

CURRICULUM

PROJECT NUMBER

2018-1-PL01-KA203-051084

PROJECT TITLE

Development of innovative training solutions in the field of functional evaluation aimed at updating of the curricula of health sciences schools

COURSE TITLE

Functional evaluation and advanced biomechanics in medicine and rehabilitation

LANGUAGE

English, Spanish, Polish, German

ECTS CREDITS

5

Course title

Functional evaluation and advanced biomechanics in medicine and rehabilitation

INTRODUCTON

Course aim	The course aim is to prepare health sciences teachers to transfer of knowledge, methodologies and innovation, generated in the field of health sciences, specifically related to functional evaluation and biomechanical methodologies, to curricula of the next generation of graduates of health schools. After the course a teacher will be able to provide up-to-date knowledge, skills and competencies in the field of functional evaluation and advanced biomechanics in medicine and rehabilitation to students of different levels of qualifications with the use of all necessary pedagogical tools adjusted to knowledge contents and students' needs.
Total amount of teaching hours	50 hours
Modules	<ol style="list-style-type: none"> 1. Module biomechanics: foundations of biomechanics applied to the locomotor system 2. Module functional evaluation: concept and methodology 3. Module biomechanics of spine 4. Module biomechanics of gait
Target group definitions	Health sciences teachers, professionals of higher education sector and decision makers responsible for curricula definition within medicine, physiotherapy, rehabilitation, sport and physical education
Prerequisites for participation	Basic knowledge in: <ul style="list-style-type: none"> – Human biomechanics – Locomotor system rehabilitation – Functional capabilities evaluation – International Classification of Functioning, Disability and Health – Pedagogical methodologies – Knowledge of English, or one language among Spanish, German or Polish within the min. level B2
Academic tutors profiles	Professionals in the fields of: advanced biomechanics, functional evaluation, rehabilitation, physiotherapy, social science, pedagogy
Pedagogical resources	<ul style="list-style-type: none"> – Learning material. Didactical digital material, in which both textual and graphical/visual information are combined to promote active learning, has the aim to provide trainees with the main required knowledge about each topic. – Video presentations. Video as an introduction to particular topic and main video training content that is basically presented by lectures and is subtitled in the different languages. – Virtual library with bibliography and references. Each topic includes both references cited into the text of training and additional bibliography recommended to expand the reading. The online structure of the course will permit that the citing is dynamically linked, so each citation can lead to its reference.

	<ul style="list-style-type: none"> - Images and illustrations. All the contents are widely improved and explained with images, tables and graphs. The images will allow not only to explain and expand some concepts treated in the text, but also to ease the reading and insert pauses in the learning process. - Insertions. To avoid plain text and transform the linear reading into more active reading, the text in each topic has specific insertions with the purpose to reinforce the content. The main insertions considered for the course are the following: <ul style="list-style-type: none"> • Concept. Important concepts or citations. • Examples • Remark boxes. Useful to emphasize or summarize some important concept that have been previously explained. • Enlargement of concepts. Additional information, that it is not strictly necessary for learning basic concepts, but that can enlarge the knowledge about one particular topic. - Glossary. Each training module presents its own glossary of terms, through which the trainer can access the description of the most specific concepts of the material treated. - Multimedia materials: a collection of multimedia resources which show in graphic way the application, in real context, of the contents described during the module. - Tutorials. As a practical complementary documentation to each module, this didactic resource will be presented. The teacher can find in the Tutorials of the module a detailed explanation of some interesting procedure treated throughout it and that, due to its complexity and significance, is developed more in detail in this section. - Conceptual maps. With the intention that the teacher has a space where he or she can find the conceptual schemes developed in the contents of each module, being able to make didactic use of them when he or she considers it appropriate, this didactic resource is presented within each training module. - Teaching guide. The guide dedicated the teachers of how to implement course content to health sciences schools. This includes pedagogical strategies, teaching methodology, innovative teaching methods and tools as well as the procedure of how to implement new subject to study program that is compatible with Qualification Framework for European Higher Education Area QF-EHEA.
<p>The procedure of assessment and examination</p>	<p>The procedure is divided into three components:</p> <ul style="list-style-type: none"> - Self-assessment questionnaires: the learner must fulfil an assessment questionnaire and pass it before starting with the next session of each module. The learner can undertake the assessment as many times as wanted. The teaching system will display their successes and mistakes and, based on these answers, will give information about what content should be reviewed in the event of not attaining the learning goals/meeting the examination requirements. In the case of a formal training system, the realization of the self-assessment is not reflected in the final grade. - Self-evaluation tests: before finishing a module, a self-evaluation test must be performed by the student before starting the next module. The self-evaluation tests will normally consist of questions with 3 or 4 answers requiring an analysis, from which the trainee must select the correct one. When the test has been completed, the application will correct it automatically and will show the mark obtained by the learner. - Final examination: after finishing the last module, the last step of the learning assessment is to take the final examination. It will consist of

