COURSE DESCRIPTION CARD - SYLLABUS

Course name
Virtual analysis of human-machine interactions and Motion Capture systems

Course

Field of study
Biomedical engineering
Area of study (specialization)
Medical and rehabilitation devices
Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
1/2
Profile of study
general academic
Course offered in
Polish/English
Requirements
elective

Number of hours

Lecture
15
Laboratory classes
15
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Faculty of Mechanical Engineering
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Responsible for the course/lecturer:

Prerequisites

Knowledge: Has basic knowledge of computer-aided engineering methods, computer-aided design, anthropometry and human body anatomy.

Skills: Logical thinking, using information obtained from the library, the Internet and other sources.

Social competences: Understanding the need to learn and acquire new knowledge.

Course objective

Acquiring knowledge about the meaning and possibilities of computer-assisted analysis of human-machine interaction (environment) and Motion Capture systems (capturing spatial human movements, recording and processing them by a computer). Introduction to the basic methods of capturing human movements and processing of measurement data.

Course-related learning outcomes

Knowledge

The student has knowledge of development trends and the most important new achievements in the fields of science and scientific disciplines relevant to the field of study being studied and related scientific disciplines.

The student knows the basic methods, techniques, tools and materials used to solve complex engineering tasks in the field of study being studied.

Skills

The student is able to plan and carry out experiments, including computer measurements and simulations, interpret the results obtained and draw conclusions.

The student is able to assess the usefulness and possibility of using new achievements (techniques and technologies) in the field of study.

Social competences

The student is able to interact and work in a group, taking on different roles.

Is ready to critically assess knowledge and received content.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Rating individual work related to the operation of different measuring systems (measurement of human body movement) and a dedicated data processing software.

Obligatory reports on laboratory classes - one report within a single position group.

Practical tests of the tasks set for the student regarding the ability to work with the computer system of virtual ergonomics and the Motion Capture system.

Final test on theoretical knowledge - written form, duration 1.5 hours. The test is carried out after the whole series of lectures. It includes a minimum of three questions, one after the knowledge of the basic definitions of virtual ergonomics, construction and operation principles of the selected Motion Capture system and computer ergonomic systems, including human models. Passing threshold: 50% of points.

Programme content

Discussion of the basic concepts and definitions in the field of Motion Capture systems and computer human models. Presentation of the division and types of Motion Capture systems. Discussion of the principles of Motion Capture system operation on the example of an "exoskeleton" and measuring gloves. To introduce students to the process of recording the sequence of human body movements on a laboratory stand. Analysis and processing of obtained measurement data in specialized computer programs. Presentation of the basic functions of virtual analysis of human-machine interactions on the example of CATIA - the "Human Ergonomics Design and Analysis" module. Acquaintance with the construction of the computer model of man, simulation of human-machine interaction and attitude analysis.

Teaching methods

1. Lecture with multimedia presentation

2. Ćwiczenia laboratoryjne: prezentacja multimedialna, wykonanie zadań praktycznych podanych przez prowadzącego, realizacja indywidualnej symulacji komputerowej

Bibliography

Basic

1. Wprowadzenie do inżynierii rehabilitacyjnej : praca zbiorowa, Pod. Red.: Marek Zabłocki, Wydawnictwo Politechniki Poznańskiej, 2017, ISBN: 978-83-941828-1-6.

2. Winkler T.: Komputerowo wspomagane projektowanie systemów antropotechnicznych, WNT Warszawa 2005

3. Tejszerska D., Świtoński E.: Biomechanika inżynierska - zagadnienia wybrane laboratorium. Wydawnictwo Politechniki Śląskiej, Gliwice 2004

4. Jabłoński J.: Ergonomia produktu. Ergonomiczne zasady projektowania produktów. Wydawnictwo Politechniki Poznańskiej, Poznań 2006

Additional

1. Chlebus E.: Techniki komputerowe CAx w inżynierii produkcji, WNT Warszawa 2000

2. Pięciak T., Pawłowski R., Wizualizacja ruchu człowieka (Motion Capture), Inżynierowie dla Biologii i Medycyny : kwartalnik wykładowców i studentów inżynierii biomedycznej ; ISSN 1897-9149. -2009 nr 5

3. Nowak E.: Atlas antropometryczny populacji polskiej – dane do projektowania, Instytut Wzornictwa Przemysłowego, Warszawa 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests, creating computer simulation and summary raport) [1]	25	1,0

[1] delete or add other activities as appropriate