

**COURSE DATA****Data Subject**

<b>Code</b>	33217
<b>Name</b>	Biomechanics of physical activity
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2019 - 2020

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1312 - Degree in Physical Activity and Sport Sciences	Faculty of Physical Education and Sport Sciences	3	Other cases
1331 - Degree in Physical Activity and Sport Sciences (Ont)	Faculty of Physical Education and Sport Sciences	3	Other cases

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1312 - Degree in Physical Activity and Sport Sciences	13 - Biomechanics of physical activity	Obligatory
1331 - Degree in Physical Activity and Sport Sciences (Ont)	13 - Biomecánica de la Actividad Física	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
BRIZUELA COSTA, GABRIEL ALBERTO	122 - Physical and Sports Education
PEREZ SORIANO, PEDRO	122 - Physical and Sports Education

**SUMMARY**

Biomechanics of physical activity is a matter of basic and mandatory training, which consists of 6 ECTS credits spread over a semester. Biomechanics of Physical Activity (and / or Sports Biomechanics), could be defined as an eminently interdisciplinary branch of applied biomechanics, with foundation or starting point in the Science of Physical Activity and Sport, whose object of study through different tools and instrumental techniques, focuses on humans for physical practice / sports (especially the kinetics and kinematics of movement), and the result of their interaction with others, fluids, surface and /or inanimate objects .



Through theoretical matter, be submitted to the biomechanics, its method, its application areas and their different perspectives, will explore the mechanical basis governing the movement, describing the instrumental techniques employed, different movements will be analyzed human as well as the main biomechanical design criteria and selection of material and sports equipment. To complement this theoretical content, practical content developed through workshops and seminars will enable students / as familiar with the method of Biomechanics, taking direct contact measurement instrumentation, and propose solutions to various problems proposed.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

## COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

### 1312 - Degree in Physical Activity and Sport Sciences

- Apply the principles of fundamental rights, gender equality, equal opportunities, universal accessibility for people with disabilities, solidarity, environmental protection, the culture of peace and democratic values.
- Design, implement and evaluate the teaching-learning processes related to physical activity and sport, paying attention to the individual, collective and contextual characteristics of people.
- Promote and evaluate the acquisition of enduring and autonomous habits of practising physical activity and sport.
- Plan, implement and evaluate physical activity and sports programmes targeted at special populations.
- Select and know how to use sports material and equipment, suitable for each type of activity and population.
- Apply information and communication technologies (ICTs) in the field of physical activity and sport sciences.
- Develop habits of professional excellence and quality.
- Gain basic scientific training applied to physical activity and sport in their mechanical forms.
- Know and understand the biomechanical factors that determine the practice of physical activity.
- Know and understand the effects of the practice of physical exercise on the structure and mechanical function of the human body.



- Apply biomechanical principles to the different fields of physical activity.
- Identify mechanical risks derived from inappropriate physical and sporting activities and propose alternatives.
- Select and know how to use sports material and equipment in the most appropriate way for different types of activities and populations under biomechanical criteria.

## LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

The **general objectives** of the student expected to matter Biomechanics of Physical Activity scope, are closely linked with the competencies listed above. In brief, one could say that the fundamental objective of the course is that "*the student knows and is able to analyze the physical and sporting activity, from a biomechanical perspective, applying its methodology.*" In this sense, the general objectives proposed will enable the student:

1. *Understanding the origins, perspectives and current status of sports biomechanics, and their main sources of scientific information.*
2. *Apply basic biomechanical principles of the causes of motion and equilibrium states for improving efficiency and reducing injuries in practice physical / sports.*
3. *Describe the physical techniques / sports from the standpoint of mechanics to improve the teaching-learning process.*
4. *Know and correctly select the tools, techniques and methodology suited to the study and analysis of different techniques and physical activities / sports.*
5. *Identify and distinguish the characteristics, properties and functions most important materials and equipment for physical practice / sports.*

**Skills or abilities** that the student of the subject Biomechanics of Physical Activity must meet, will be able to:

1. *Understanding Physical Activity and Sport from a biomechanical perspective, and apply subject knowledge to specific problems that occur during exercise training.*
2. *Relate the principles and laws of mechanics with the content of other subjects of the degree, especially with the structure and function of the human body.*
3. *Using concepts and mechanical parameters for describing and analyzing human body movement.*
4. *Select and recommend, from a biomechanical perspective, the material and sports equipment suited to the characteristics of individuals and Physical Activity to develop.*



5. 5. *Drawing on documentary sources that specialize in finding specific information to solve problems.*
6. 6. *Select and use simple biomechanical instrumentation for basic analysis of human movement, and to interpret data derived from the use of basic playing techniques.*

**Enhanced social skills** in the subject of Biomechanics of Physical Activity, from the academic point of view, social and professional are:

1. 1. *Observe and follow established educational standards in the classroom and the laboratory of the Faculty of Physical Education and Sport.*
2. 2. *Be rigorous, methodical, and systematic during the application of methods and techniques used in biomechanics, as well as the shape and organization of the results.*
3. 3. *Rate Biomechanics as a useful tool for improving the work of graduates in Science of Physical Activity and Sport.*
4. 4. *Appreciate the usefulness of technology for the analysis and biomechanical studies.*
5. 5. *Consider the attitudes of collaboration, consensus, negotiation, conflict resolution and respect for the views while working as a team.*
6. 6. *Foster spirit of research, developing in students the ability to analyze new problems with instrumental techniques presented.*

*Develop communication skills and / or expression as well as the use of new learning technologies and resources.*

## DESCRIPTION OF CONTENTS

### 1. INTRODUCTION TO BIOMECHANICS

Unit One (Issues 1-3), establish the conceptual and historical framework of Biomechanics and analysis methodology used.