	<p>questions for every module, which will regard all training topics and the learner must select the correct answer from multiple choices. The final examination will not be available to the trainee at any time, but it must be done only during one previously defined day (the date of the final examination will be stated before starting the online course). The learner will perform it at home, but he or she will have only 45 minutes to complete it.</p>
Technical infrastructure	e-learning Platform

MODULE BIOMECHANICS: FOUNDATIONS OF BIOMECHANICS APPLIED TO THE LOCOMOTOR SYSTEM

Module description	<p>A complementary module of basic knowledge that is fundamental to learn advanced procedures and techniques for biomechanics. The module includes synthetic contents preparing a trainee for next and advanced learning materials that is focused on specialized issues on human biomechanics and functional diagnosis.</p> <p>Within six different topics, comprehensive and general information presenting the most important aspects of biomechanics, anthropometric and physiology is provided.</p> <p>The module contains mainly theoretical content with elements of practice.</p>
ECTS	1
Total workload in hours: classes + individual study	10 + 15
Topics	<p>A) Movement</p> <p>B) Forces and pressures</p> <p>C) Physiological signs and morphometric parameters</p> <p>D) Techniques for the instrumental analysis of movements and forces</p> <p>E) Techniques for the instrumental analysis of physiological signs and anthropometric and morphometric parameters</p> <p>F) Requirements of a biomechanical assessment system. Concepts of validity, reliability and accuracy</p>
Academic tutors profiles	Academic tutors possess detailed theoretical and practical knowledge from biomechanics anthropometrics physiology. Is experienced in using modern instruments in the field of measurement signs and parameters and diagnosis evaluation.

DIDACTIC UNIT A

TOPIC: MOVEMENTS

ECTS	0,05		
Workload in hours: classes + individual study	0,5 + 0,75		
Content	The learner will be acquainted with the meaning of basic concepts related to movements in the context of human movement analysis, and will have notions of how to interpret them.		
Description of learning outcomes	Knowledge The learner knows and understands: <ul style="list-style-type: none"> – foundations of movements (kinematics) and differences with the causes that produce them (kinetics); 	Skills The learner is able to: <ul style="list-style-type: none"> – identify which are the basis of movements in general, in terms of kinematics itself and the causes of movements (kinetics). 	Competences The learner is ready for: <ul style="list-style-type: none"> – understanding how parameters affect each movement and is able to infer the effect that a given alteration or change in any of this items may have over a certain movement;

	<ul style="list-style-type: none"> - fundamental concepts in linear movements: position, trajectory, velocity and acceleration; - fundamental concepts in circular movements: angle, angular velocity and angular acceleration; - foundations of human motion: movement planes and Euler angles. 	<ul style="list-style-type: none"> - analyse, explain, and correlate kinematic concepts related to human motion; - distinguish among main concepts related to linear movement, like: position, trajectory, velocity and acceleration; - distinguish among main concepts related to circular movement, like: angle, angular velocity and angular acceleration; - correlate human segment movements with the existing movement planes and Euler angles; - explain the development of a movement and to identify the plane of movement and system of coordinates in which it is displayed. 	<ul style="list-style-type: none"> - using different physics concepts like angle, velocity, or acceleration in the context of human motion in order to resolve problems involving those.
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DIDACTIC UNIT B

TOPIC: FORCES AND PRESSURES

ECTS	0,05		
Workload in hours: classes + individual study	0,5 + 0,75		
Content	In this didactic unit, the learner will be acquainted with the meaning of basic concepts related to forces and pressures in the context of human movement analysis, and will have notions of how to interpret them.		
Description of learning outcomes	<p style="text-align: center;">Knowledge</p> <p>The learner knows and understands:</p> <ul style="list-style-type: none"> - causes that produce movements: kinetics; - concepts of interest: forces, pressure, torque, power, work and energy; - other concepts of interest: center of gravity, center of pressure. 	<p style="text-align: center;">Skills</p> <p>The learner is able to:</p> <ul style="list-style-type: none"> - to analyse, explain, and correlate kinetic concepts related to human motion; - distinguish among main parameters of force and pressure; - develop an understanding on the concepts of force, pressure, torque, power, work and energy and how are 	<p style="text-align: center;">Competences</p> <p>The learner is ready for:</p> <ul style="list-style-type: none"> - understanding how parameters affect each movement and is able to infer the effect that a given alteration or change in any of this items may have over a certain movement; - using different physics concepts like torque, power, work and energy in the context of human motion in order to resolve problems involving those.

