



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanics and strength of materials [S1Log2>MiWM]

### Course

Field of study  
Logistics

Year/Semester  
1/1

Area of study (specialization)  
–

Profile of study  
general academic

Level of study  
first-cycle

Course offered in  
Polish

Form of study  
full-time

Requirements  
compulsory

### Number of hours

Lecture  
30

Laboratory classes  
15

Other (e.g. online)  
0

Tutorials  
30

Projects/seminars  
0

### Number of credit points

6,00

### Coordinators

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### Lecturers

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### Prerequisites

Basic knowledge in mathematics (in the field of algebra, geometry, trigonometry) and physics (vector calculus, Newtonian physics). In addition, the ability to think logically and can visualize simple mechanical constructions in space. Ability to obtain information from specified sources. Is aware of the interdependence between mathematical, physical and technical sciences.

### Course objective

Providing students with basic knowledge in the field of applied mechanics, especially in the field of statics. In addition, visualization of theoretical and practical problems related to the strength analysis of simple structures based on the mechanical properties of materials as the basis for the proper design of machinery and equipment.

### Course-related learning outcomes

### Knowledge:

Student knows the basic issues of mechanics, construction and operation of machines related to logistics [P6S\_WG\_02]

Student knows the basic issues in the field of chemical changes, materials science, commodity science and the strength of materials and their importance for industrial and logistic processes [P6S\_WG\_03]

### Skills:

Student is able to apply appropriate experimental and measurement techniques, including computer simulation within logistics and its specific issues and supply chain management [P6S\_UW\_03]

Student is able to assess and make a critical economic analysis of a selected problem, falling within the scope of logistics and its specific issues and supply chain management [P6S\_UW\_06]

### Social competences:

Student is aware of initiating activities related to the formulation and transfer of information and cooperation in the society in the field of logistics [P6S\_KO\_02]

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: formative assessment - written tests, summary assessment - arithmetic average of the grades obtained as part of the formative assessment.

Exercises: formative assessment - written tests, summary assessment - arithmetic average of the grades obtained as part of the formative assessment

Laboratories: forming assessment - oral and written answer, written reports from each laboratory exercise, summary assessment - arithmetic average of the marks obtained as part of the forming assessment.

The exam includes tests during the semester, which are graded on points. The student receives a positive assessment of the credit if he / she obtains at least 50% of the points available for each colloquium. The final grade for the credit is determined according to the following rules:

Very good (A) - if the total number of points obtained from all colloquia is above 90% of the total number of points possible to get, Good plus (B) - 80.1 - 90.0% of points, Good (C) -70.1 - 80.0%, Sufficient plus (D) - 60, 1 - 70.0%, Sufficient ( E) - 50.0 - 60.0%.

A student who has received an unsatisfactory grade has the option of joining one retake exam.

Laboratory exercises: credit on the basis of: oral or written answer for each exercise and reports on each exercise. The condition of passing laboratory exercises is passing all the exercises included in the program and acceptance by the teacher of all reports.

## Programme content

The fundamental rights of mechanics. Definition of force and its types. Systems of forces. Moment of forces relative to the pole. Principles of statics. Friction: nature and effects, coefficient of friction (rolling resistance). Strength of materials. Normal stresses and strain. Elasticity, plasticity. Linear elasticity and Hook's Law. Analysis of Stress. Analysis of Strain. Centroids and moments of inertia of plain areas. Shear stress and strain. Deflections of Beams. Buckling. Basic of kinematics of particle and rigid body. Basic of dynamics of particle and rigid body. Vibration of particle body.

Laboratory exercises:

1. Static tensile test.
2. Hardness measurements using the following methods: Brinell, Vickers and Poldi.
3. Rockwell hardness measurement. Microhardness measurement by the Vickers method.
4. Material fatigue. Locati trial.
5. Bend test. Spring characteristics.
6. Static strain gauges in thin-walled tank

## Course topics

1. engineering mechanics
2. Statics and equilibrium conditions of systems of forces
3. Friction
4. Introduction to strength of materials
5. Tension and axial compression of bars

6. Mechanical properties of materials
7. Strength of bar and bar-beam systems
8. Analysis of stress and strain states
9. Geometrical characteristics of figures
10. Torsion of shafts
11. Bending of beams
12. Strength hypotheses and elements of composite strength.

### Teaching methods

Lecture - mediated lecture,

Classes/tutorial - giving method: discussion on the application of analytical methods

Practical method: lab exercises

### Bibliography

Basic:

Zielnica J., Wytrzymałość materiałów. Wydawnictwo PP, Poznań, 1996.

Ostwald M., Podstawy wytrzymałości materiałów, Wydawnictwo PP, Poznań, 2007.

Ostwald M., Wytrzymałość materiałów. Zbiór zadań. Wydawnictwo PP, Poznań, 2008.

Badania eksperymentalne w wytrzymałości materiałów. Pod redakcją S. Joniaka, WPP. 2006.

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, Warszawa, 2000.

2. Dyląg Z., Jakubowicz A., Orłoś Z., Wytrzymałość materiałów, t. 1 i 2, WNT, Warszawa, 2000.

3. Gere J.M., Timoshenko S.P., Mechanics of Materials, PWS-KENT, Boston, 1984

### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	5,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	2,00