with other subjects of the degree, including significantly pharmacology, in order to jointly understand the tools that exist today, as well as the open lines of research to provide diagnostic, prognostic and therapeutic solutions for these pathological processes of the cardiovascular system.

GOAL

To know the molecular basis of the signaling pathways involved in the genesis, progression and eventually treatment of cardiovascular diseases with the highest global prevalence.
Specifically:
- To know at the molecular level the etiology that triggers the pathological processes under study.
- Understand the interconnection of the different molecular signaling pathways that affect cardiovascular health.
- Analyze the specific targets that are used and/or of potential future use for the early diagnosis, progression and treatment of
illness.
- Learn about the most recent advances in cardiovascular research applied to the non-invasive molecular detection of molecules
specific with teragnostic capacity.

PRIOR KNOWLEDGE

The student must have knowledge obtained from disciplines in cell biology, molecular biology, biochemistry, general genetics, molecular genetics, anatomy, physiology, general pathology and pharmacology.

COURSE SYLLABUS

The course is organized in the following blocks:
Block I: Pathophysiology of the vascular bed.
-I.1. Molecular basis of blood pressure regulation.
-I.2. Pathological vascular remodeling as a source of disease.
-I.3. Molecular targets of pathological changes in blood pressure: hypertension/hypotension.
-I.4. Molecular targets on which high blood pressure plays a pathological role during the genesis of other diseases cardiovascular.

Block II. Atherothrombotic diseases

-II.1. Molecular basis of atherothrombotic occlusive disease: atherosclerosis.
-II.2. Molecular basis of the systemic inflammatory response in the genesis of atherosclerosis.
-II.3. Study of the composition of atheromatous plaques as a predictive factor of rupture and genesis of other diseases
cardiovascular.
-II.4. Molecular basis of expansive atherothrombotic disease: aneurysms.
-II.5. Study of the composition of the vascular bed, blood flow sensing molecules, and genetic variants
specific as key factors in the etiology of aneurysmal sac generation.
-II.6. Molecular basis of aneurysmal sac progression vs. stability, as a prognostic factor for surgical intervention.
-II.7. Molecular basis of atherothrombotic occlusive disease: aortic stenosis due to neointimal hyperplasia.
-II.8. Neointimal hyperplasia. Endothelial and muscular molecular factors that induce smooth muscle proliferation towards
the arterial lumen. Molecular tools used for prevention: pharmacoactive stents.

Block III. Heart Diseases.
-III.1. Acute coronary syndrome: molecular etiology of acute myocardial infarction. Molecular basis of infarct progression.
-III.2. Cardiac preconditioning: molecular signaling pathways involved in cardioprotection during
preconditioning process.
-III.3. Molecular basis of ventricular hypertrophy.
-III.4. Molecular basis of dilated cardiomyopathy: genetic markers. New lines of biomedical research.
-III.5. Molecular basis of cardiac conduction disorders. Molecular tools for the study in biomedicine.
-III.6. Heart failure. Etiology of heart failure. Molecular targets of firing and decompensation. Bases
molecular components of the pharmacological treatment of heart failure.

Block IV. Congenital heart diseases.
-IV.1. Molecular basis of pathologies associated with structural defects of large vessels and the myocardium.
-IV.2. Cardiac development: molecular basis of cardiomyopathies and congenital arrhythmias.

Block V. Technological advances in the detection of molecules using non-invasive molecular imaging techniques in research
biomedical with clinical application.
-V.1. Nanotechnology applied to the cellular and molecular detection of molecular targets in cardiovascular pathology.
-V.2. Non-invasive molecular imaging using nuclear magnetic resonance combined with molecular nanotechnology applied to
the non-invasive visualization of molecular targets with theranotic capacity.
-IV.3. Molecular ultrasound imaging in biomedical research in real time.

EDUCATION ACTIVITIES

The training activities of the subject are detailed below:
1. Self-employment of the student.
In the virtual classroom, students have all the classes taught in person, as well as additional additional information,
including cardiovascular biomedical research articles for each teaching block, videos made by experts in the subject matter, links to information websites and evaluation exercises.
2. Face-to-face work in class.
- Expository classes for each block in which the syllabus is structured by the teachers of the subject.
- Master lessons given by international experts in biomedical research from each of the blocks.
- Exhibition seminars conducted by students, distributed in working groups at the end of each block, with additional information
of the most recent specific developments. This section will be conditioned on online compliance by virtue of the different scenarios in relation to
the indications of the health authorities.
- Evaluation tests.
3. Practical session with tools used in Cardiac Biomedical research.
4. Group and personalized tutoring.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
30 Horas	45 Horas

LEARNING RESULTS

To know the general mechanisms of the disease and its associated molecular, structural and functional alterations, its syndromic expression and the therapeutic tools to restore health.

SPECIFIC LEARNING RESULTS

Knowledge at the molecular level of the etiology of cardiovascular diseases

Relate the different alterations to the pathophysiological processes that occur at the origin and progression of cardiovascular diseases

LEARNING APPRAISAL SYSTEM

1. Evaluation of the theoretical content of the subject (70%) by means of an exam. The main objective of the exams will be to verify that they have been assimilated and understood.
the basic concepts presented in theoretical classes, as well as students' reasoning ability to solve problems. A final exam will take place. La
The exam score will amount to 2/3 of the grade. It will be necessary to get a 5 in the grade to pass and average with the rest of the grades in the subject.
The student may give up the final exam grade to attend the extraordinary call.
2. Evaluation test score (10%). The progression, assimilation and interest of the student throughout the teaching period are
will evaluate using the evaluation tests that will be carried out at the end of each block.
3. Evaluation of work in seminars (20%). The ability to search and analyze scientific information, as well as its capabilities
of analytical, reflective and critical thinking, the fundamental basis of Biomedical Research in Cardiac Pathology, will be evaluated
through this block.
4. In addition to health reasons, those students who for significant reasons cannot be evaluated using the methods mentioned above, an alternative evaluation system will be carried out through the online computer systems provided by the University.

If you have not passed the subject in the first call, the grades of the approved parts will be saved until the extraordinary call.

Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:
a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.
2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the Guide for the Responsible Use of Artificial Intelligence in Studies at UFV. Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.
3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

publishers, Joseph Loscalzo... [et al.]. Harrison: Principles of Internal Medicine/21st ed. Madrid:Mc Graw-Hill Education, 2023

John E. Hall. Guyton and Hall: Treatise on Medical Physiology/13th ed. Barcelona:Elsevier, 2016