COURSE DESCRIPTION CARD - SYLLABUS

Course name
Patobiomechanics [S2IBio1>Pato]

Course

Field of study
Biomedical Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge located in the educational standards in the field of: a) anatomy and physiology of the human motion system b) basics of classical mechanics, biomechanics, biophysics. Student can obtain information from various sources, also in English, work individually and in a team. Has the skills necessary to work in an industrial and medical environment. He has social competences, in particular he understands the need for lifelong learning, he can interact and work in a group.

Course objective

Understanding and understanding issues in the field of biomechanical and pathobiomechanical processes occurring in the human body related to the functioning of the musculoskeletal system during its static and dynamic activities. Understanding and understanding by students from the perspective of the kinesiological structure of the musculoskeletal system, artromechanics and arthropathomechanics, including the basic issues of muscle mechanics. Familiarizing students with the latest biomechanical measurement tracks enabling objective evaluation of the patient movement system - also based on the Department"s own research Understanding the biomechanical characteristics of normal and pathological gait, based on measurements at modern research stations.

Course-related learning outcomes

Knowledge:
Student defines the basic concepts related to the functional and structural characteristics of the motor system in normal and clinical conditions.
Student characterizes the methods of assessing the condition of the human movement organ to explain the structure and function disorders.
Student characterizes the mechanism of compensation at various degrees of dysfunction in the basic motor functions of a human.
Student explains the basics of friction and lubrication processes as causes that may lead to their wear.
He has detailed knowledge of analysis, assessment of human locomotion, orthopedic supply, techniques of assisting the function of damaged limbs, useful for formulating and solving complex pathobiomechanical tasks in the field of the studied field of study.

Skills:
Can use biomechanical experimental methods to formulate and solve selected problems in the field of clinical biomechanics.

Social competences:
He can interact and work in a group, taking on different roles.
He can think and act in a creative way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Forming rating:
a) for the lectures:
- Based on answers to questions concerning the material discussed in previous lectures
b) for the laboratories:
- On the basis of reports from laboratory tests.
Summary rating:
a) for the lectures - exam
b) for the laboratories - on base of final test
Lectures:
Passing requires more than 50% of points:> 50% - dst,> 60% - dst plus,> 70% - db,> 80% - db plus,> 90% of points - very good.

Programme content

Lectures:
Structural parameters of the human motion system - man in terms of Theory of Machines and Mechanisms. Joint joints: types of joint movements and their relationships with the number of axis of rotation and degrees of freedom. Location of the axis of rotation in the main joints of the limbs. Mechanical properties of tissue structures of the skeletal-muscular system. Functional parameters of selected muscle actones. Lubrication and joint wear processes. The role of body fluids (synovial fluid) in tribological processes occurring in human joints. The disease and mechanical changes of joints and their influence on tribological processes. Endoprosthetics of joints (bio-bearings) - on the example of hip joint endoprosthesis - biomechanical aspects. Biomechanics and pathobiomechanics of human locomotion. Detailed characteristics of the osteoarticular joints of the human motion system. Biomechanics and pathobiomechanics of body posture. Biomechanical and pathobiomechanical image of the function of the lumbar-pelvis-pelvic system. Selected aspects of biomechanics and spine pathobiomechanics.
Laboratories:
• Discussing the principles of conducting comprehensive pathobiomechanical studies using a synchronized measurement path (EMG, BART SMART D system, AMTI platforms) - exemplary measurements and interpretation of results
• Measurement and assessment of biomechanical and pathobiomechanical parameters of the human motion system in dynamic or static conditions - a modern isokinetic dynamometer - Biodex
• Measurement of objective parameters related to posture and balance, in a clinical setting - a portable platform for analyzing aberrations and balance ACCU SWAY
• An attempt to optimize walking with a ball in selected lower limb pathologies using the BTS optoelectronic system

• Biomechanical analysis of alternating two-gait walk with crutches - comparison with standard gait using the BTS optoelectronic system
• Osteokinematic femoral movement - examination using the BTS system
• Biomechanical analysis of walking gait methods and techniques for clinical purposes. Conditions for correct gait observation using the BTS optoelectronic system

Course topics

none

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: performing exercises, discussion, team work.

Bibliography

Basic
Basic bibliography:
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Additional
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Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	28	1,00