



Information about the subject

Degree: Bachelor of Science Degree in Podiatry

Faculty: Faculty of Medicine and Health Sciences

Code: 470201 **Name:** Biomechanics

Credits: 6,00 **ECTS Year:** 2 **Semester:** 2

Module: GENERAL PODOLOGY AND BIOMECHANICS

Subject Matter: Biomechanics **Type:** Compulsory

Field of knowledge: Health Sciences

Department: -

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

472A Francisco Javier Torralba Estelles (**Responsible Lecturer**)

Javier Martinez Gramage

javier.torralba@ucv.es

javier.martinez@ucv.es



Module organization

GENERAL PODOLOGY AND BIOMECHANICS

Subject Matter	ECTS	Subject	ECTS	Year/semester
General Podiatry	21,00	Evolutionary Podiatry	3,00	This elective is not offered in the academic year 23/24
		Expertise in podiatry	3,00	This elective is not offered in the academic year 23/24
		General Podiatry	6,00	1/2
		Preventive Podiatry	3,00	4/1
		Social Morality. Deontology	6,00	3/1
Biomechanics	27,00	Biomechanics	6,00	2/2
		Ergonomics and footwear	3,00	4/1
		General Intervention Procedures	6,00	This elective is not offered in the academic year 23/24
		Physiotherapy Assessment	6,00	This elective is not offered in the academic year 23/24
		Sports Podiatry	6,00	3/2
Radiology	6,00	Radiology and Radiation Protection	6,00	3/1



Research and management	12,00	Introduction to research and sanitary documentation	6,00	4/1
		Planning and management of the podiatric clinic	6,00	4/2

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 Knows how to locate and recognize on a phantom 10 points corresponding to the axes, planes of movement and joint paths of the different joints of the lower limb and foot.
- R2 After viewing two videos, the student is able to recognize the criteria of normality of the biomechanics of the foot and gait in a checklist.
- R3 On the basis of the presentation of 5 clinical cases, the student is able to distinguish the different pathomechanical entities of the foot and the alterations of the gait, being able to emit an adjusted diagnosis.
- R4 In the biomechanics classroom/workshop, the student will visualize patients/actors by corners simulating pathological wanderings. The student will have to request the most suitable computerized biomechanical exploration and later, without the patient, will have to write a complete report delivering it through the platform for its evaluation.
- R5 After viewing several sports videos, the student identifies the concepts related to the biomechanics of physical exercise in a rubric.
- R6 The student shows knowledge about physical mechanics and elasticity to understand and analyze certain situations and biomechanical processes.
- R7 Searches for bibliographic information from different sources and knows how to analyze it with a critical and constructive spirit.
- R8 Shows knowledge of thermodynamics describing biological processes of energy and heat transmission.
- R9 Knows the main disciplines that integrate the physical sciences, their fundamentals and areas of work.



Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB1	Students demonstrate knowledge and understanding in an area of study that is at the core of general secondary education, and is often at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.		X		
CB3	Students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant social, scientific or ethical issues.		X		
SPECIFIC		Weighting			
		1	2	3	4
CE37	Students know the basics of biomechanics and kinesiology. Support theories. Human walking. Structural alterations of the foot. Postural alterations of the locomotive system with repercussions on the foot and vice versa. Instruments of biomechanical analysis.				X
TRANSVERSAL		Weighting			
		1	2	3	4
CT1	Analytical capabilities				X
CT2	Organizational and planning skills			X	
CT7	Problem solving				X
CT8	Decision making				X
CT14	Critical Reasoning			X	



Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4, R5, R6, R7, R8, R9	40,00%	Tests
R1, R2, R3, R4, R5	15,00%	Practice (exercises, case studies, problems)
R1, R2, R3, R4, R5, R6, R7, R8, R9	5,00%	Class participation
R1, R2, R3, R4, R5	40,00%	Practice exam- technical proficiency testing

Observations

NOTES:

To pass, the theoretical and practical content must be approved independently.

The written test will consist of:

40 multiple choice questions with 4 answer alternatives and a single valid option. Each question answered incorrectly will discount following the formula: $A - (E / n - 1)$. A = correct answers, E = errors, n = number of alternatives. Maximum value: 4 points.

