69310 - Biomechanical modeling of the cardiovascular system

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	547 - Master's in Biomedical Engineering
ECTS	3.0
Course	1
Period	Second semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process will be developed at several levels: theoretical lectures given by the professor but promoting student participation, practical lectures at the computers laboratory, practical sessions at the experimental laboratory for mechanical characterization of the tissue and practical activities and homework for application of the theoretical concepts and research activities. The proposed methodology tries to promote the continuous development of the matter and the relationship between the different parts of this subject

5.2.Learning activities

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The course will be developed along the bimester as a collection of the following activities:

A01 Theoretical classes with the active involvement of the student. The main course contents are presented.Clase magistral participativa (20 hours).

A03 Computer and experimental laboratory sessions.Different lab sessions are carried out. Notes for each lab session where the different activities are planned will be available before the session. In the following days after the lab session, the student should present a report of the corresponding lab session. (6 hours).

A05 Development of practical tasks related with the theoretical contents or with research in this field. Different activities/tasks are proposed related with the main contents of the course

A06 Tutorship. Students may solve any questions they might have about unclear contents of the course

A08 Assessment. The student will take an exam and several reports derived from the computer lab sessions and derived from the development of practical tasks will be evaluated (2hour)

Activities A05, A08 and student personal study-time will account with 48 hours.

5.3.Program

1: Introduction

2: Composition, structure and functionality of tissues of the cardiovascular system.

3: Elastic behaviour models for the cardiovascular tissue.

4: Inelastic behaviour models for the cardiovascular tissue.

5: Modelling of the blood flow.

6: Modelling of adaptive and degenerative processes in the cardiovascular pathologies.

7: Interaction of intravascular devices and prostheses in the cardiovascular system.

5.4.Planning and scheduling

The course calendar will be defined by the Escuela de Ingeniería y Arquitectura calendar

5.5.Bibliography and recomended resources

BB	Advanced School on "Biomechanics of Soft Tissue" . Biomechanics of soft tissue in cardiovascular systems / edited by

69310 - Biomechanical modeling of the cardiovascular system

BB	Gerhard A. Holzapfel, Ray W. Ogden Wien [etc.] : Springer, cop. 2003
BB	Fung, Yuan Cheng . Biomechanics: Mechanical properties of living tissues / Fung Y.C . Springer-Verlag, 1993
BB	Fung, Yuan Cheng . Biomechanics: Motion, Flow, Stress and Growth / Fung Y.C Springer Verlag. 1990
BB	Fung, Yuan Cheng. Biomechanics : circulation / Y. C. Fung . - 2nd ed. New York : Springer, cop. 1997
BB	Humphrey, Jay D.. Cardiovascular solid mechanics : cells, tissues, and organs / Jay D. Humphrey New York : Springer, cop. 2002

Different research papers in specialized journals. These papers will be referred during the course development.