

69708 - Ergonomics and evaluation of functional capacity

Syllabus Information

Academic year: 2023/24

Subject: 69708 - Ergonomics and evaluation of functional capacity

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 633 - Master's Degree in Biomedical Engineering

ECTS: 3.0

Year:

Semester: Second semester

Subject type: Optional

Module:

1. General information

The objective of this subject in the field of ergonomics is to enable the student to perform an analysis of the physical aspects of human beings in their interaction with the environment, whatever that environment is: work, daily, sports or otherwise. The Evaluation of Functional Capacity is intended for the student to know the procedures and techniques used to assess injuries, after effects, disabilities or disabilities caused by various causes, such as accidents, diseases or others.

Its purpose is aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es>), specifically, the achievement of Objectives 3.d, 5b and 8.8 of their respective SDGs.

It is recommended to previously take the subject: 69708-Motion Capture and Characterization.

2. Learning results

- To know the purpose of Ergonomics and Functional Capacity Evaluation and its fields of application in the labour, biomedical, legal and forensic medical or product design fields.
- To be able to identify MSDs (musculoskeletal disorders) resulting from an occupational activity. To identify the key factors to be considered in order to assess the ergonomic risks of an activity, considering the existing regulations in this regard.
- To be able to perform a biomechanical analysis and ergonomic evaluation of a workstation by applying different methods to assess risks due to load handling, forced postures, or performing repetitive tasks at high frequency.
- To be able to measure the functional capacity of a subject, in order to assess their degree of temporary or permanent disability, to support their rehabilitation or their reinsertion in a job after an illness or accident.
- To be able to use specific hardware and software applied to Ergonomics and Functional Capacity Evaluation. To be able to capture and characterise the movement of the subject under study and perform a dynamic simulation with biomechanical models.

3. Syllabus

- Work and product ergonomics. Ergonomic methodology.
- Musculoskeletal disorders (MSDs) of work activity.
- Biomechanics and anthropometry. Anatomical planes, reference systems of body segments and joint movements.
- Evaluation of postural load - REBA (Rapid Entire Body Assessment) method.
- Load handling. NIOSH equation. Single-tasking and multitasking.
- Evaluation of repetitive movements of the upper limbs at high frequency. UNE-ENE-1005-52007. MoveHuman-FORCES (UZ) method.
- Functional Capacity Evaluation (FCE).
- Valuation of bodily injury. Medico-legal and forensic implications.
- Application systems in the field of musculoskeletal system capacity assessment. Methodologies, procedures and interpretation of results.
- Application of virtual reality systems in the field of ergonomics and Functional Capacity Evaluation.

4. Academic activities

Participative master class (20h.). Presentation of the main contents.

Laboratory practices (8h.). Practice will be carried out with specific hardware and software for ergonomic evaluations and Functional Capacity Evaluation. Motion capture systems available in the biomechanics laboratory of the Project Engineering area will be used.

Practical application work (14.5h.). Team work in which the student must show their capacity to assimilate the concepts introduced in the other activities, by means of a written assessment report, including bibliographic review, description of the case, assessment methods and procedures used, analysis of results and final conclusions. The resulting work must be submitted to the teacher and presented and defended orally.

Personal study (30h.).
Assessment (2.5h.).

5. Assessment system

E1: Final exam (35%).

Written exam of short questions on basic concepts of the subject. It must be passed and will not be compensated by the practical part. Estimated duration 1 h.

E2: Tutored practical work (40%).

Completion of case studies related to the topics covered in the subject. The use of specific software and hardware will be required to complete the evaluation reports of each of the studied cases. The methodological approach, the rigor in the procedures applied, the analysis and interpretation of the results, and the coherence in the final conclusions will be valued.

E3: Oral presentations and discussions (25%)

The student must present and defend the practical work orally.

In order to pass the subject the student must have obtained a grade equal to or higher than 4.5 in the final exam and 5.0 in the rest of the exams. If this condition is not met, the final grade will be a failing grade of 4.0, unless the result of the average of all parts is less than 4.0, in which case the final grade will correspond to that value.

In case a student fails or does not show up for the first evaluation, the criteria for the second evaluation are the same. If the student has undergone the first evaluation and has failed any of the tests, the grade of the tests they have passed during the corresponding academic year will be kept.

Additionally, there will be a global test in each of the established dates and schedules throughout the academic year, on the dates and times determined by the Centre.