



IDENTIFYING DATA

Physiology: Functional movement in physiotherapy

Subject	Physiology: Functional movement in physiotherapy			
Code	P05G171V01105			
Study programme	Grado en Fisioterapia			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Basic education	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Justo Cousiño, Lorenzo Antonio			
Lecturers	Justo Cousiño, Lorenzo Antonio			
E-mail	lorenzo.justo@uvigo.es			
Web	http://http://fisioterapia.uvigo.es/gl/			
General description	<p>In the subject Functional Movement in Physical Therapy, the human body will be studied from a functional and dynamic point of view, taking as a starting point the static analysis provided by Anatomy. Therefore, a general perspective of Biomechanics applied to the human body will be provided.</p> <p>Biomechanics is the science that studies internal and external forces, and how they affect the human body from a multidisciplinary approach, taking as a reference Anatomy and Mechanics (part of Physics that studies the movement of bodies and their responses to forces). Therefore, Biomechanics can be considered the convergence between Classical Mechanics and Life Sciences.</p> <p>In this course, students will learn the basic aspects of biomechanics and movement analysis, study the behavior of biological tissues under different forces, as well as the segmental joint physiology of the human body.</p> <p>It is intended that the student acquires the necessary knowledge about the functioning of the locomotor system and the influence that can exert the different forces to which the organic tissues are subjected.</p>			

Training and Learning Results

Code	
A2	Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
C2	Understand the principles of biomechanics and electrophysiology, and their main applications in the field of physical therapy.
C6	Identify anatomical structures as a basis of knowledge to establish relationships dynamically with the functional organization.
C12	To know and apply the theoretical bases and the development of physiotherapeutic methods and procedures.
C13	Have the ability to assess from the perspective of physiotherapy, the functional status of the patient/user, considering the physical, psychological and social aspects of the same.
C15	Understand ergonomic and anthropometric principles.
C31	Know the structure of the human body and identify structural elements and alterations of normality in the different methods of analysis and diagnosis through imaging.
C34	To know and understand the morphology, physiology, pathology and behavior of people, both healthy and sick, in the natural and social environment.
C35	To know and understand the sciences, models, techniques and instruments on which physiotherapy is based, articulated and developed.
D2	Computer skills related to the field of study
D5	Developing leadership and organizational skills.

Expected results from this subject			
Expected results from this subject		Training and Learning Results	
Know the bases *elementais of the *biomecânica		C2 C15 C35	
Identify the guidelines for the analysis of the human movements		C6 C12 C15 C35	
Know to laws of the movement, strengths, crowbars and pulleys and his application in Physiotherapy		C2 C12 C15	
Define the concept of elasticity, *viscoelasticidade and his practical application in physiotherapy		C2 C12 C15 C35	
Identify the mechanical properties of the bone		C6 C34	
Describe the articular mechanics and his application in Physiotherapy		C2 C12 C15 C35	
Identify the mechanical properties of the muscular contraction		C6 C34	
Identify the repercussion of the distinct types of muscular activity and his application in the Physiotherapy		C2 C6 C12 C13 C15	
Describe and *correlacionar the segmentary analysis, of the movements of the human body		C2 C12 C15 C31 C35	
Analyse the *biomecânica basic of a determinate gesture		A2 C2 C12 C15 C31 C35	D2 D5

Contents

Topic	
1. Physical basis of biomechanics and kinesiological analysis of movement.	1. Introduction to Biomechanics. 2. Basic concepts of Biomechanics. 3. Kinesiological analysis of movement.
2. Biomechanics of organic tissues.	1. Biomechanics of bone. 2. Biomechanics of the joints. 3. Muscle biomechanics.
3. Joint and muscular biomechanics of the trunk.	1. Biomechanics of the spine as a whole. 2. Biomechanics of the pelvic girdle. 3. Biomechanics of the lumbar spine. 4. Biomechanics of the thoracic spine. 5. Biomechanics of the cervical spine and temporomandibular joint.
4. Joint and muscle biomechanics of the upper extremity.	1. Biomechanics of the shoulder joint complex. 2. Biomechanics of the elbow and pronation. 3. Biomechanics of the wrist and hand.
5. Joint and muscle biomechanics of the lower extremity.	1. Biomechanics of the hip. 2. Biomechanics of the knee. 3. Biomechanics of the ankle and foot. 4. Biomechanics of gait.
Practical contents	Basic experiments in Biomechanics. Gesture analysis..

