COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mechanics and strength of materials

Course

Field of study

Logistics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

I/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

Tutorials

30

Projects/seminars

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

Magdalena Grygorowicz Ph. D.

Faculty of Mechanical Engineering

CMBiN, room 406

Jana Pawła II street, No. 24

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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 has knowledge of physics covering mechanics, thermodynamics, and solid state physics, including the knowledge necessary to understand engineering issues related to logistics [K1A_W02].

Has basic knowledge of: mechanical engineering as well as material strength [K1A_W07].

Skills

Ability to self-study in the field of mechanics and strength of materials [K1A_U05].

Ability to use analytical, simulation and experimental methods to formulate and solve engineering tasks in the field of mechanics and strength of materials [K1A_U09].

Ability to make a critical analysis of the functioning method and assess - especially in connection with the mechanics and strength of materials - existing technical solutions, in particular devices, objects, systems, processes, services [K1A_U13].

Social competences

Understands the need to constantly expand his knowledge; can inspire and organize the learning process of others [K1A_K01].

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 3 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

1. The fundamental rights of mechanics. Definition of force and its types. Systems of forces. Moment of forces relative to the pole.

2. Principles of statics.

3. Friction: nature and effects, coefficient of friction (rolling resistance).

4. Strength of materials. Normal stresses and strain.

5. Elasticity, plastisity. Linear elasticity and Hook's Law.

6. Analysis of Stress.

7. Analysis of Strain.

8. Centroids and moments of inercia of plain areas.

9. