# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | Code |
|---|---|
| **Mechanics and Strength of Materials** | **1011101311010210975** |

| Field of study | Profile of study (general academic, practical) | Year /Semester |
|---|---|---|
| **Logistics - Full-time studies - First-cycle studies** | **(brak)** | **1 / 1** |
| Elective path/specialty | Subject offered in: | Course (compulsory, elective) |
| **-** | **Polish** | **obligatory** |

| Cycle of study: | Form of study (full-time,part-time) |
|---|---|
| **First-cycle studies** | **full-time** |

| No. of hours | No. of credits |
|---|---|
| Lecture: **30** Classes: **30** Laboratory: **15** Project/seminars: **-** | **5** |

| Status of the course in the study program (Basic, major, other) | (university-wide, from another field) |
|---|---|
| **(brak)** | **(brak)** |

| Education areas and fields of science and art | ECTS distribution (number and %) |
|---|---|
| | |

**Responsible for subject / lecturer:**

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Basic in mathematics and physics, knowledge and understanding of mathematics (study of functions, algebraic transformations) |
| 2 | **Skills** | Student can study functions, operate basic geometrical and trigonometric relations, has the ability to logically think |
| 3 | **Social competencies** | Understands the need to acquire new knowledge, is aware of mutual dependencies between mathematical knowledge, physical knowledge and technical sciences. |

## Assumptions and objectives of the course:

Mastering basic principles in the field of mechanics and strength analysis. Understanding the theoretical and practical problems related to strength analysis based on mechanical properties of materials as a basis for proper design of machines and devices.

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. Has knowledge of physics including mechanics, thermodynamics, optics, electricity and magnetism, nuclear physics and solid state physics, including knowledge necessary to understand technical issues related to logistics - [K1A_W02]
2. Has basic knowledge in the field of: mechanics and machine construction as well as strength of materials - [K1A_W07]

### Skills:

1. Has the ability to self-education in the field of mechanics and strength of materials - [K1A_U05]
2. Can use to formulate and solve engineering tasks in the field of mechanics and strength of materials, analytical, simulation and experimental methods - [K1A_U09]
3. Is able to make a critical analysis of the functioning and evaluate - especially in connection with the mechanics and durability of materials - existing technical solutions, in particular devices, objects, systems, processes, services - [K1A_U13]

### Social competencies:

1. Understands the need to learn throughout life; can inspire and organize the learning process of other people - [K1A_K01]

## Assessment methods of study outcomes

Lecture: formative assessment - written tests, summary evaluation - arithmetic mean of grades obtained as part of the forming assessment

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

Laboratories: forming evaluation - oral and written answer, written reports from each laboratory, summary evaluation - arithmetic mean of grades obtained as part of the forming evaluation

The credit includes three tests during the semester, which are scored on points. The student receives a positive pass mark, if he receives at least 50% of the points possible from each of the colloquiums. The final grade for the pass is determined according to the following rules:

Very good - if the total number of points obtained from all tests is over 90% of the total number of points possible to get, Good plus - 80.1 - 90.0% points, Good-70.1 - 80.0% Sufficient plus - 60, 1 - 70.0%, Sufficient - 50.0 - 60.0%.

A student who has received an unsatisfactory grade has the opportunity to take one correction. Laboratory classes: Credits based on: oral or written answer in each exercise and reports on each exercise. The condition for passing laboratory classes is passing all the exercises covered by the program and the adoption by the teacher of all reports.

## Course description

Lecture and exercises:

1. Basic concepts of mechanics. Definition of strength, division of forces, systems of forces. Moment of force relative to the pole.

2. The axiom statics). 3. Ties and reactions of bonds. 4. The center of gravity of the body. 5. The conditions of the equilibrium of plane systems of forces. 6. Mechanical properties of materials. 7. Internal forces and unitary forces (stresses). 8. Stretching and squeezing rods. Hooke's law. Bar systems.

9. Static tensile test. Permissible stresses and safety factor of the structure.

10. Stress / compression strength condition.

11. Assembly and thermal stress.

12. Moments of inertia of flat figures. Steiner's theorem.

13. Twisting bars with circular cross-sections. 14. Bending of straight beams, determining lateral forces and bending moments. Beam deflection line.

Laboratory exercises:

1. Static tensile test. 2. Hardness measurements by the methods: Brinell, Vickers and Poldi. 3. Rockwell hardness measurement. Measurement of microhardness using the Vickers method.

4. Fatigue of the material. The Locati test. 5. Attempt of bending impact. Characteristics of springs. 6. Static tensometric measurements

Teaching methods:

Lecture - informative and conversational lecture

Exercises - a method of training

Laboratory - laboratory method

## Basic bibliography:

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

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

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

4. Misiak J., Mechanika techniczna t.1, WNT, Warszawa, 1998, 2012.

## Additional bibliography:

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.

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Lectures | 30 |
| 2. Laboratory | 15 |
| 3. Classes | 30 |
| 4. Consultation | 10 |
| 5. Final test | 5 |
| 6. Preparation to the final test | 10 |
| 7. Preparation to laboratory and classes | 20 |

| Student's workload | | |
|---|---|---|
| **Source of workload** | **hours** | **ECTS** |
| Total workload | 120 | 5 |
| Contact hours | 90 | 4 |
| Practical activities | 45 | 2 |