Planning

	Class hours	Hours outside the classroom	Total hours

Introductory activities	1	0	1
Lecturing	48	120	168
Mentored work	1	3	4
Laboratory practical	8	23	31
Presentation	1	3	4
Autonomous problem solving	2	7	9
Collaborative Learning	1	2	3
Essay questions exam	1	0	1
Essay	2	0	2
Laboratory practice	1	0	1
Objective questions exam	1	0	1

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Introductory activities	Activities directed to take contact and gather information on the students, as well as to present the matter.
Lecturing	The theoretical classes will be participatory and will use the didactic query, debate, study of cases and strategies of resolution of problems. The students will have to his disposal in the platform Fear the notes elaborated by the/the professor/to, that will serve him of guide.
Mentored work	The students will have to elaborate a work, where will do an analysis *biomecánico basic of the human body on a filming in video that has to make the own students. Each group, in accordance with the/the professor/to, will do the work with a specific orientation on the subject and will use the platform Fear.
Laboratory practical	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and procedures related with the matter object of study. They develop in space spaces with skilled equipment. It will use the experimental demonstration, the strategy of simulation, the didactic treatment of errors and the systematic training.
Presentation	Exhibition with audiovisual means by part of the students, in front of the educational and the other students, of the work *tutelado.
Autonomous problem solving	The students will have to solve situations of the real life with his own strategies through the knowledge, the investigation and the reflection.
Collaborative Learning	In the theoretical classes will develop a methodology of learning *colaborativo, where the different subjects will see through activities made in group, facilitating the development of an active participation of the students.

Personalized assistance

Methodologies	Description
Collaborative Learning	The orientation and mentoring of the collaborative learning activity will be done in large group tutoring.
Mentored work	Students must send an e-mail request indicating "Tutorials" in the subject line. The teacher will indicate the date and time of the tutorial.
Laboratory practical	Students should send an e-mail request indicating "Tutorials" in the subject line. The teacher will indicate the date and time of the tutorial.
Lecturing	Students should send an e-mail request indicating "Tutorials" in the subject line. The teacher will indicate the date and time of the tutorial.
Presentation	The orientation and advice for the exhibition and presentation of the works will make in small group tutoring.
Autonomous problem solving	The students will have to request the *tutoría by means of an email, indicating in the subject "Tutorials", and the/the educational will indicate him the date and hour of the same.
Introductory activities	The orientation and advice of the introductory activities will make in of big group tutoring.

Assessment

Description	Qualification	Training and Learning Results

Essay questions exam	A score of 5 out of 10 must be obtained to pass the examination.	35	C2 C6 C12 C13 C15 C31 C34 C35	D2
	The examination of developmental questions and the examination of objective questions must be passed independently.			
Essay	The completion, attendance to tutorials, exposition and defense of the work is mandatory. The participation in the tutorials, the formulation and analysis of the work, as well as its writing and the use of bibliographic sources will be valued.	15	C12 C15 C31 C34 C35	D2
	Failure to complete the work or the corresponding defense will result in failing the course.			
Laboratory practice	Students will demonstrate the application of the theoretical fundamentals of the subject. It is mandatory to attend the practices of the course to pass them.	15	A2 C12 C13 C34 C35	D2 D5
	Failure to attend 50% of the practices will result in failing the course. All absences must be duly justified and due to force majeure.			
	In order to pass the subject, the documentation requested by the teacher related to the internship must be completed and submitted. The minimum score to pass the internship must be 5 out of 10.			
	A score of 5 out of 10 must be obtained to pass the examination.			
Objective questions exam	In order to pass the subject, the documentation requested by the teacher related to the internship must be completed and submitted. The minimum score to pass the internship must be 5 out of 10.	35	C2 C6 C12 C13 C15 C31 C34 C35	D2
	A score of 5 out of 10 must be obtained to pass the examination.			
	This type of exam includes closed questions with different answer alternatives (true/false, multiple choice, matching of elements, etc.).			
	The examination of developmental questions and the examination of objective questions must be passed independently.			
	Incorrect questions will be penalized.			

