

1. BASIC INFORMATION

Course	Biomechanics
Degree program	Bachelor's degree in physical Activity and Sports Sciences
School	Faculty of Physical Activity and Sports Sciences
Year	2nd
ECTS	6
Credit type	Basic
Language(s)	Spanish and English
Delivery mode	Face
Semester	S4
Academic year	2nd
Coordinating professor	Ignacio López Moranchel
Professor	Jesús Aceituno Duque

2. PRESENTATION

Biomechanics was defined by the *International Council for Sports and Physical Education* of UNESCO (1971) as: a scientific discipline with its own objective and methodology that allows us to know the role played by the mechanical forces that produce movements, their autonomic support, neurological initiation, integrated control and perception, as well as their central design. Having as its main contents the physical foundations of human movement.

Its methodological procedures and applications focus on:

- The medical field, analysing the pathologies that affect the musculoskeletal system with the aim of generating knowledge for their diagnosis, evaluation and recovery.
- The sports field, analysing sports practice with the aim of optimising performance, supporting the training process and designing sports equipment.
- The occupational field, analysing the mechanical relationships between man and the elements of his domestic, work, leisure or educational environment, with the aim of adapting them to their needs and biological characteristics, increasing productivity and guaranteeing occupational health.

Thus, Biomechanics offers physical education professionals enormous possibilities for the study and analysis of movement, providing proposals and solutions of a scientific and technological nature, thus contributing to improving technical sports training, optimizing performance and contributing to physical recovery.

Biomechanical assessment in all professional fields (sports, education, health, research, etc.) is a professional competence and an important part of the work that graduates in Physical Activity and Sports Sciences usually carry out within a multidisciplinary environment, therefore, any sports and health professional (doctors, physiotherapists, podiatrists, coaches, Physical trainers..) you can ask professionals

with university degrees in Physical Activity and Sports Sciences to carry out a biomechanical assessment of one of their patients or athletes as the case may be.

In this subject, the biomechanical foundations are developed to analyze human movement in any sports discipline, focusing attention on throwing, running and jumping. The subject will allow us to know and apply the mechanical foundations that determine human functionality and its effects on external loads. On the other hand, the contents to be developed allow us to know and use the instruments that are currently used in biomechanics for kinematic and dynamic analysis of movement.

3. LEARNING OUTCOMES

Knowledge

CON01. It identifies the anatomical structures, functions of the different systems of the human body and pathophysiology to seek their applicability and development through physical exercise.

- Identify the basic concepts of biomechanics applied to the sciences of physical activity and sport.
- It integrates biomechanical principles for the analysis of a sporting gesture.
- Identify methods and techniques that contribute to measuring different biomechanical variables

Skills

HAB01. It examines the anatomy, functions of different systems or apparatus, and the pathophysiology that influence responses to physical exercise

- Apply biomechanical principles to career analysis.
- Apply biomechanical principles for jump analysis.
- Solves practical problems related to biomechanical principles in any sporting gesture.

Competences

CP01. Identify, communicate and apply anatomical-physiological and biomechanical scientific criteria at an advanced level of skills in the design, development and technical-scientific evaluation of appropriate procedures, strategies, actions, activities and orientations; to prevent, minimise and/or avoid a health risk in the practice of physical activity and sport in all types of population.

CP18. To develop and implement the technical-scientific evaluation of the elements, methods, procedures, activities, resources and techniques that make up the manifestations of movement and the processes of physical condition and physical exercise; taking into account the development, characteristics, needs and context of individuals, the different types of population and the spaces where physical activity and sport are carried out; in the various sectors of professional intervention and with emphasis on populations of a special nature.

CP26. Articulate and deploy with rigor and a scientific attitude the justifications on which to elaborate, support, substantiate and justify in a constant and professional manner all acts, decisions, processes, procedures, actions, activities, tasks, conclusions, reports and professional performance.

CP38. Digital competence: Use information and communication technologies for data search and analysis, research, communication and learning.

CP41. Critical analysis. Integrate analysis with critical thinking in a process of evaluating different ideas or professional possibilities and their potential for error, based on evidence and objective data that lead to effective and valid decision-making.

CP42. Resilience. Adapt to adverse, unexpected situations, and situations that cause stress, whether personal or professional, overcoming them and even turning them into opportunities for positive change.

4. CONTENT

Topic 1. Basics.

Topic 2. Kinematics (linear and angular).

Topic 3. Dynamics (kinetic and static).

Topic 4. Biomechanical analysis of the race.

Topic 5. Biomechanical analysis of the jump.

Topic 6. Biomechanical analysis of the sports gesture

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Masterclass
- Problem-Based Learning
- Learning based on workshop/laboratory teachings
- Simulation environments

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Lectures	12
Freelance work	56
Debates and colloquia	8
Tutorials	12
Face-to-face assessment tests	2
Preparation of reports and writings	17
Activities in workshops and/or laboratories	8
Troubleshooting	17
Practical Application Classes	18
TOTAL	150

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Face-to-face assessment test	40-50%
Case/Problem	10-40%
Workshop/laboratory practice notebook	15-25%
Reports and Briefs	5-15%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Date
Hand out practical worksheets 1 and 2	4th week of February
Partial Knowledge Test 1	4th week of March

Hand out practical worksheets 3 and 4	1st week of June
Presentation of jumping and running topics	1st week of June
Partial knowledge test 2	2nd week of June

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAFÍA

The main reference work for this subject is:

- AGUADO, X. (1993): Eficacia y técnica deportiva. Análisis del movimiento humano. Barcelona. INDE. ISBN 848730207.
- AGUADO, X.; IZQUIERDO, M. (1997): Biomecánica fuera y dentro del laboratorio. León. Universidad de León. ISBN 8477196265
- BARTLETT, R. (2007): Introduction to sports biomechanics: analysing human movement patterns. Routledge. . ISBN 9780415339933
- BLAZEVICH, A. (2013): Biomecánica deportiva: manual para la mejora del rendimiento humano. Badalona. Paidotribo. ISBN 9788499100715
- CARR, G. (1997): Mechanics of Sport, Champaign, Human Kinetics. ISBN 0873229746
- FUCCI, S.; BENIGNI, M; FORNASARI, V. (2008): Biomecánica del aparato locomotor aplicada al acondicionamiento muscular, Barcelona, Mosby/Doyma

The recommended Bibliography is:

- GUTIÉRREZ, M (2015): Fundamentos de Biomecánica Deportiva, Madrid, Síntesis. ISBN 9788490771921
- HAY, J.G. (1993): The Biomechanics of sports techniques, Philadelphia, Prentice-Hall. ISBN 013084534
- KAPANDJI, I. (1994): Cuadernos de fisiología articular, Barcelona, Toray-Masson. ISBN8431101520
- KNUDSON, D. (2007): Fundamentals of biomechanics. Springer. ISBN 9780387493114
- LUTTGENS, K.; WELLS, K.F. (1985): Kinesiología. Bases Científicas del Movimiento Humano, Madrid, Saunders College Publishing. ISBN 8485514521
- WATKINS, J. (2014): Fundamental biomechanics of sport and exercise. Routledge. ISBN 9780203066461
- WILSON, J.D. (2007): Física, México, Pearson Educación. ISBN 9789702608516

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.

2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage 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. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.