COURSE DESCRIPTION CARD - SYLLABUS

Course name

Advanced Methods in Machine Design

Course

Field of study

Mechanical Engineering

Area of study (specialization)

Level of study

Form of study

full-time

Year/Semester

-

Profile of study

general academic

Course offered in

english

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

MSc Eng. Krzysztof Wałęsa

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Faculty of Mechanical Engineering

Piotrowo 3 Street, 61-138 Poznań

Responsible for the course/lecturer:

PhD Eng. Dominik Wilczyński

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Faculty of Mechanical Engineering

Piotrowo 3 Street, 61-138 Poznań

Prerequisites

Basic knowledge of descriptive geometry, technical drawing, basic knowledge of machine science and machine parts, knowledge of physics (mechanics in the field of: statics, kinematics and dynamics), mathematics, after passing as part of the study program.

Ability to solve tasks from geometry and from the basics of machine construction based on the knowledge and the ability to acquire information from the indicated sources.

Understanding the need to broaden their competences, readiness to cooperate within the team.

Course objective

Improve of understanding two important issues connected with machine design: threaded connections and shafts with bearings. Improve abilities of using advanced methods including CAD tools to conduct design process of the structures in a proper way.

Course-related learning outcomes

Knowledge

The graduate has a basic knowledge of materials science, mechanical strength and fatigue, knows and understands to an advanced level the typical technologies of machine component manufacturing [K1_W4 (P6S_WG)].

The graduate knows and understands, to an advanced level, typical engineering technologies, principles and techniques of designing simple automation and robotics systems; the graduate knows and understands the principles of selection of actuators, computational units and measuring and control equipment [K1_W20 (P6S_WG)].

The graduate knows and understands the basic processes occurring in the life cycle of devices and selected security systems used in automation and robotics [K1_W22 (P6S_WG)].

Skills

Is able to obtain information from bibliography, databases and other sources; has the ability to self-educate in order to improve and update professional competences [K1_U1 (P6S_UW)].

Can determine and use models of simple electromechanical systems and selected industrial processes, as well as use them for the purposes of analysis and design of automation and robotics systems [K1_U11 (P6S_UW)].

Social competences

The graduate is aware of responsibility for own work and willingness to conform to the principles of teamwork and taking responsibility for jointly implemented tasks; is able to lead a small team, set goals and set priorities leading to the implementation of the task. The graduate is ready to play a responsible professional role [K1_K3 (P6S_KR)].

Is aware of the need for a professional approach to technical issues, scrupulous familiarization with the documentation and environmental conditions in which devices and their components can operate; is

ready to comply with the principles of professional ethics and require it from others, respect for the diversity of views and cultures [K1_K3 (P6S_KR)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assesment of the current progress during classes.

Programme content

1) Threaded connections:

a) theoretical background,

b) analytical calculations,

c) methods of CAD modelling and stress analysis.

2) Axles, shafts and bearings:

a) theoretical background,

b) analytical calculations,

c) methods of CAD modelling and stress analysis.

Teaching methods

Informative lecture with a multimedia presentation, using the case study method - analysis of solutions to real construction problems. Workshop methods of practical construction classes during laboratory.

Bibliography

Basic

1. Collins J. A., Busby H. R., Staab G. H.: Mechanical Design of Machine Elements and Machines, John Wiley & Sons; 2nd Edition, 2009,

2. Bhandari V. B.: Design of Machine Elements, 3rd Edition 2010, published by TATA McGraw-Hill Publishing Company Limited,

3. Budynas R. G., Keith J Nisbett K. J.: Shigley's Mechanical Engineering Design, McGraw-Hill Higher Education; 9 edition, 2011,

4. Deutschman A. D., Michels W. J., Wilson Ch. E.: Machine design: theory and practice, Macmillan Publ. London: Collier Macmillan Publ.,1975,

5. Dudley D.W.: Handbook of Practical Gear Design, CRC Press, 2004,

6. Juvinall R.C., Marshek K. M.: Machine Component Design, John Wiley & Sons; 5th Edition International Student Version edition, 2012.

Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	6,0
Classes requiring direct contact with the teacher	15	1,0
Student's own work (literature studies, preparation for laboratory classes) [1]	75	5,0

[1] delete or add other activities as appropriate