Other comments on the Evaluation

-CONTINUOUS EVALUATION:

In the continuous evaluation, students will take a partial evaluation once half of the theoretical contents have been completed and another partial evaluation in the ordinary exam.

1- Written tests (theoretical): 35%.

Contents: Physical basis of biomechanics and kinesiological analysis of movement. Biomechanics of organic tissues. Examination of objective questions: 17,5 %.

Developmental questions exam: 17.5%.

2- Written tests (theoretical): 35 %.

Contents: articular and muscular biomechanics of the trunk, upper extremity and lower extremity. Examination of objective questions: 17.5%.

Developmental question exam: 17.5%.

Total theoretical evaluations (part 1 + part 2): 70%. Work and

oral test: 15%.

Laboratory practices: 15%.

-GLOBAL ASSESSMENT (waiver of continuous assessment):

In this case, no partial evaluations will be carried out, so in the ordinary call the students will be evaluated as follows:

Theoretical evaluations: 70% (35% exam of objective questions and 35% exam of development questions). Both exams (objective questions and developmental questions) must be passed independently.

Work and oral test: 15% Laboratory practice: 15% Laboratory practice: 15% Laboratory practice:

15% Laboratory practice: 15% Laboratory practice: 15% Laboratory practice: 15% Laboratory practice:

15% Laboratory practice:15%

Students who do not wish to follow the continuous evaluation must notify in writing following the procedure established by the Faculty of Physiotherapy. The waiver to the continuous evaluation must be made in the 5th week of teaching, which means that the student will assume the global evaluation established in the subject. Once the continuous evaluation has been waived, the student will not be entitled to it, nor to the considerations established therein.

- EXTRAORDINARY EVALUATION - RECOVERY:

Students who have waived the continuous evaluation and adhere to the global evaluation will have the same evaluation percentages as in the ordinary call in global evaluation mode.

Students who in continuous evaluation have passed one of the partial exams (partial 1 or partial 2) in extraordinary evaluation will only have to take the exam of the partial not passed. In order to pass the subject it will be necessary to pass the exam of objective questions and the exam of development questions independently. Therefore, all the requirements of ordinary evaluation in continuous mode must be fulfilled. In case of not passing any of the written exams (exam of objective questions or developmental exam) the subject will be failed and there will be no average between evaluations, nor between partial exams.

Students who have failed the two partial evaluations in continuous evaluation will have the same percentages and criteria in extraordinary evaluation as the students in global evaluation, as described below:

Theoretical evaluations: 70% (35% exam of objective questions and 35% exam of development questions). Both must be passed independently.

Description of the tests and requirements to pass the subject:

-The written tests (in all evaluations) will consist of two examinations: an exam of objective questions and an exam of developmental questions; both will take place in the same evaluation session.

The written tests may include multiple-choice exercises, true/false exercises, item matching exercises, sentence completion exercises, response exercises with a specific term, resolution of clinical cases or interpretation of an image/graph, as well

as other activities that have been developed throughout the course.

Likewise, concepts of different topics can be evaluated in the same statement to check the assimilation of contents by the students.

To pass the written tests (in all the evaluations) it is necessary to achieve a minimum of 5 out of 10 in each of the parts (to achieve a 5 out of 10 in the exam of objective questions and to achieve a 5 out of 10 in the exam of developmental questions).

In all evaluations in the examination of objective questions there will be a penalty for wrong answers: each wrong answer subtracts half the value of a correct answer, so that two wrong answers penalize the value of a correct answer.

In the case of not reaching 5 out of 10 in the exam of objective questions, the grade of the corresponding written test will be the one obtained in this part. If the objective part is passed and the objective exam is not passed, the grade of the corresponding written exam will be the one obtained in this part.

developmental questions the grade of the written test will be of the latter part.

In order to pass the course in ordinary exams, the two partial exams must be passed independently. In addition, work must be done and its corresponding defense/oral exam. Attendance to the practice is mandatory (in case of not attending 50% of the practices and/or not handing in the corresponding material, the subject will not be passed). So, if the first partial exam is passed, but the second partial exam is not passed, the student must take the corresponding partial exam in the extraordinary evaluation.

