1. BASIC DATA

Subject	Biomechanics
Qualification	Physiotherapy/ Physical Activity and Physiotherapy Sciences
School/Faculty	Medicine, Health and Sports
Course	Second
ECTS	6
Character	Basic
Language/s	English
Modality	On-site
Semester	S1
Academic year	2025/2026
Coordinating teacher	Olga Barceló Guido

2. PRESENTATION

This subject belongs to the 2nd year of the Physiotherapy Degree and takes place in the 1st semester of the academic year.
This subject provides the basic biomechanical foundations for analysing balance and gait (both normal and pathological), as well as any everyday motor or sporting gesture, in order to prevent health problems.
At the same time, the understanding and mastery of fundamental concepts for the analysis of human movement is acquired. The integration of knowledge about the normal pattern of human gait is achieved. The subject is completed with the ability to identify pathological gait alterations and their relationship with the possible causes, understanding the biomechanical modifications that can be produced when performing inadequate daily motor or sporting gestures, in order to prevent health problems.

3. COMPETENCES AND LEARNING OUTCOMES

Core competences:

- CB2: That students know how to apply their knowledge to their work or vocation in a professional manner and possess the competences that are usually demonstrated through the elaboration and defence of arguments and problem solving within their area of study.
- CB4: Students are able to convey information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5: That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

Cross-cutting competences:

- TC2: Problem-solving skills.
- CT4: Capacity for analysis and synthesis.
- CT7: Computer skills relevant to the field of study.

Specific competences:

- SC1: Ability to examine and assess the functional status of the patient/user.
- SC8: Ability to evaluate the evolution of results.
- CE10: Ability to intervene in health promotion and disease prevention.
- CE92: Apply the principles and theories of physics, biomechanics, kinesiology and ergonomics, oriented to physiotherapy.

Learning outcomes:

- RA1: Understanding and mastery of fundamental concepts for the analysis of human movement.
- RA2: Integration of knowledge of the normal human gait pattern.
- RA3: Ability to identify pathological gait disturbances and their relationship to possible causes.
- RA4: Understanding of the biomechanical modifications that can occur when performing inadequate everyday motor or sporting gestures, in order to prevent health problems.

The table below shows the relationship between the competences developed in the subject and the learning outcomes pursued:

Competences	Learning outcomes
CB2, CB4, CB5, CT2, CT4, CE10	RA1: Understanding and mastery of fundamental concepts for the analysis of human movement.
CB2, CB4, CB5, CT2, CT4, CT7, CE8, CE92	RA2: Integration of knowledge of the normal human gait pattern.
CB2, CB4, CB5, CT2, CT4, CE1, CE8, CE10, CE92	RA3: Ability to identify pathological gait disturbances and their relationship to possible causes.
CB2, CB4, CB5, CT2, CT4, CT7, CE1, CE10, CE92	RA4: Understanding of the biomechanical modifications that can occur when performing inadequate everyday motor or sporting gestures, in order to prevent health problems.

4. CONTENTS

This section indicates the content of each of the topics contained in the learning units.

AU1: Anthropometry and mechanical properties of the locomotor apparatus.

-Cinematics
-Dynamics
-Statics
-Kinetics

AU2: Description and analysis, from a biomechanical and ergonomic point of view, of normal and altered human movement.

-Normal running pattern
-Alterations in human gait

UA3: Measurement of human movement using instrumental methods and techniques.

-Kinematic analysis techniques
-Kinetic analysis techniques

5. TEACHING-LEARNING METHODOLOGIES

The following are the types of teaching-learning methodologies to be applied:

- Masterclass.
- Case method.
- Cooperative learning.

6. TRAINING ACTIVITIES

The following identifies the types of training activities to be carried out and the student's dedication in hours to each of them:

Face-to-face mode:

Training activity	Number of hours
Master Class	10
Classroom practice	25
Case study analysis	35
Laboratory practicals	20
Self-study	50
Tutoring	10
TOTAL	**150**

7. EVALUATION

The following is a list of the assessment systems and their weighting in the total grade for the course:

Face-to-face mode:

Evaluation system	Weight
Knowledge test	35%
Case/problem	20%
Learning portfolio	45%

On the Virtual Campus, when you access the course, you will be able to consult in detail the assessment activities to be carried out, as well as the delivery dates and the assessment procedures for each one of them.

7.1. Ordinary call for proposals

To pass the course in the ordinary exam you must ....

- Attending the classes in which the evaluative training activities take place. Absences on any of the days of a learning activity may result in the suspension of that work for that particular person and a lower score in the participation item of the whole group to which he/she belongs.
- Achieve a grade equal to or higher than 5.0 in each evaluation block (training activities, cases and objective test).
- A minimum grade of 4.0 must be achieved in the learning activities of the block of training activities in order to be able to take the average.

7.2. Extraordinary call for applications

In order to pass the course in the extraordinary exam you must ....
-Make up those learning activities that have not been passed in the ordinary exam, doing them again in a group or individually, according to the teacher's criteria.
-Achieve a grade equal to or higher than 5.0 in each evaluation block (training activities, cases and objective test).
-A minimum grade of 4.0 must be achieved in the learning activities of the block of training activities in order to be able to take the average.