### 2. MECHANIC BASES: ANALYSIS OF PHYSICAL ACTIVITIES & SPORTS

Second unit (items 4-9) presents the basic content for the mechanical analysis (dynamic and kinematic) motion or rest of the body, as well as interaction with fluids and materials for the practice of physical activity and sport.

**3. BIOMECHANICAL TECHNIQUES TO INSTRUMENTATION**

Unit III (Items 10): Instrumental techniques not discussed in the workshops will be described.

**4. BIOMECHANICAL ANALYSIS OF PHYSICAL ACTIVITIES & SPORTS**

Fourth unit, is presented to students from the perspective of biomechanical analysis, kinematic and kinetic characteristics of human gestures often related to physical activity, and a small representation of biomechanical analysis in different sports and physical activities.

**5. BIOMECHANICAL OF SPORTS EQUIPMENT**

Finally, the Fifth Unit , aims to introduce students in the biomechanical study of materials and sports equipment, from the perspective of health and performance, specifically in footwear and sports surface (present in any physical activity / sports).

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Laboratory practices	15,00	100
Attendance at events and external activities	2,00	0
Development of group work	10,00	0
Development of individual work	8,00	0
Study and independent work	20,00	0
Readings supplementary material	14,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	8,00	0
Resolution of case studies	8,00	0
<b>TOTAL</b>	<b>150,00</b>	

**TEACHING METHODOLOGY**

As shown in the previous section, the development of the subject is structured around 4 face axes: Theoretical lessons, workshops, seminars and tutorials, as well as two non-contact areas: Study and autonomous and / or team work.



The theoretical lessons will be taught in the classroom, where the scientific and technical matter, bases highlighting the key to understanding the subject concepts are explained.

The practical lessons (workshops) are normally taught in the Laboratory of Biomechanics. Will last approximately 2 hours and the student may check (individually or collectively), procedures practical application, allowing familiar with tools used in sports biomechanics, develop their ability to analyze biomechanical variables and confront the actual resolution problems, and to strengthen and reaffirm the validity of the content covered in lectures.

Seminars: may be developed in the classroom, with the same resources of the lectures. Each seminar will consist of a small number of works, which will be presented by the students themselves. These monographs, allow introduce students in intellectual collaboration, preparing for team research, especially focused on the search and selection of information.

Tutorships: they will be held in the offices of professors and virtually by email (official user UV). They guide the student's interest in learning more about a particular subject matter, and especially to answer questions related to the subject itself.

## EVALUATION

The minimum requirements to overcome the subject are related to overcoming of the theoretical part and the practice:

1. In relation to the theoretical part, students must obtain a minimum score of 5 points (out of 10) in the final theoretical exam.

There will be a theoretical exam on the official day. However, prior (partial) checks may be carried out, which eliminate subject matter from the final exam. In these partial exams the same criteria will be followed to overcome them, that is, it is exceeded by 5 points (out of 10).

2. In relation to practical part, attendance, participation, as well as the obligatory presentation of the requested workshops ("Portfolios") (in the case of being requested) will have a maximum score of 2 points.

The final mark of the subject will be obtained as follows: Final Note = (80%) Theoretical note + (20%) Practical note + \* Complementary activities (10%)

*\* Participation in activities complementary to the subject will be raised on a voluntary basis (previously confirmed by the professor), and may increase the final mark to a maximum of 1 point.*



*\* "The literal or partial copying of works by third parties presenting them as their own is considered an unacceptable conduct in the academic field, and on the other hand, due to the law of protection of intellectual property, total or partial reproductions of the works of others are usually prohibited. give rise to non-compliance with the corresponding offenses or criminal offenses. "*

## REFERENCES

### Basic

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- Joseph Hamill PhD, Kathleen Knutzen PhD, Timothy Derrick (2017). Biomecánica básica. bases del movimiento humano 4ª ed. Lippincott Williams and Wilkins. Wolters Kluwer Health

## **ADDENDUM COVID-19**

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

### **ADENDA A LA GUÍA DOCENTE MOTIVADA POR COVID 19 - 2º CUATRIMESTRE (1º Y 2º CONVOCATORIA)**

#### ***Evaluación***

Se mantienen los criterios de evaluación previos, eliminando materia para el examen final.

Se mantiene el peso del 20 % de la Nota Final para el total de prácticas realizadas por cada subgrupo.

El examen teórico se sustituye por un trabajo académico, que supondrá el 80 % de la nota final y se detallará en el Aula Virtual.

En Segunda Convocatoria los alumnos serán convocados a presentar un trabajo académico, que se detallará en el Aula Virtual.