In case of not passing the first partial examination (grade equal to or higher than 5 out of 10 in each of the exams: exam of objective questions and exam of development questions) the student must take the exam of all the thematic blocks in the

ordinary exam. In this case, the same evaluation criteria are followed as in the partial examinations with the same evaluation percentages (therefore the exam would be formed by two exams of objective questions and two exams of developmental questions; all of them must be passed independently).

The work and oral test will be only one. The grade obtained in this test will represent 15% of the final grade and its completion is mandatory. In addition, it is necessary to perform a correct development of the tutorials, especially delivery of the requested material on time. All students must be present during the oral test of the rest of the classmates, since the teacher may request a critical evaluation of the rest of the work. In case of not following the guidelines set by the teacher or not showing up for the oral test, the student will not get a score in this section and will fail the course. In case of not signing up to form a workgroup, it will be considered that the student will not take the oral test and the score in this section will be zero (0).

Summary of minimum requirements to pass the course in the regular exam (ALL requirements must be met):

Grade equal to or higher than 5 (out of 10) in the theoretical tests, being mandatory to pass each of the exams independently (reaching a 5 out of 10 in the exam of objective questions and reaching a 5 out of 10 in the exam of development questions). The partial evaluations must be passed independently.

The overall grade must be equal to or higher than 5 (out of 10), considering the percentages that correspond to each evaluation system.

Evaluation dates:

The partial exam 1 will be held during theory teaching hours with a maximum duration of 1 hour on the date set out in the course schedule (once the thematic blocks that are evaluated in this partial exam have been completed), in case of not passing this partial exam, all the thematic blocks must be examined in the ordinary examination in June.

The written tests of part 2 will take place on the dates indicated in the ordinary June exams. If the student passes part 1, he/she will be examined only on the corresponding thematic blocks (if he/she does not pass part 1, he/she will have to take the entire course).

The presentation of the oral work-test will take place during theory teaching hours on the day assigned in the course schedule.

Regardless of the average grade obtained in the evaluation tests, if the minimum requirements previously exposed are not met, the grade obtained will be SUSPENDED. The final grade of the students who have not passed one of the theoretical tests will be the grade obtained in the failed part.

The failing grade will never be higher than 4.5.

Therefore, it could be the case that a student obtains in the global evaluation, taking into account the percentages of the evaluation tests, a grade of 5 out of 10 or higher; however, if the student has failed any written exam (exam of objective questions and exam of developmental questions) separately, the grade in the global evaluation will be a fail.

In all written examinations (partial, ordinary and ordinary exams), if the objective test is not passed, the grade that will appear in the minutes will be the grade of said test (or the average of the objective tests); no average will be taken with the rest of the evaluations (the grade will be directly that of the objective tests).

Other considerations:

The evaluation systems described in this Teaching Guide are sensitive both to the evaluation of the competencies and to the contents of the course.

The realization of the work is mandatory and its evaluation will be made through the practices/tutorials established in the programming of the subject and in the presentation and defense of the same. All the work activities requested by the teacher must be carried out, as well as the collaborative activity (failure to do so will result in the corresponding penalty).

The presence of spelling mistakes in papers or written tests may lead to a failing grade.

The Teaching Guide will follow the "REGULAMENTO SOBRE A AVALIAÇÃO, A CALIFICAÇÃO E A CALIDADE DA DOCÊNCIA E DO PROCESSO DE APRENDIZAGEM DO ESTUDANTADO" (Aprobado no claustro do 18 de abril de 2023), as well as the specific adaptations for the Degree in Physiotherapy determined in Junta de Centro.

