COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechanical Constructions

Course

Field of study
Automatic Control and Robotics
Area of study (specialization)
Robotics
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
3/6
Profile of study
general academic
Course offered in
english
Requirements
elective

Number of hours

Lecture
30
Tutorials

Laboratory classes
30
Projects/seminars
15

Other (e.g. online)

Number of credit points

5

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. Mikołaj Spadło

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tel. +48 61 665 2222

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

Mastering the basic rules for recording the construction of spatial object images on a plane, 2D drawing. Education of spatial imagination, 3D drawing. Understanding the methods and principles of writing a structure. Practical ability to create drawing documentation. The ability to "read" drawings of technical documentation. Providing students with basic knowledge of the durability of materials, machinery, materials and fundamentals of machine construction in the field of modeling of disjoint and inseparable connections as well as the supporting structure and elements of the drive structure.

Developing students' skills:

- calculation and construction of machine elements and assemblies,

- documenting and reading technical documentation based on the acquired knowledge.

Developing teamwork skills in students.

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:

Written exam for the lecture. Implementation of the final project.

Programme content

Introductory information: drawing lines, sheet formats, presenting objects on the drawing plane: rectangular projections, axonometric projections, straight section, half section, stepped cross-section, broken section, foundations, application of geometrical structures for drawing flat machine parts, drawing parts of a machine shaft class, dimensioning, drawing connections of machine parts, threaded and spline connections, drawing drawings of machine parts such as shaft, cogwheel, assembly drawing of a gripper with peripherals, detailing of the assembly drawing, CAD.

Basics of material strength, elastic-plastic materials, brittle materials, stretching plot, yield point, strength limit, allowable stress.

Basic principles of the construction process, mechanism elements, characteristics of load types, defining loads and formulating strength conditions. Connections and their calculation: soldered, welded, welded, glued; riveted, shaped connections: grooved, splined, bolt connections, threaded connections. Screw mechanisms: examples and application, construction calculations. Basic information about mechanical transmissions and drive systems, which include axles and shafts, bearings, clutches and brakes, gear wheels and pulleys.

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. Project methods used in design classes.

Bibliography

Basic

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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,

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8. Freuch T.E., Vierck C.I., Engineering drawing and grafic technology, McGraw-Hill Book Co., New York 1972.

Additional

1. Niemann G., Maschinenelemente t. I, II, III, Springer Verlag Berlin, 1965

2. Bahl G., Beitz W., Nauka konstruowania, WNT, Warszawa 1984

3. Dobrzański T., Rysunek techniczny maszynowy, WNT, W-wa 1997.

4. Lewandowski T., Rysunek techniczny dla mechaników, WSiP, W-wa 2009.

5. Bober A, Dudziak M., Zapis konstrukcji, PWN, W-wa 1999.

6. Jankowski W. Geometria Wykreślna. Wydawnictwo P.P. 1999 r.

7. Korczak J., Prętki Cz. Przekroje i rozwinięcia powierzchni walcowych i stożkowych. Wydawnictwo P.P. 1999 r.

8. Loska J., Zbiór zadań ćwiczeniowych z rysunku technicznego, Wyd. Politechniki Śląskiej, Gliwice 1982

9. Mały poradnik Mechanika, T1 i T2.

10. Praca zbiorowa pod red. Z. Osińskiego, Podstawy konstrukcji maszyn, PWN, W-wa, 1999

11. Praca zbiorowa pod red. M. Dietricha: Podstawy konstrukcji maszyn. Tom 1, 2, 3, WNT, Wa-wa, 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

[1] delete or add other activities as appropriate