8. TIMETABLE

In this section you will find the timetable with dates for the delivery of evaluable activities of the subject:

Assessable activities	Date
Activity 1. Resolution of practical cases of moments of force	Week 2, 3
Activity 2. Analysis of normal human gait descriptors	Week 4, 6 and 9
Activity 3. Analysis of the normal gait pattern	Week 5, 6, 7 and 8
Activity 4. Analysis of real cases	Week 13, 14 and 15

This timetable may be subject to modifications for logistical reasons. Any modification will be notified to the student in due time and form.

9. BIBLIOGRAPHY

The reference work for the follow-up of the subject is:

- Sanchez-Lacuesta J. Biomechanics of normal and pathological human gait. 2nd edition. Valencia: Instituto de Biomecánica de Valencia, 2013.

Recommended bibliography is given below:

- Baker R. Measuring walking. A Handbook of Clinical Gait Analysis. Wiley, 2013.
- Bukowski E. Muscular analysis of everyday activities. Thorofare: Slack, 2000.
- Dufour M, Del Valle S, Langlois K, Pillu M. Functional biomechanics: limbs, head and trunk. Elsevier. 2018.
- Fucci S, Benigni M, Fornasari V. Biomechanics of the locomotor apparatus applied to muscular conditioning. 4th ed. Madrid: Elsevier, 2008.
- Garner J, Allen C, Chander H, Knight A. Applied Biomechanics Lab Manual. Human Kinetics Books, 2022.
- Hamil J, Knutzen KM, Derrick TR. Biomechanics: the basis of human movement. 5th ed. Barcelona: Wolters Kluwer, 2021.
- Izquierdo M, director. Biomechanics and neuromuscular bases of physical activity and sport. Madrid: Panamericana, 2013.
- Kapandji AI. Joint physiology: Volume 1: Upper limb. 6th ed. Madrid: Editorial Médica Panamericana, 2012.
- Kapandji AI. Joint physiology: Volume 2: Lower limb. 6th ed. Madrid: Editorial Médica Panamericana, 2012.
- Kapandji AI. Fisiología articular: Tomo 3: Tronco y Raquis. 6th ed. Madrid: Editorial Médica Panamericana, 2012.
- Kirtley C. Clinical gait analysis. Theory and practice. Edinburgh; New York: Elsevier 2006.
- Levine D, Richards J, Whittle M. Whittle's Gait Analysis. 5th ed. Churchill Livingstone: Elsevier, 2012.
- Martínez-Zazo S. Clinical Biomechanics of Gait and its Relation to Musculoskeletal Pathology. Zazo SM, 2020.
- Michaud T. Human Locomotion. The Conservative Management of Gait-Related Disorders. CreateSpace, 2011
- Miralles RC, Miralles I. Biomecánica clínica de las patologías del aparato locomotor, Barcelona: Masson, 2007.
- Molina Rueda F, Carratalá Tejada M. Human gait. Biomechanics, evaluation and pathology. Madrid: Editorial Médica Panamericana, 2020.
- Nordin M, Frankel VH. Biomechanical basis of the musculoskeletal system. 5th ed. Barcelona: Wolters Kluwer Heath/Lippincott Williams & Wilkins, 2022.
- Perry J, Burnfield, J. Gait Analysis, Normal and Pathological Function. Base, 2015.
- Pierre-Marie G, Bernard W. Posturology: regulation and alterations of standing. Barcelona: Masson, 2007.
- Pifarré F. Physics and Clinical Biomechanics for Physiotherapists and Podiatrists. Lérida: University of Lérida, 2021
- Prat J. Training course for Euroforum orthopaedic technicians: lower limb and human gait. Valencia: Instituto de Biomecánica de Valencia, 1995.
- Robertson GD, Caldwell GE, Hamill J, Kamen G, Whittlesey SN. Research methods in biomechanics + Access to Visual 3D Educational Software. 2nd edition. Champaign, IL: Human kinetics, 2013.
- Rose J, Gamble JG. Human Walking. Baltimore: Williams & Wilkins, 1994.
- Richards J. The comprehensive textbook of biomechanics (with Access to E-Learning Course). Elsevier Helth Science, 2018.
- Trew M, Everett T. Fundamentals of human movement. 5th edition. Barcelona: Masson. 2006.
- Watkins J. Structure and function of the musculoskeletal system. 2nd ed. Champaign, IL: Human kinetics, 2010.
- Whittle M. Gait analysis: an introduction. Edinburgh: Butterworth. 2007.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit (ODI) we offer support to our students throughout their university life to help them achieve their academic achievements. Other pillars of our action are the inclusion of students with specific educational support needs, universal accessibility in the different campuses of the university and equal opportunities.
This unit offers students:

1. Accompaniment and follow-up through counselling and personalised plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made, i.e. in terms of methodology and assessment, for those students with specific educational support needs, thus pursuing equal opportunities for all students.
3. We offer students different extracurricular training resources to develop various skills that will enrich their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to participate in satisfaction surveys to detect strengths and areas for improvement about the teaching staff, the degree and the teaching-learning process.

Surveys will be available in the survey area of your virtual campus or through your email.

Your assessment is necessary to improve the quality of the degree.

Thank you very much for your participation.