Sources of information

Basic Bibliography

- Calais Germain B, **Anatomía para el movimiento**, 7, La liebre de marzo, 1999
- Kapandji AI, **Fisiología Articular Tomo 1. Miembro superior**, 6, Médica Panamericana, 2012
- Kapandji AI, **Fisiología Articular Tomo 2. Miembro inferior**, 6, Médica Panamericana, 2012
- Kapandji AI, **Fisiología Articular Tomo 3. Tronco y raquis**, 6, Médica Panamericana, 2012
- Valerius K, **El libro de los músculos: Anatomía - exploración - función.**, Médica Panamericana, 2013
- Hamill J, **Biomecánica : bases del movimiento humano.**, 5, Wolters Kluwer, 2021
- Carr K, Feit MK, **Anatomía del entrenamiento funcional**, Tutor, 2021
- Leal L, **FUNDAMENTOS DE LA MECÁNICA DEL EJERCICIO: Biomecánica aplicada al entrenamiento de Fuerza**, Resistance Institute (Independently Published), 2020
- Vázquez D, **ENTRENAMIENTO FUNCIONAL Y APRENDIZAJE MOTOR: De la lógica aparente a los fundamentos.**, Resistance Institute (Independently Published), 2021
- Marango S, McCulloch C, **NETTER's Moving AnatoME. An Interactive Guide to Musculoskeletal Anatomy**, ELSEVIER, 2019
- Shumway-Cook A, Woollacott M, **Control Motor. De la Investigación a la Práctica Clínica**, 5, WOLTERS KLUWER, 2019
- Sañudo J, Morroni M, **Anatomía Funcional e Imágenes. Sistema Locomotor**, 1, ERGON, 2019
- McGinnis P, **Biomechanics of Sport and Exercise**, 4, HUMAN KINETICS BOOKS, 2020
- Martínez-Zazo S., **Biomecánica Clínica de la Marcha y su Relación con Patología Musculoesquelética**, 2, AUTOR-EDITOR, 2020
- Dufour M, Del Valle S., **Los Músculos. Anatomía Clínica de las Extremidades**, 1, PAIDOTRIBO, 2021
- Nordin M, Frankel V., **Bases Biomecánicas del Sistema Musculoesquelético**, 5, WOLTERS KLUWER, 2022
- Hazari A, **Conceptual Biomechanics and Kinesiology**, 1, SPRINGER, 2021
- Biel A, **Guía del Cuerpo Humano en Movimiento**, 2, Editorial Medica Panamericana, 2021

Complementary Bibliography

- Viladot A, **Lecciones básicas de biomecánica del aparato locomotor**, 2, Masson, 2004
- Cailliet R, **Anatomía Funcional Biomecánica**, 1, Marbán, 2005
- Miralles Marrero R, Miralles-Rull I, **Biomecánica clínica de las patologías del aparato locomotor**, 1, Elsevier Masson, 2006
- Trew M, Everett T, **Fundamentos del movimiento humano**, 5, Masson, 2006
- Dufour M, Pillu M., **Biomecánica funcional. Miembros, cabeza, tronco**, 2, Elsevier Health Sciences, 2018
- Calderón JF, **Fisiología humana, aplicación a la actividad física**, 2, Médica Panamericana, 2018
- Fucci S, **Biomecánica del aparato locomotor aplicada al acondicionamiento muscular**, 4, Elsevier, 2003
- Miralles Marrero R, Miralles-Rull I, Puig Cunillera M, **Biomecánica clínica de los tejidos y las articulaciones del aparato locomotor**, 2, Elsevier, 2005
- Neumann, D. A., Kelly, E. R., Kiefer, C. L., Martens, K., & Grosz, C. M, **Kinesiology of the musculoskeletal system: Foundations for rehabilitation**, Elsevier, 2017
- Esteban-Yáñez, C., Santos-Lozano, A., Martín-Hernández, J., & Justo-Cousiño, L. A., **Carrera descalza¿ Naturalmente descalzos?: análisis desde la biomecánica**, Rev MED Nat, 2021
- Kerr A, Rowe P., **An Introduction to Human Movement and Biomechanics**, ELSEVIER, 2019
- Comerford M, Mottram S., **Kinetic Control. The Management of Uncontrolled Movement**, 2, ELSEVIER, 2019
- Molina F, Carratalá M., **La Marcha Humana. Biomecánica, Evaluación y Patología**, 1, Medica Panamericana, 2020

Recommendations

Subjects that are recommended to be taken simultaneously

Physiotherapy evaluation/P05G171V01108

Subjects that it is recommended to have taken before

Human anatomy: Medical-surgical conditions/P05G171V01107

Biochemistry-Physics: Biochemistry and biophysics/P05G171V01103

Physiology: Human physiology/P05G171V01102