		<p>they correlated with human movements in each case;</p> <ul style="list-style-type: none"> – identify the importance of the concepts of center of gravity and pressure for human statics. 	
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DIDACTIC UNIT C

TOPIC: PHYSIOLOGICAL SIGNS AND MORPHOMETRIC PARAMETERS

ECTS	0,05		
Workload in hours: classes + individual study	0,5 + 0,75		
Content	The learner will be acquainted with the fundamental of concepts, definitions and type of physiological signs and morphometric parameters in the context of biomechanical assessment. Additionally the learner will gather practical skills and competences of using different type of signs and parameters regarding physiology and morphometry for creating human health paradigms.		
Description of learning outcomes	Knowledge	Skills	Competences
	<p>The learner knows and understands:</p> <ul style="list-style-type: none"> – the fundamental concepts of musculoskeletal system physiology; – the fundamental concepts of morphometry in biomechanical implications; – the types of physiological signs in biomechanics; – importance of morphometric parameters in biomechanical assessment; – the influence of physiological signs and morphometric parameters on locomotor systems analysis. 	<p>The learner is able to:</p> <ul style="list-style-type: none"> – define the objectives and concepts of physiology and morphometry in relation to musculoskeletal system analysis; – describe relationships between physiology, morphometry and biomechanics; – select physiological signs and morphometric parameters for biomechanical analysis purposes; – reason on the basis of physiological signs and morphometric parameters; – plan biomechanical analysis based on physiology and morphometry science. 	<p>The learner is ready for:</p> <ul style="list-style-type: none"> – critical evaluation of achievements of physiology and morphometry in relations to biomechanical implications; – thinking and acting in a professional and entrepreneurial way when it comes to biomechanics; – recognition of the importance of knowledge on physiology and morphometry in human health issues.

DIDACTIC UNIT D

TOPIC: TECHNIQUES FOR THE INSTRUMENTAL ANALYSIS OF MOVEMENTS AND FORCES

ECTS	0,5		
Workload in hours: classes + individual study	5 + 7,5		
Content	The learner will be acquainted with how can movements, forces and pressures be measured and which parameters can be analyzed. In addition, the learner will know what are the main advantages and disadvantages of each technique, as well as the applications of the movements, force and pressure analysis in the context of human motion.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> - main techniques for the instrumented analysis of movement. Characteristics and parameters obtained by: <ul style="list-style-type: none"> • Goniometer • Inclinator • Photogrammetry • Inertial sensors • Other devices: GPS, Chronometer, 2D analysis, smartphones; - main techniques for the instrumented analysis of forces and pressures. Characteristics and parameters obtained by: <ul style="list-style-type: none"> • Dynamometers • Dynamometric platforms. • Pressure platforms and instrumented insoles. • Other devices: accelerometers, Nintendo wii balance board. 	The learner is able to: <ul style="list-style-type: none"> - distinguish among all the existing techniques for the kinematic analysis of movement. 	The learner is ready for: <ul style="list-style-type: none"> - selecting the most appropriate technique for measuring movement from a kinematic and kinetic point of view depending on the objective, segment or function of the study; - interpreting the parameters provided by each device in the context of human movement analysis and can use this information in the clinical field.

