

25648 - Biomechanics and Movement Analysis

Syllabus Information

Academic year: 2023/24

Subject: 25648 - Biomechanics and Movement Analysis

Faculty / School: 127 - Facultad de Ciencias de la Salud

Degree: 605 - Degree in Physiotherapy

ECTS: 8.0

Year: 2

Semester: Annual

Subject type: Compulsory

Module:

1. General information

The main purpose of this subject is to provide students with a basic knowledge of the physical phenomena that govern the movement of bodies for their subsequent incorporation into the understanding of the mechanical behaviour of tissues and the biomechanical peculiarities inherent to the different joints. We will also focus, both theoretically and practically, on the methods of evaluation of human movement, with particular focus on gait pattern and postural hygiene.

These approaches and goals are aligned with the following Sustainable Development Goals (SDGs) of the 2030 United Nations Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement.

2. Learning results

- To be able to solve problems on the mechanical principles applied both to the postures and movements of the human body and to the different physiotherapeutic treatments.
- To know how the structures that form the locomotor system respond to different types of loads and their application in injury prevention, as well as the biomechanical characteristics of the different joints of the human body.
- To know how our joints move, which muscles are involved in the different phases of their movement and the most relevant parameters to explore in each case.
- To know how to identify the factors that influence energy expenditure in walking.
- To be able to use different techniques for the study of human movement, especially gait.

3. Syllabus

Block 1: Fundamentals of biomechanics

1. Introduction to biomechanics
2. Statics
3. Kinematics
4. Kinetics
5. Work, power and energy
6. Simple machines
7. Fluid dynamics

Block 2. Structural biomechanics

1. Mechanical behaviour of tissues
2. Biomechanics of bone tissue
3. Biomechanics of muscle tissue
4. Joint biomechanics (tendon, ligament, cartilage)
5. Muscle strengthening

Block 3: Biomechanics of the joints of the human body

1. Biomechanics of the upper extremity
2. Biomechanics of the lower extremity
3. Biomechanics of the trunk

Block 4: Motion analysis

1. Introduction to motion analysis

2. Biomechanical analysis of erect posture
3. Biomechanical analysis of walking and running
4. Variations of normal gait in specific situations

4. Academic activities

Master classes: 46 hours

Each chapter of content that integrates the program of the subject will be presented, analysed and discussed by the faculty.

Laboratory practices: 15 hours

They will be carried out in small groups and in them the student should become familiar with the use of some techniques for the analysis of gait and posture, raising and working different scenarios.

Special practices in installations: 4 hours

Seminars / problem solving: 15 hours

Problems related to mechanical aspects applied to both posture and movements will be raised. A time will be allotted for their resolution, providing the students with the necessary help if they have doubts, and then they will be resolved as a group.

Group work: 36 hours

Study and personal work. 80 hours

Assessment tests. 4 hours

5. Assessment system

1. Written test (70% final grade, minimum 5/10 in each section):

a.- 50 multiple-choice test questions, with four alternatives of which only one will be correct. For every 3 incorrect answers correct answer will be subtracted.

b.- 10 short applied questions and/or problems on mechanical principles applied to the human body.

There will be an option to take a mid-term exam, with the same characteristics as the final exam but with half the length and which will allow the elimination of subject matter, averaging with the new content of the final exam.

2. Completion of a group work on movement analysis (15% final grade, minimum 5/10):

This work will consist of: approach of the same, with an appropriate bibliographic search, data collection with some of the techniques used in the laboratory to analyse the movement, analysis and discussion of the results and conclusions obtained. There will be an oral presentation and final defence of the work.

3. Active participation in laboratory practices and seminars (15% final grade, minimum 5/10):

At the end of the term, an individual report will be handed in with a brief summary of the practice carried out.

Students who do not attend 80% of practices and seminars will have to pass a practical exam. In this exam they should use the analysis techniques available in the laboratory, and know how to solve problems related to the mechanical bases of motion.