COURSE DESCRIPTION CARD - SYLLABUS

Course name

Ergonomy in virtual systems

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Virtual Design Engineering

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

0

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

30

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Michał Rychlik

email: michal.rychlik@put.poznan.pl

tel. 665 2167

Wydział Inżynierii Mechanicznej

ul Jana Pawła II 24, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

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

Skills: Able to plan and conduct experiments, including computer measurements and simulations, interpret the results obtained and draw conclusions.

Social competences: Can interact and work in a group.

Course objective

Acquiring knowledge about the meaning and possibilities of computer-assisted analysis of human-technical object interaction (virtual ergonomics) and Motion Capture systems (capturing spatial human movements). Acquainted with the basic elements of the computer system of virtual ergonomics and systems for capturing human body movements. Supporting work in designing objects that take into account the user and ergonomic elements using CAD systems, Motion Capture devices, as well as 3D scanning. Planning, preparation and realisation of computer simulation using virtual ergonomic systems.

Course-related learning outcomes

Knowledge

Has knowledge of the principles of safety and ergonomics in the design and operation of machinery and the threats that machines pose to the environment.

Has general knowledge about the types of tests and methods of testing working machines using modern measuring techniques and data acquisition.

Skills

Is able to estimate potential threats to the natural environment and people from the designed work machine and vehicle from a selected group.

Social competences

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:

Assessment of individual work related to the operation of various measuring systems and data processing in specialized software.

Practical implementation of tasks set before the student regarding the skills of working with a computer system of virtual ergonomics and Motion Capture.

Implementation of a design task involving the analysis of a 3D model of a technical object in the field of virtual ergonomics and the use of the selected Motion Capture system as well as the use of computer human models.

Programme content

Presentation of the basic knowledge and definitions in the field of virtual engineering systems, Motion Capture systems and computer human models. Presentation of the basic functions of virtual analysis of

human-machine interactions on the example of CATIA v5 program "Human Ergonomics Design and Analysis". Acquaintance with the construction of the computer model of man, simulation of human-machine interaction and attitude analysis. Development of a virtual study plan (scenario), preparation and conduct of computer simulation using a virtual ergonomic system. Discussion of the principles of Motion Capture system operation and its use on a design example. To introduce students to the process of registering the sequence of human body movements on a laboratory stand.

Teaching methods

1. Lectures conducted using a multimedia presentation

2. Projects based on the list of tasks given by the teacher, implementation of individual computer simulations using virtual human models.

Bibliography

Basic

1. Praca zbiorowa, Pod. Red.: Marek Zabłocki "Wprowadzenie do inżynierii rehabilitacyjnej" , 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	90	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for lectures, implementation of project tasks, computer simulations, preparation of the final report from the project) [1]	60	2,0

[1] delete or add other activities as appropriate