	– advantages and disadvantages of each technique.		
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DIDACTIC UNIT E

TOPIC: TECHNIQUES FOR THE INSTRUMENTAL ANALYSIS OF PHYSIOLOGICAL SIGNS AND ANTHROPOMETRIC AND MORPHOMETRIC PARAMETERS

ECTS	0,3		
Workload in hours: classes + individual study	3 + 4,5		
Content	The learner will be acquainted with methods for measuring physiological signs as well as morphometric and anthropometric parameters, the applications of the analysis of physiological signs and anthropometric and morphometric parameters.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – the main development trends in instrumented analysis in biomechanics; – the methodology for instrumented analysis based on physiological signs and anthropometric and morphometric parameters; – the applications of the analysis of physiological signs; – the applications of the analysis of anthropometric and morphometric parameters; – the newest instrumental techniques for measurement of physiological signs and anthropometric and morphometric parameters. 	The learner is able to: <ul style="list-style-type: none"> – define the objectives and scope of research with the use of instrumental techniques for measurement of physiological signs and anthropometric and morphometric parameters; – describe instrumental techniques for measurement of physiological signs and anthropometric and morphometric parameters; – select instrumental techniques for measurement of physiological signs and anthropometric and morphometric parameters for biomechanical analysis purposes; – analyse and draw conclusion based on measurement of physiological signs 	The learner is ready for: <ul style="list-style-type: none"> – critical evaluation of achievements of measurement instruments and approaches based on innovative technologies in the field of physiology morphometry and anthropometrics; – thinking and acting in a professional and entrepreneurial way when it comes to measure physiological signs and anthropometric and morphometric parameters; – recognition of the importance of knowledge on instrumental analysis of physiological signs and anthropometric and morphometric parameters.

		and anthropometric and morphometric parameters; <ul style="list-style-type: none"> – plan measurements scenarios for gathering physiological signs and anthropometric and morphometric parameters. 	
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DIDACTIC UNIT F

TOPIC: REQUIREMENTS OF A BIOMECHANICAL ASSESSMENT SYSTEM. CONCEPTS OF VALIDITY, RELIABILITY AND ACCURACY

ECTS	0,15		
Workload in hours: classes + individual study	1,5 + 2,25		
Content	The learner will be acquainted with what features should an appropriate biomechanical assessment system count on and what do validity, reliability and accuracy mean and why are they important.		
Description of learning outcomes	Knowledge The learner knows and understands: <ul style="list-style-type: none"> – characteristics and requirement of an adequate biomechanical analysis: usability, standardization and protocols; – concept of validity; – concept of reliability; – concept of accuracy. 	Skills The learner is able to: <ul style="list-style-type: none"> – understand the importance of validity, reliability, usability and standardization of protocols to perform an adequate biomechanical analysis. 	Competences The learner is ready for: <ul style="list-style-type: none"> – distinguish whether a certain system for biomechanical analysis count on basic requirements related to validity, reliability, accuracy or usability, selecting the most appropriate methodology according to this and depending on the objective of the study.

MODULE FUNCTIONAL EVALUATION: CONCEPT AND METHODOLOGY

Module description	<p>A complementary module of basic knowledge that the student should know in the area of functional evaluation in a holistic approach to human health. Student acquires comprehensive knowledge, skills and competencies about integration of physical health, cognitive (mental) health and social integration in diagnosis and treatment of musculoskeletal impairments.</p> <p>The module contains six different topics, that present the variable aspects of disability and aging society in the context of the new technological approaches to maintain health and quality of life.</p> <p>The module contains both theoretical and practical content basically focusing on the utility of the instrumented biomechanical analysis in clinical field, including management of disabilities and handicap.</p>
ECTS	1
Total workload in hours: classes + individual study	10 + 15
Topics	<ul style="list-style-type: none"> A) Classification of activities and functions according to the ICF B) Importance of functional assessment and its applications C) Classification of functional impairments and disability D) Socio-health impact of disability. Disability in working places E) Importance of cognitive abilities in the performance of motor tasks and why it is important to include biomechanical analysis in cognitive impairments F) Functional evaluation assessment: classical assessments vs instrumented analysis
Academic tutors profiles	Academic tutors possess detailed theoretical and practical knowledge from International Classification of Functioning, Disability and Health, functional evaluation and social science. Is experienced in using methods for functional evaluation.

DIDACTIC UNIT A

TOPIC: CLASSIFICATION OF ACTIVITIES AND FUNCTIONS ACCORDING TO THE ICF

ECTS	0,25		
Workload in hours: classes + individual study	2,5 + 3,75		
Content	The learner will be acquainted with the objectives and characteristics of the ICF including selected components of the ICF, the model of functioning and disability as well as the possible use of ICF in practice.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – basic terminology in accordance with the International 	The learner is able to: <ul style="list-style-type: none"> – use the language of the ICF classification; 	The learner is ready for: <ul style="list-style-type: none"> – cooperation with other specialists in the field of disability using the

