Subject: Clinical Biomechanics

I. General information

Organization unit	Faculty of Rehabilitation Department of Natural Sciences Head: dr hab. Professor AWF Ida Wiszomirska
Course name	Clinical Biomechanics
Subject code	FV-12
Teaching language	English
Type of subject (obligatory/ facultative)	Obligatory
Level of studies	Long-cycle master's
Study year	II
Semester	IV
ECTS points	1
Teacher/ e-mail	dr hab. prof. AWF Michalina Błażkiewicz, michalina.blazkiewicz@awf.edu.pl
Studies program in which the subject is realized	Physiotherapy
Method of realization (stationary/ distance learning)	Stationary
Prerequisites	Before starting the module, the student has knowledge of: applied biomechanics and ergonomics, biophysics, normal and x-ray anatomy, functional anatomy, biochemistry, general physiology, kinesiology.

II. Detailed Information

Course aims and objectives

A1	Familiarize students with the modern methods of measuring and analyzing the results of biomechanical tests.
A2	Introduction to gait analysis.
A3	To acquaint the student with knowledge of the relevant and latest problems of clinical biomechanics.

Learning outcomes

Learning outcome	Subject's learning outcomes
Knowledge	
O.W4. basis of the mechanical forces impact on the human body of a healthy and sick person, including the elderly, with various dysfunctions and diseases, in various conditions; A.W12. legal and economic aspects of the functioning of entities involved in the rehabilitation process of people with disabilities; A.W13. ethical, legal and social issues of physiotherapist profession.	1. Has knowledge of methods of assessing the human locomotor system in order to explain disorders of their structure and function. 2. Has knowledge of modern measuring equipment used in biomechanics. 3. Has knowledge in the field of physiological and pathological gait analysis.
Skills	
O.U9. plan their own educational activity and constantly improve their knowledge to update it; A.U10.; encourage others to learn and take part in physical activity; A.U11. communicate with the patient and their family in an atmosphere of trust, taking into account the needs of the patient and their rights.	1. Can carry out biomechanical gait analysis. 2. Is able to apply appropriate methods of analyzing results in biomechanical studies. 3. Is able to use cinematographic analysis to analyze the movement of the human body.
Social Competences	
O.K4. compliance with patients' rights and professional ethics; O.K5. perceive and recognize their own limitations, self-assessing deficits and educational needs; O.K6. use objective sources of information; O.K9. take responsibility related to decisions taken as part of the professional practice, as well as those of self and other people's safety.	1. Knows health and safety rules regarding behavior in clinical conditions affecting patient and patient safety. 2. Is able to make good contact with the patient. 3. Has the ability to communicate effectively. 4. Understands the need for lifelong learning and the need for lifelong learning and professional development.

Syllabus contents

No.	Lecture title
Classes/ Practical classes	
1	Introduction to clinical biomechanics. Basic health and safety rules used in laboratory.
2	Description of rigid body dynamics. Degrees of freedom, axes of rotation in the joints. Coordinate systems.
3	Introduction to cinematographic analysis.
4	Rules for the preparation of equipment, laboratory and patient. Familiarization with gait analysis systems.
5	Cinematographic analysis of gait using the APAS system.
6	Cinematographic analysis of gait using the Vicon system.
7	Gait kinematic parameters of healthy person. Analysis of kinematic parameters of examples of pathological gait.
8	Calculation of joints angles in base on markers position data.
9	Gait kinetic parameters of healthy person. Analysis of kinetic parameters of examples of pathological gait.
10	Kinetic parameters - Inverse dynamics task.
11	Analysis of the muscle force distribution during gait – static optimization task.
12	The issue of symmetry and asymmetry - indicator methods.
13	Assessment of balance maintenance - nonlinear methods.
14	Programs and methods of modeling the dynamics of human movement.
15	Analysis of human movement using the OpenSim program.

Assessment criterion

Local grade	**Grade**	**Criteria**
5	**A**	90% of final test
4,5	**B**	80% of final test
4	**C**	70% of final test
3,5	**D**	60% of final test
3	**E**	50% of final test
2	**F**	< 50% of final test

1ECTS point = 30 hours students work (contact + self study)

TYPES OF CLASSES	**HOURS**
Contact hours	15
Self study	15
Total = 30 hours. = 1 ECTS	