COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechanical constructions [S1AiR1E>PO2-KM]

Course

Field of study
Automatic Control and Robotics

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
english

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

5,00

Coordinators

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Lecturers

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:
Has basic knowledge of materials-science, strength and fatigue of materials, knows typical manufacturing technologies of machine components [K1_W4 (P6S_WG)].
Knows and understands typical engineering technologies, principles and techniques of construction of simple automation and robotics systems; knows and understands the principles of selection of executive systems, computational units and measurement and control elements and devices [K1_W20 (P6S_WG)].
Knows and understands the basic processes in the life cycle of devices and selected safety systems used in automation and robotics [K1_W22 (P6S_WG)].
Skills:
Is able to obtain information from literature, databases and other sources also in a chosen foreign language [K1_U1 (P6S_UW)].
Can determine and use models of simple electromechanical systems and selected industrial processes, and use them for analysis and design of automation and robotics systems [K1_U11 (P6S_UW)].
Social competences:
Is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for jointly implemented tasks; is able to lead a small team, set goals and determine priorities leading to the realisation of the task; is ready toto play a responsible professional role. [K1_K3 (P6S_KR)].
The graduate is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which the equipment and its components can operate. The graduate is ready to observe the rules of professional ethics and to demand it from others, to respect the diversity of opinions and cultures [K1_K5 (P6S_KR)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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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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.
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6. Jankowski W. Geometria Wykreślna. Wydawnictwo P.P. 1999 r.
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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	150	5,00
Classes requiring direct contact with the teacher	75	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	2,50