	Classification of Functioning, Disability and Health (ICF); <ul style="list-style-type: none"> – the objectives and characteristics of the ICF classification; – the model of functioning and disability consistent with the classification ICF. 	<ul style="list-style-type: none"> – put into practice the classification ICF; – can see the relationship between the different determinants of health and disability, affecting the functioning of the patient; – will perform basic diagnostics and documentation in the field of disability in accordance with ICF. Based on this knowledge. 	terminology and classification ICF; <ul style="list-style-type: none"> – application of the ICF classification in practice, taking into account the interdisciplinary nature of the work with the people with disabilities and other specialists.
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DIDACTIC UNIT B

TOPIC: IMPORTANCE OF FUNCTIONAL ASSESSMENT AND ITS APPLICATIONS

ECTS	0,25		
Workload in hours: classes + individual study	2,5 + 3,75		
Content	The learner will be acquainted with the theoretical and practical aspects of functional assessment including development of tools and procedures supporting therapeutic program for patients.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – definitions for functional diagnosis; – principles of creating diagnostic tools; – methods of assessment - analysis of diagnostic material and construction of an individual development profile. 	The learner is able to: <ul style="list-style-type: none"> – use the essence of the assessment - functional diagnosis for practical tasks; – take into consideration such principles as e.g.: using the strengths of the patient, comprehensiveness multidisciplinary and multidimensionality of the planned interactions, taking into account the dynamics of the patient's development; – create functional assessment sheets and development profiles using the results of the collected diagnostic material. 	The learner is ready for: <ul style="list-style-type: none"> – making consciously and responsibly diagnostic activities and making functional assessment of the patient and creating development profiles and indications for the program of therapeutic interactions.

DIDACTIC UNIT C

TOPIC: CLASSIFICATION OF FUNCTIONAL IMPAIRMENTS AND DISABILITY

ECTS	0,15		
Workload in hours: classes + individual study	1,5 + 2,25		
Content	The learner will be acquainted with the various classification of functional impairments and disability particularly in the context of creating solutions and health strategy for improving quality of life. Particularly the impairments will be described in accordance to aging society problematic.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – conceptual basics regarding to the consequences of diseases and disorders at the body level, people and people as a social being and understands the differences between these concepts; – a unifying framework for classifying the health components of functioning and disability; – the various criteria of classification of functional impairments and disabilities. 	The learner is able to: <ul style="list-style-type: none"> – use the correct nomenclature within the notions of disability, impairment and handicap; – can see and distinguish variable aspects of disability and an aging population; – can describe different types of disabilities on the background of holistic approach to human health. 	The learner is ready for: <ul style="list-style-type: none"> – looking for methods and tools supporting improvement processes in relation to classified disabilities and functional impairments.

DIDACTIC UNIT D

TOPIC: SOCIO-HEALTH IMPACT OF DISABILITY. DISABILITY IN WORKING PLACES

ECTS	0,2		
Workload in hours: classes + individual study	2 + 3		

Content	The learner will be acquainted with the theoretical and practical aspects and attitudes of functioning disable people at life environment and working environment. The content includes all important factors influencing quality of life of people with disability.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – selected theoretical concepts regarding the evolution of attitudes towards people with disabilities and the resulting consequences for their health and quality of life; – the importance of good functioning in the social and professional environment for health and quality of life; – the ways to assess the level of social and professional functioning and indications resulting of good practices. 	The learner is able to: <ul style="list-style-type: none"> – use the known theoretical concepts to assess the patient's developmental abilities and needs, and to plan his therapy and support; – take into whole patient functioning so aspects such as: school and learning, free time, life in partnership and sexual needs, access to social contacts (culture, sport, etc.), political and professional needs for health and quality of life of the patient; – use and create your own sheets for assessing the level of social and professional functioning of people with disabilities. Create a space for effective counseling for people with disabilities. 	The learner is ready for: <ul style="list-style-type: none"> – making consciously and responsibly diagnostic, therapeutic and consulting activities that take into account the needs and specificity of functioning of people with disabilities.

