



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Strength of materials

### Course

Field of study

Engineering Management

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

16

Laboratory classes

10

Other (e.g. online)

Tutorials

14

Projects/seminars

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

Ph.D., Marcin Rodak

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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### Prerequisites

Has a basic knowledge in mathematics

Ability to solve basic tasks in geometry and mathematical analysis.

Ability to search for necessary information in literature, databases, catalogues.

The ability to self-study.

Using information and communication techniques appropriate to carry out engineering tasks.



## Course objective

Introduction to the basic principles of mechanics of deformable bodies.

## Course-related learning outcomes

### Knowledge

1. has basic knowledge about mechanics of deformable bodies [P6S\_WG\_16]
2. has knowledge about the properties of materials used in mechanical engineering [P6S\_WG\_16, P6S\_WG\_17]
3. has basic knowledge about the principles of design and operation of machines [P6S\_WG\_14, P6S\_WG\_15, P6S\_WG\_17]

### Skills

1. is able to solve a simple design task [P6S\_UW\_15]
2. is able to design a part or subassembly of the machine [P6S\_UW\_14, P6S\_UW\_16]
3. is able to carry out measurements of mechanical properties of materials [P6S\_UW\_14, P6S\_UW\_15]

### Social competences

1. understands the need for lifelong learning
2. is aware of the importance of technical issues in the creation of products [P6S\_KO\_02]

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture, tutorials - written test and assessment of activity in the classroom:

3 50.1% -70.00%

4 70.1% -90.0%

5 from 90.1%

Laboratory classes - ongoing control of theoretical preparation for classes, discussion of results, substantive assessment of test reports.

## Programme content

Conditions of equilibrium of a rigid body.

Classification of loads acting on an elastically deformable body, stresses and internal forces. Internal forces in the bar.

Tests of mechanical properties of materials.

Tension and compression. Strength conditions, generalized Hooke's law.



Tension and compression within the limits of elasticity, the statically determinate and indeterminate bar systems.

Moments of inertia of flat figures.

Torsion of round bars.

Graphs of bending moments and shear forces. Bending of beams.

Normal stresses in beams.

Beam Design. Differential equation for beam deflection lines and beam deflection lines.

Statically indeterminate beams.

Program content of laboratory classes: tensile test, hardness measurements using Brinell, Vickers, Rockwell methods, fatigue tests, impact bending test, spring characteristics, strain gauges tests.

### Teaching methods

Live lecture with multimedia illustrations, tutorials with problems solved on the board, laboratories - measurements performed by students under the supervision of a teacher.

### Bibliography

Basic

1. M. Ostwald, Podstawy wytrzymałości materiałów i konstrukcji, WPP, Poznań 2017
2. Ostwald M., Wytrzymałość materiałów i konstrukcji. Zbiór zadań. Wydawnictwo PP, Poznań, 2018.
3. Badania eksperymentalne w wytrzymałości materiałów. Pod redakcją S. Joniaka, WPP. 2006.
4. Misiak J., Mechanika techniczna t.1, WNT, Warszawa, 1998, 2012.

Additional

1. Magnucki K., Szyc W., Wytrzymałość materiałów w zadaniach: pręty, płyty i powłoki obrotowe, Wydawnictwo Naukowe PWN, 2000.
2. Dyląg Z., Jakubowicz A., Orłoś Z., Wytrzymałość materiałów t.1 i 2, WNT, Warszawa, 2000.



### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	40	1,5
Student's own work (literature studies, preparation for tutorials, preparation for tests, preparation for laboratory classes, preparing reports of conducted laboratory exercises) <sup>1</sup>	60	2,5

<sup>1</sup> delete or add other activities as appropriate