The practical test will consist of:

The student will blindly choose two tests from among all the clinical tests seen during the practice of the subject. The evaluation will be on the practical exam rubric. It will be mandatory to pass the subject to have each and every one of the parts of the assessment instruments approved with a minimum grade of 5.

MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.



Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- M1 Theoretical classes (TC). Training activity preferably oriented to the acquisition of knowledge skills. It is characterised by the fact that students are spoken to. Also called master class or expository class, it refers to the oral exposition made by the teacher, (with the support of a blackboard, computer and cannon for the exposition of texts, graphics, etc.).
- M2 Seminars (S). Training activity preferably oriented to obtain knowledge application and research competences. Knowledge is built through interaction and activity. Consisting of supervised monographic sessions with shared participation (Teachers, students, experts). The size of the group is variable, from a large group to small groups, no less than 6 students for interaction. The evaluation will be made by means of follow-up records by the teacher. Participation and development of problem-solving skills should be taken into account.
- M3 Problems practice (CPP). Training activity oriented to group work for problem solving under the supervision of a teacher. The size of the group is variable, in a range of 10-20 students, to avoid confusion with a master class.
- M4 Classroom practice (CPA). Training activity of work in groups that is developed in the classroom. It includes work with documents (e.g.: work with articles or documents, clinical case studies, diagnostic analyses, etc). The size of the group is variable, in a range of 10-20 students.
- M5 Computer Practice (CPI). Training activity of work in groups that is developed in the Computer Classroom where the learning is developed using the computer as a support. It includes the work with computer models, specific software, web queries, etc. The size of the group is variable, in a range of 10-20 students.
- M6 Laboratory Practice (CPL). Training activity of work in groups that is developed in the Laboratory. It includes the sessions where students actively and autonomously develop, supervised by the teacher, laboratory experiments. The size of the group is variable, in a range of 10-20 students.



- M7 Tutorials (T). Set of activities carried out by the teacher with personalised attention to the student or in small groups with the aim of reviewing and discussing the materials and topics presented in the classes, seminars, readings, completion of assignments, etc. The aim is to ensure that education is truly a comprehensive training of the student and is not reduced to a transfer of information. It is, therefore, a personalized relationship of help in which the teacher-tutor attends, facilitates and guides one or more students in the formative process.
- M8 Evaluation (Ev). It is the set of processes that try to evaluate the learning results obtained by the students and expressed in terms of acquired knowledge, capacities, developed skills or abilities and manifested attitudes. It covers a wide range of activities that can be developed for students to demonstrate their training (e.g. written, oral and practical tests, projects or assignments,). It also includes Official Calls.
- M10 Estudio del alumno: Preparación individual de lecturas, ensayos, resolución de problemas, seminarios



IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical lessons M1	R1, R2, R3, R5, R6, R7, R8, R9	25,00	1,00
Seminar M2	R1, R2, R3, R4, R5, R6, R7, R8, R9	10,00	0,40
Practice lessons M4	R2, R3, R4, R5	16,50	0,66
Office Hours M7	R6, R8	3,50	0,14
Evaluation M8	R1, R2, R3, R4, R5, R6, R7, R8, R9	5,00	0,20
TOTAL		60,00	2,40

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Autonomous work M10		70,00	2,80
Group work M10		20,00	0,80
TOTAL		90,00	3,60



Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
INTRODUCTION:	Introduction to biomechanical systems Modern biomechanical terminology
BIOMECHANICS OF THE LOCOMOTIVE DEVICE.	STUDY OF THE ELEMENTS.
TECHNOLOGY	New devices applied to biomechanics Software and hardware for use in biomechanics Kinematic and kinetic devices
CLINIC TEST	Biomechanical valuation with clinic test
CLINICAL TEST	Biomechanical assessment clinical tests
Biomechanics of normal human gait	Study of the normal development of human gait Muscular system involved in human gait
THE CLINICAL-BIOMECHANICAL HISTORY	Development of clinical biomechanics history
PRACTICES	Development of the skills acquired during the course in biomechanical exploration



Temporary organization of learning:

Block of content	Number of sessions	Hours
INTRODUCTION:	2,00	4,00
BIOMECHANICS OF THE LOCOMOTIVE DEVICE.	2,00	4,00
TECHNOLOGY	4,00	8,00
CLINIC TEST	2,00	4,00
CLINICAL TEST	5,00	10,00
Biomechanics of normal human gait	6,00	12,00
THE CLINICAL-BIOMECHANICAL HISTORY	4,00	8,00
PRACTICES	5,00	10,00



References

- Kapandji. Fisiología Articular Tomo 2 Miembro inferior 6ª ed.
- CALAIS-GERMAIN, B. Anatomía para el movimiento. Girona: Curbet y Marques Impressors ;1992.
- De Pedraza. Física Aplicada de las Ciencias de la Salud: Barcelona : Masson; 2000
- Donskoi D, Zatsiorski V. Biomecánica de los ejercicios físicos. Moscú : Raduga; 1988
- Hainaut K. Introducción a la biomecánica. Barcelona : Jims; 1982
- Le Veau B. Biomecánica del movimiento humano. México: Trillas; 1991
- LlanoS F. Introducción a la biomecánica del aparato locomotor. Madrid: Universidad Complutense; 1988
- Miralles Marrero R.C. Biomecánica clínica del aparato locomotor. Barcelona: Masson; 1998
- Viladot Lecciones Básicas de Biomecánica del Aparato Locomotor. Barcelona: Springer; 2001
- ADRIAN,MJ COOPER,J.M. (1995) Biomechanics of human movement. Brown Benchmark. Iowa
- ALCANTARA, E. Guía de recomendaciones para el diseño, selección y uso de calzado para personas mayores. Ministerior de Trabajo y Asuntos Sociales. Madrid. 1998
- Hunter,s (1995) Foot orthotics in therapy and sport. Human Kinetics. England.
- Instituto de Biomecanica de Valencia. (1989) El calzado para carrera urbana. Criterios biomecánicos de diseño
- Instituto de Biomecanica de Valencia. 1992 Biomecánica de la fractura osea y técnicas de reparación. Vol II.
- Lelievre,j. (1982). Patología del pie. 4ª ed. Barcelona. Toray Masson, S.A
- Nordin, M Frankel, V(1989) Basic biomechanics of the musculoskeletal system. Lea Febiger
- Pérez García, JM Podobarometría. En Monografías Médico-Quirúrgicas del Aparato Locomotor. El Pie. (1997) Llanos Alcazar LF Acebes Cachafeiro JC. Masson S.A. pp.17-32
- Perry,J (1992) Gait Analysis. Normal and pathological function. SLACK Incorporated. New Jersey.
- Plas,F. Viel,E. Blanc,Y. (1984). La marcha humana. Paris. Masson, S.A.



Ramiro, J - Alcantara, E - Ferrandis, R - Forner, A - García Belenguer, A - Vicente, J - Vera, P 1995
Guía de recomendaciones para el diseño de calzado. Instituto de Biomecánica de Valencia

Kirby K. Foot and lower extremity biomechanics I. A ten year collection of Precision Intricast

Kirby K. Foot and lower extremity biomechanics II. 1997- 2002 Precision Intricast

Kirby K. Foot and lower extremity biomechanics III. 2002- 2008 Precision Intricast

Root M, Orien W, Week J. "Normal and abnormal function of the foot". Clinical Biomechanics. Los Angeles; 1997

Root M; Orien W. "Exploración Biomecánica del pie". Volumen 1. Madrid: Edit. Ortocen.; 1991

Valmassy, RL. Clinical Biomechanics of the lower extremities. Edit. St. Louis. Mosby; 1996.

Perry, Burnfield. Análisis de la marcha. Función Normal y Patológica. Barcelona. Ed. Base. 2015.

Kirby K. Foot and lower extremity biomechanics IV. 2009- 2013 Precision Intricast

Biomecánica Funcional. Miembros, Cabeza, Tronco. Ed. ELSEVIER. Michel Dufour, Michel Pillu. Ed. 2018.

Biomecánica clínica de la marcha. Ed. Zazo SM. 2020.

Biomecánica patológica de las lesiones de pie y tobillo. Ed. Zazo SM. 2021.



Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

☒ Microsoft Teams

☐ Kaltura



Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

☒ Microsoft Teams

☐ Kaltura

Explanation about the practical sessions:



2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools:

☒ The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

☐ The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Comments to the Assessment System: