Course guide
820037 - BIB - Biomedical Implants

Last modified: 14/06/2023

Unit in charge: Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering.

Degree: BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** English

LECTURER

Coordinating lecturer: DANIEL RODRÍGUEZ RIUS

Others: Rodríguez Rius, Daniel

REQUIREMENTS

BIOMATERIALS - Prerequisit
BIOMECÀNICA - Prerequisit

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Understand biomechanics and biomaterials.

Transversal:
2. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

The course is divided up as follows:
- 30% face-to-face expository classes (theory)
- 15% face-to-face directed classes (problems and seminars)
- 55% self-directed learning (group project and study)

An important component of the course is based on the performance of a group project done through the course. It corresponds to an activity initially oriented by the teacher, but developing afterwards more autonomously, with mentoring support.

LEARNING OBJECTIVES OF THE SUBJECT

After completing the course the student should be able to:
- Understand the principles and concepts of the application of biomedical implants and be able to use them in projects within biomedical engineering.
- Understand the fundamental criteria to be met by a biomedical implant for its use.

STUDY LOAD

Type	Hours	Percentage
Self study	90,0	60.00
Hours large group	45,0	30.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Biomedical implats. Types and properties.

Description:
Presentation of the characteristics of medical devices: definition, classification and most important properties, with examples of specific applications.

Specific objectives:
Definition of biomedical implants.
Classification of biomedical implants.
Properties of biomedical implants.

Full-or-part-time: 36h
Theory classes: 14h
Laboratory classes: 2h
Self study : 20h

Biological response to biomedical implants.

Description:
Study of the biological response and biocompatibility of medical devices.

Specific objectives:
To understand the biological response to an implant insertion in the human body.
To understand the biocompatibility of the medical devices.

Full-or-part-time: 20h
Theory classes: 8h
Laboratory classes: 2h
Self study : 10h

Legal framework and standards for biomedical implants.

Description:
Analysis of the regulations and legal framework that affects medical devices.

Specific objectives:
To Understand the legal issues affecting the design, manufacture and use of biomedical implants.

Full-or-part-time: 19h 30m
Theory classes: 8h
Laboratory classes: 1h 30m
Self study : 10h

Design of biomedical implants.

Description:
Description of methodologies and techniques used in the design of medical devices, with practical examples.

Specific objectives:
To understand the flowchart and methodologies of the design of medical devices.

Full-or-part-time: 56h
Theory classes: 14h
Laboratory classes: 2h
Self study : 40h

New trends in the development of medical devices.

Description:
Presentation of the current and future lines of research in medical devices.

Specific objectives:
To acquire a knowledge of the future trends for medical devices.

Full-or-part-time: 9h 30m
Theory classes: 4h 30m
Self study : 5h

Biomaterials. Types and properties.

Description:
Presentation of the characteristics of biomaterials: what is a biomaterial, how is it classified and which are their most important properties.

Specific objectives:
Definition of biomaterial.
Classification of biomaterials.
Properties of biomaterials.

Full-or-part-time: 9h
Theory classes: 4h
Self study : 5h

GRADING SYSTEM

Partial exams (2): 25%
Final exam: 30%
Group project and presentations: 45%

Attendance to group sessions and seminars is mandatory to pass this subject.
This subject does not include a reevaluation test.

EXAMINATION RULES.

The use of any electronic equipment with wireless communication capabilities is stricty forbidden in the evaluations.

BIBLIOGRAPHY

Basic:
- Ratner, B. D. [ed]. Biomaterials science : an introduction to materials in medicine. 3rd ed. Amsterdam: Elsevier Academic, 2013. ISBN 0125824637.
- Park, J. B. Biomaterials : an introduction. 3rd ed. New York: Springer, cop. 2007. ISBN 9780387378794.

Complementary:
- Silver, F. H. Biomaterials, medical devices and tissue engineering : an integrated approach. London, [etc.]: Chapman & Hall, 1994. ISBN 0412412608.
- Fries, Richard C. Reliable design of medical devices. 2nd ed. Boca Raton: CRC : Taylor & Francis, cop. 2006. ISBN 0824723759.