DIDACTIC UNIT E

TOPIC: IMPORTANCE OF COGNITIVE ABILITIES IN THE PERFORMANCE OF MOTOR TASKS AND WHY IT IS IMPORTANT TO INCLUDE BIOMECHANICAL ANALYSIS IN COGNITIVE IMPAIRMENTS

ECTS	0,15		
Workload in hours: classes + individual study	1,5 + 2,25		
Content	The learner will be acquainted with the theoretical and practical aspects of cognition in the context of functional evaluation. Particularly the cognitive impairments are described and the relations between cognitive impairments and biomechanical analysis.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands:	The learner is able to: <ul style="list-style-type: none"> – identify the principals cognitive function 	The learner is ready for: <ul style="list-style-type: none"> – discriminate in what kind of pathologies the functional

	<ul style="list-style-type: none"> - the main cognitive functions and they involved in complex voluntary movement; - the interference of cognitive load in normal and pathological functional movement; - motor impairment in people with cognitive / mental disorders; - biomechanical assessment of functional movement with cognitive load: interpretation and usefulness. 	involved in complex voluntary movement; <ul style="list-style-type: none"> - describe the functional impairment that occur when adding cognitive load to movement; - describe how to evaluate the functional alterations of the movement with cognitive load. 	movement could be abnormally deteriorated by the cognitive load; <ul style="list-style-type: none"> - knowing how the movement of a patient could be affected when he suffers a cognitive / mental disorder; - designing an evaluation of functional movement under cognitive load.
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DIDACTIC UNIT F

TOPIC: FUNCTIONAL EVALUATION ASSESSMENT: CLASSICAL ASSESSMENTS VS INSTRUMENTED ANALYSIS

ECTS	0,1		
Workload in hours: classes + individual study	1 + 1,5		
Content	The learner will be acquainted with the theoretical and practical aspects of performing functional evaluation assessment taking into account two basic approaches classical assessment and instrumented analysis.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> - the basic principles and procedures for classical assessments and instrumented analysis; - the circumstances orientating or promoting the type of functional assessment procedure; - advantages and disadvantages of classical assessments and instrumented analysis of functional assessment. 	The learner is able to: <ul style="list-style-type: none"> - decide about appropriateness of best solutions for functional evaluations; - create assumptions for various approaches to functional evaluation; - identify limitations of using classical assessments and instrumented analysis; - identify information, material recourses and human competences to perform functional evaluation using classical assessments and instrumented analysis. 	The learner is ready for: <ul style="list-style-type: none"> - critical assessment of achievements in the fields of classical assessments and instrumented analysis; - recognition of the importance of knowledge on up-to-date solutions for functional evaluation; - professional discussion and expression of advantages and disadvantages with reference to classical assessments and instrumented analysis of functional assessment.

MODULE BIOMECHANICS OF SPINE

Module description	<p>The module contains theoretical and practical knowledge about detailed aspects of biomechanics of spine.</p> <p>Student acquires comprehensive and detailed knowledge skills and competencies about methods and instrumental techniques, scales and physical examination techniques for assessing lumbar, dorsal and cervical spine.</p> <p>The module contains four different topics, that present the variable aspects of spine analysis.</p> <p>The module prepares student to perform professionally functional evaluation (FE) within the spine giving wide spectrum of clinical methods and tools basing on newest achievements in the field of biomechanics.</p>
ECTS	1
Total workload in hours: classes + individual study	10 + 15
Topics	A) Biomechanics of the normal spine B) Biomechanical alterations of the spine C) How do I assess lumbar/dorsal/cervical spine? D) Instrumented analysis of the spine
Academic tutors profiles	Academic tutors possess detailed theoretical and practical knowledge about spine pathologies and advanced biomechanics.

DIDACTIC UNIT A

TOPIC: BIOMECHANICS OF THE NORMAL SPINE

ECTS	0,05		
Workload in hours: classes + individual study	0,5 + 0,75		
Content	The learner will be acquainted with the theoretical and practical aspects of biomechanics and especially kinematics of different segments of spine in accordance to normal functions of spine.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – biomechanics of the elements that compose the segments of the spine; – kinematics of the different spinal segments: movement possibilities; – biomechanics of the different spinal segments in resting 	The learner is able to: <ul style="list-style-type: none"> – describe the biomechanics of the elements of the spine; – know the possibilities of movement of the spine; – describe the normal function of the spine in static positions such as during functional movement. 	The learner is ready for: <ul style="list-style-type: none"> – discriminate which are the best function conditions of the segments spine.

	positions: bipedal, seated, supine; <ul style="list-style-type: none"> – biomechanics of the spinal segments in the different functional gestures. 		
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DIDACTIC UNIT B

