COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mechanics and strength of materials [S1AiR2>MiWM]

Course

Field of study
Automatic Control and Robotics

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
practical

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Basic knowledge of physics and mathematics (core curriculum for secondary schools, level basic) Skills: The student starting this subject should have basic knowledge of mathematical analysis, calculus matrix and physics. Should have the ability to solve basic problems with math and skill obtaining iformation from the indicated sources. Social Competences: He should also understand the necessity to expand his competences.

Course objective

1. Provide students with basic knowledge of statics, kinematics, dynamics and endurance materials. 2. Presentation of construction methods of mathematical models describing real objects. 3. Developing students' skills in solving simple problems in statics, kinematics and dynamics.

Course-related learning outcomes

Knowledge:
1. has the knowledge necessary to understand the basic physical phenomena occurring in systems mechanical; - [K1_W2]
2.has ordered and theoretically founded general knowledge of general mechanics: statics, kinematics

and dynamics, including the knowledge necessary to understand the principles of modeling and construction simple mechanical systems; - [K1_W3]

Skills:
1. is able to design simple mechanical elements for various applications (taking into account material properties); - [K1_U25]

Social competences:
1. understands the need and knows the possibilities of continuous training? raising competences professional, personal and social; - [K1_K1]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment:
a) in the field of lectures:
- on the basis of answers to questions about the material discussed in previous lectures and activity during the current lecture,
b) in the field of auditorium exercises:
- based on the assessment of the current progress in the implementation of tasks,
Summative assessment:
a) in the field of lectures, verification of the assumed learning outcomes is carried out by:
- assessment of the knowledge and skills demonstrated in the written exam, which consists of 10 questions and issues for which 20 points can be obtained (2 points for each question or issue); additionally, optionally: writing a program to control a mechanical object;
- additionally (during the oral exam) by assessing knowledge and skills on the basis of a discussion results of the written exam (and other questions and control issues) - evaluation may be increased or reduced (the teacher will notify about the necessity to take the oral exam after conducting a written exam);
b) in the field of auditorium exercises:
- assessment of knowledge and skills related to the implementation of exercises through 2 tests semester,
Obtaining additional points for activity during classes, especially for (only to pass exercises):
- solving the indicated simple tasks of the type processed in class;
- additionally, optionally: writing a program to control a mechanical object.

Programme content

The lecture covers the following issues:
- statics: principles of statics, basic body models in technical mechanics, equilibrium of systems flat and spatial - conditions of balance,
- kinematics: movement of a material point, movement of a system of material points, movement of the body stiff, flat body movement stiff, spherical motion of a rigid body, general motion of a rigid body, relative (complex) motion,
- dynamics: mass geometry, Newton's laws, the relativity principle of classical mechanics, dynamics material point dynamics of the system of material points dynamics of a rigid body (including: d'Alembert's principle, Euler's equations, kinetic and potential energy);
-basics of analytical mechanics: principles of mechanics, free system, constraints and their classification, generalized coordinates and generalized speeds, shifts prepared and possible, principle d'Alembert, the principle of prepared works, strengthgeneralized, equilibrium equations, types of equilibrium, Dirichlet's principle, general equation of dynamics analytical, Lagrange equations of the second kind, Hamilton's principle, Hamilton's equations, energy mechanical - kinetic and potential, the principle of conservation of energy,
- in the field of material strength: introduction, simple strength cases, stresses acceptable; hypotheses endurance; composite and fatigue strength.
-examples of some elementary problems from particular departments covered by the lecture.
As part of the exercises, students learn about:
- examples of solving statics equations: plane and spatial force system,
- examples concerning the kinematics of a material point and the system of material points,
- examples of composing equations of dynamics of a material point, arrangement of material points and

solids stiff,
- examples illustrating the application of the analytical mechanics apparatus (the use of the principle of work prepared, composing equations of motion).

Course topics

none

Teaching methods

1. Lecture: traditional presentation.
2. Tutorial exercises: solving tasks, case studies.

Bibliography

Basic:
1. Mechanika ogólna, tom 1, Leyko J., Wydawnictwa Naukowe PWN, Warszawa, 2010
2. Mechanika ogólna, tom 2, Leyko J, Wydawnictwa Naukowe PWN, Warszawa, 2010
3. Mechanika techniczna, tom 1, Misiak J., Wydawnictwa Naukowo-Techniczne WNT, Warszawa, 2006
4. Mechanika techniczna, tom 2, Misiak J., Wydawnictwa Naukowo-Techniczne WNT, Warszawa, 1998
5. Mechanika ogólna, Niezgodziński T, Wydawnictwa Naukowe PWN, Warszawa, 2010
6. Zbiór zadań z mechaniki ogólnej, Niezgodziński M.E., Niezgodziński T., Wydawnictwa Naukowe PWN, Warszawa, 2009
7. Metodyka rozwiązywania zadań z mechaniki, Nizioł J., Wydawnictwa Naukowo-Techniczne WNT, Warszawa, 2002
8. Wytrzymałość materiałów, Niezgodziński M.E., Niezgodziński T., Wydawnictwa Naukowe PWN, Warszawa, 1998

Additional:
1. Mechanika klasyczna Tom 1 i 2, Taylor John R., PWN, Warszawa 2006
2. Mechanika ogólna, Rozwiązywanie zagadnień z MATHCAD-em, Tomasz Kucharski, Wydawnictwo WNT, Warszawa, 2015
3. Vector Mechanics for Engineers: Statics and Dynamics, Ferdinand P. Beer, Elwood Russell Johnston, David F. Mazurek, Brian P. Self, Phillip J. Cornwell, McGraw-Hill Education, 2018

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50