Biomechanics

Academic Year: (2024 / 2025) **Review date: 24-04-2024**

Department assigned to the subject: null

Coordinating teacher:

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

SKILLS AND LEARNING OUTCOMES

K3. To know the fundamentals of basic scientific and technical subjects in the field of biomedical engineering, which enable to learn new methods and technologies, as well as provide great versatility to adapt to new situations.
"K7. To know the structure, composition, processing, properties and behavior of the different
families of materials and biomaterials, their interrelationships and the response of the organism to biomaterials and implants, and to
be able to select them based on their applications in biomedicine."
K9. To know the fundamentals of micromanufacturing, microfluidics, nano and biotechnology, 3D printing, bioreactors and organ and tissue reconstruction techniques and use them to solve complex biomedical problems in regenerative medicine.
K12. To understand the techniques used in the design of medical devices and the instruments that compose them, allowing their development for medical applications, such as surgical instruments, electromechanical microdevices, robots and micro- and nanometric-sized biosensors.
S3. To analyze and synthesize basic problems related to bioengineering and biomedical sciences, solving them with initiative, appropriate decision making and creativity and communicating solutions efficiently, including social, ethical, health and safety, environmental, economic and industrial implications.
S5. To analyse scientific and technical information for decision-making in the field of biomedical engineering by keeping abreast of new developments
S6. To solve mathematical, physical, chemical, biological and biochemistry problems that may arise in biomedical engineering, knowing how to interpret the results obtained and reach informed conclusions.
C3. Be able to transmit knowledge both orally and in writing, to a specialised and non-specialised audience, working in multidisciplinary and international teams.

DESCRIPTION OF CONTENTS: PROGRAMME

Introduction and foundations of biomechanics. Biomechanics of the musculoskeletal system, hard and soft tissues. Experimental techniques and ethics in trials with human beings in biomechanics. Design, characteristics, planning, requirements and risks of biomechanical tests. Analysis and biomechanics of human movement. Anthropometry, photogrammetry, inertial sensors, electromyography, optical techniques, motion analysis and simulation software. Numerical modelling applied to biomechanics. Mechanical behaviour of biological tissues. Design and manufacturing of personalised prostheses. 3D printing. Concepts, risk analysis and ergonomic design. Ergonomics and disability

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES:
FACE-TO-FACE CLASSES: REDUCED (WORKSHOPS, SEMINARS, CASE STUDIES)
LABORATORY SESSION
STUDENT INDIVIDUAL WORK

METHODOLOGY:
PRACTICAL LEARNING BASED ON CASES AND PROBLEMS, AND EXERCISE RESOLUTION
INDIVIDUAL AND GROUP OR COOPERATIVE WORK WITH THE OPTION OF ORAL OR WRITTEN

PRESENTATION
INDIVIDUAL AND GROUP TUTORIALS TO RESOLVE DOUBTS AND QUERIES ABOUT THE SUBJECT.

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

FINAL EXAM: 60% Max.

CONTINUOUS EVALUATION: 40% Min.