TOPIC: BIOMECHANICAL ALTERATIONS OF THE SPINE

ECTS	0,05		
Workload in hours: classes + individual study	0,5 + 0,75		
Content	In this didactic unit, the learner will be acquainted with the theoretical and practical aspects of biomechanics of different segments of spine in accordance to main pathologies and possible surgical interventions and treatment procedures.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – biomechanics of the main pathologies of the cervical spine; – biomechanics of the main pathologies of the thoracic spine; – biomechanics of the main pathologies of the lumbosacral spine; – biomechanics of the main conservative interventions; – main surgical interventions: biomechanical possibilities. 	The learner is able to: <ul style="list-style-type: none"> – identify the main pathologies of the spine globally or by segments; – describe the main techniques of conservative treatment and the biomechanical reaches in the spine; – describe the main techniques of surgical intervention and the biomechanical reaches in the spine. 	The learner is ready for: <ul style="list-style-type: none"> – identifying the biomechanical limitations from a certain pathology; – identifying the functional limitations of the main treatment methods and relate them to the biomechanics limits of the spine.

DIDACTIC UNIT C

TOPIC: HOW DO I ASSESS LUMBAR/DORSAL/CERVICAL SPINE?

ECTS	0,7		
Workload in hours: classes + individual study	2,5 + 3,75		

Content	The learner will be acquainted with: <ul style="list-style-type: none"> – what methods may I apply to assess the function of the spine appropriately? – what clinical scales exist to assess spine? – what are the advantages of the use of instrumental techniques versus scales and physical examination in spine? 		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – principal methodologies for the functional assessment of spine: from visual analysis and physical examination to modern devices; – clinical scales for the functional assessment of cervical, dorsal and lumbar spine; – advantages and disadvantages of the use of each methodology. 	The learner is able to: <ul style="list-style-type: none"> – describe the main existing methodologies for the functional assessment of spine and know the difference among them; – identify the most appropriate methodology for the assessment of spine depending on the specific case. 	The learner is ready for: <ul style="list-style-type: none"> – selecting the most appropriate methodology for the functional assess of cervical, dorsal and lumbar spine according to the parameters provided and characteristics of the measuring tool and depending on the objective of the study; – interpreting the results provided by tool in the context of human movement analysis in order to use this information in the clinical field.

DIDACTIC UNIT D

TOPIC: INSTRUMENTED ANALYSIS OF THE SPINE

ECTS	0,7		
Workload in hours: classes + individual study	7 + 11,5		
Content	The learner will be acquainted with: <ul style="list-style-type: none"> – Which cervical biomechanical instrumented evaluation protocols exist? – Which dorsal and lumbar biomechanical instrumented evaluation protocols exist? – How is a normal biomechanical assessment of the cervical spine? – How is a normal biomechanical assessment of the lumbar spine? – How do I interpret a biomechanics instrumented analysis' report in a case of spinal pathology? – In which cases and how can a biomechanical instrumented analysis of spine be useful? 		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – kinematic assessment of cervical, dorsal and lumbar spine: classic goniometry; 	The learner is able to: <ul style="list-style-type: none"> – describe the existing devices for the instrumented assessment of cervical, dorsal and/or lumbar spine and know the 	The learner is ready for: <ul style="list-style-type: none"> – selecting and use the most appropriate technique for measuring cervical, dorsal and/or lumbar spine's function depending on the objective of the study;

	<ul style="list-style-type: none"> - inclinometers, inertial sensors and photogrammetry. Protocols and parameters obtained; - assessment of cervical, dorsal and lumbar spine in terms of force: dynamometry and electromyography systems. Protocols and parameters obtained; - other devices (topography, raquimeter, 3D morphological analysis); - examples of instrumented functional assessments in healthy and pathological population: hint on the interpretation of results and utility. 	<p>difference among them;</p> <ul style="list-style-type: none"> - recognize and understand the parameters provided by each analysis device and identifies altered from normal results. 	<ul style="list-style-type: none"> - interpreting the parameters provided by each device in the context of functional assessment of healthy or pathological spine and can use this information in the clinical field with different purposes.
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MODULE BIOMECHANICS OF GAIT

Module description	<p>The module contains theoretical and practical knowledge about detailed aspects of biomechanics of gait.</p> <p>Student acquires comprehensive and detailed knowledge, skills and competencies about methods and instrumental techniques, scales and physical examination techniques for assessing human gait.</p> <p>The module contains four different topics, that present the variable aspects of gait analysis.</p> <p>The module prepares student to perform professionally functional evaluation (FE) within the human gait giving wide spectrum of clinical methods and tools basing on newest achievements in the field of biomechanics.</p>
ECTS	2
Total workload in hours: classes + individual study	20 + 30
Topics	A) Biomechanics of the normal gait B) Biomechanical alterations in gait C) How do I assess gait? D) Instrumented analysis of gait
Academic tutors profiles	Academic tutors possess detailed theoretical and practical knowledge about human gait pathologies and advanced biomechanics.

