

CLASS CARD**BIOMECHANICS**

Basic classes	Code in the study plan	ECTS
Biomechanics	15/2/I/PE	4

Education profile	Physical Education
Faculty and field of study	Faculty of Physical Education
Studies program in which the subject is realized	Sports, PE
Professor's name	Anna Mazurkiewicz
Level of studies (eg. bachelor, master)	bachelor
Study year and semester	2 year, 3 or 4 semester
Language	English
Method of realization (stationary/ distance learning)	stationary
Lectures/classes hours	30
Form of passing classes	credit for a grade
Type of subject (obligatory/ facultative)	obligatory
Prerequisites	Anatomy, biology, biochemistry, physiology

DETAILED INFORMATION**Course aims and objectives**

A1	Knowledge and skills connected with understanding the causes and results of forces in human body movement
A2	Knowledge about structural, geometric , informational and energy-related parameters of human body movement abilities
A3	Ability to perform selected biomechanical measurements (maximum Torque of selected group of muscles in static conditions , ground reaction force)

LEARNING OUTCOMES IN KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES FOR CLASSES

Learning outcome	Subject's learning outcomes
KNOWLEDGE	
K_W01, K_W12	Knowledge about basics of mechanics

	Knowledge about basic statements of biomechanics
K_W01, K_W03, K_W08	<p>Knowledge about practical application of biomechanics in physical education and sports</p> <p>Knowledge about Structural, geometric , informational and energy-related parameters of human body movement abilities</p> <p>Knowledge about relations between outside and inside forces in human body</p> <p>Basic knowledge about static and dynamic type of muscles work</p>
SKILLS	
K_U02	<p>Ability to apply basic mechanic formulas to evaluate kinematics and dynamics of motion in various sport disciplines</p> <p>Ability to conduct measurement of the maximum Torque of selected groups of muscles on static conditions</p> <p>Ability to conduct measurement of the ground reaction force counter movement vertical jump, count maximum height of displacement the center of body mass and interpret changes of ground reaction force from the chart</p> <p>Ability of practical application of those skills in training</p>
SOCIAL COMPETENCES	
K_K05, K_K02	<p>Understands the practical application of mechanics in analysis of human body movement and the constant need of improvement in that area</p> <p>Has the necessary abilities to conduct basic biomechanics measurements and understands it's necessity and practical application in sport.</p> <p>Has the abilities to conduct control measurement of basic physical abilities with compliance to safety rules.</p> <p>Shows self-sufficiency and initiative to create and modify new measurement or control methods in a field of developing physical activity habits and proper and safe movement technique.</p>

SUBJECT PROGRAM CONTENT DIVISION BY FORMS OF IMPLEMENTATION

FORM OF CLASSES – LECTURE - subject	Reference to subject-specific learning outcomes
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1-14	<p>Introduction to biomechanics Practical application of biomechanics in science, sport and physical education</p> <p>Structural, geometric , informational and energy-related parameters of human body movement abilities</p> <p>Fundamental concepts of mechanics in physics in: the statics, dynamics and kinematics and its practical application in sport and sport science</p>	K_W01, K_W03, K_W08, K_W12
FORM OF CLASSES – CLASSES – subject		
15-30	<p>Measurement of maximum torque of selected muscle group in static condition</p> <p>Measurement of ground reaction force in countermovement jump.</p> <p>General concept of metrology and rules and methods of data analysis</p>	K_U02 K_K05, K_K02

PLANNED METHODS/FORMS/TEACHING MEANS

Program content	Teaching methods/forms
1-14	Lecture with visuals and presentation, discussion
15-30	Measurements, individual and grouped problem solving exercises
Teaching resources: power point presentations, educational videos, measurement systems	

METHODS OF VERIFYING THE EXPECTED LEARNING OUTCOMES ACHIEVED BY THE STUDENT

Learning outcomes for classes	Assessment methods
K_W01, K_W03, K_W08, K_W12	Theoretical exam

K_U02 K_K05, K_K02	Conducting measurements and analyzing data independently and in groups Presentation of final results
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CONDITIONS FOR PASSING CLASSES:

The assessment model is composed 2 criteria:

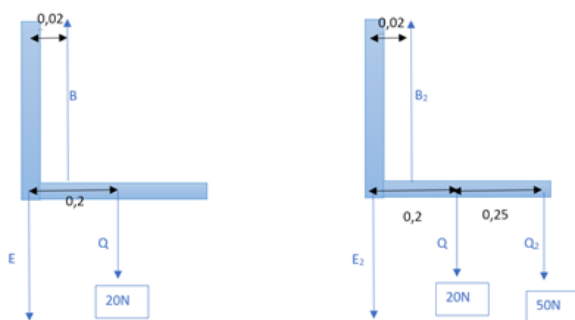
- theoretical evaluation (writing test/exam)
- proper conducting of measurements and proper analysis of measured data (paper work or presentation)

Each criteria is graded from 2 to 5. Grade 2 means that student did not reach the evaluation criteria. In order to evaluate student has to achieve at least grade 3 in each criteria.

SAMPLE ASSESSMENT/EXAMINATION TOPICS

1. What is biomechanics and how can we use its knowledge in sports ?
2. What is the relation between force and velocity of muscle work. How can you use it in sports strength training?
3. Explain Newton's three laws of motion and provide a sport-related example for each.
4. Describe the concept of torque and give an example of its application in a sporting movement.
5. Define ground reaction force and explain its role in activities such as running or jumping.
6. How does impulse-momentum relationship apply to improving performance in activities like jumping.
7. What is the magnitude of Work, when lift a stone of 10 kg of mass is performed with acceleration of 5 m/s^2 at the height of 2,5m?
8. What is the difference of magnitudes of the forces E and B between situation when someone is just holding arm and forearm in static position at 90 degree angle (picture on the left) and the situation when there is an extra weight hold in hand (picture on the right)? All

necessary values are inputted on the pictures.



ENGLISH BIBLIOGRAPHY

Basic	R. Enoka, <i>Neuromechanics of Human Movement</i> , wyd. 5, 2008
Additional	Watkins, J, <i>Fundamental Biomechanics of Sport and Exercise</i> . Routledge, 2014.

SELF STUDY

Full-time studies		Type of activity
Number of hours to complete the activity	ECTS	
30	1	Contact hours
90	3	Self-study

Number of ECTS points that a student obtains in classes developing practical skills:

Author of the class card:	Name, surname and email
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