DIDACTIC UNIT A

TOPIC: BIOMECHANICS OF THE NORMAL GAIT

ECTS	0,25		
Workload in hours: classes + individual study	2,5 + 3,75		
Content	The learner will be acquainted with the theoretical and practical aspects of biomechanics gait including biomechanics of lower limbs and general knowledge about parameters and procedures of analysis of gait.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> - historical background of gait analysis; - biomechanics of lower limb; - parameters used in gait analysis; - possibilities of the use of mathematical modelling to assess forces generated by muscles. 	The learner is able to: <ul style="list-style-type: none"> - understand gait from biomechanical point of view; - recognize correct patterns of parameters used in gain analysis. 	The learner is ready for: <ul style="list-style-type: none"> - taking part in biomechanical gait analysis; - assessing if human gait is correct.

DIDACTIC UNIT B

TOPIC: BIOMECHANICAL ALTERATIONS IN GAIT

ECTS	0,25		
Workload in hours: classes + individual study	2,5 + 3,75		
Content	The learner will be acquainted with the theoretical and practical aspects of abnormal gait including causes and parameters describing alterations in gait as well as the procedure of abnormal gait diagnosis.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – chosen dysfunctions causing abnormal gait; – basic types of abnormal gait; – chosen differences in parameters describing gait between normal and abnormal gait. 	The learner is able to: <ul style="list-style-type: none"> – indicate basic cases where one can expect abnormal gait; – state if gait is correct. 	The learner is ready for: <ul style="list-style-type: none"> – basic diagnosing of gait; – recognizing and describing, on a basic level, parameters of abnormal gait.

DIDACTIC UNIT C

TOPIC: HOW DO I ASSESS GAIT?

ECTS	0,65		
Workload in hours: classes + individual study	6,5 + 9,75		
Content	The learner will be acquainted with methods to assess gait, clinical scales exist to assess gait performance and what are the advantages of the use of instrumental techniques versus scales and physical examination to assess gait.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> – human gait assessment methods; – differences between clinical and instrumental methodologies to gait assessment; – main clinical methodologies to 	The learner is able to: <ul style="list-style-type: none"> – identify the methodological advantages and disadvantages between clinical and instrumental tools; – describe the main clinical test and scale of gait assessment for normal and pathological people. 	The learner is ready for: <ul style="list-style-type: none"> – choosing between one technique and another according to clinical circumstances and assessment needs.

	normal and pathological gait assessment.		
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DIDACTIC UNIT D

TOPIC: INSTRUMENTED ANALYSIS OF GAIT

ECTS	0,85		
Workload in hours: classes + individual study	8,5 + 12,75		
Content	The learner will be acquainted with existing gait biomechanical instrumented evaluation protocols, how is a normal biomechanical assessment of gait, how to interpret a biomechanics instrumented analysis' report in a case of gait pathology or in which cases and how can a biomechanical instrumented analysis of gait be useful.		
Description of learning outcomes	Knowledge	Skills	Competences
	The learner knows and understands: <ul style="list-style-type: none"> - kinematics gait assessment protocol with photogrammetry 3D and the main variables outcomes; - kinematic gait assessment protocol with accelerometers and the main variables outcomes; - kinetic gait assessment protocol with dynamometric platforms and the main variables outcomes; - kinetic gait assessment protocol with instrumented insoles with pressure sensors and the main variables outcomes; - normal and pathological examples of functional gait assessment. Interpretation of results and utility. 	The learner is able to: <ul style="list-style-type: none"> - describe the main methodologies of biomechanical evaluation; - identify the differences between the instruments of biomechanical gait evaluation; - recognize and understand the parameters provided by each analysis device and identifies altered from normal results. 	The learner is ready for: <ul style="list-style-type: none"> - selecting the most appropriate methodology for the functional gait assess according to the parameters provided and characteristics of the measuring tool and depending on the objective of the study; - interpreting the results provided by tool in the context of human movement analysis in order to use this information in the clinical field.



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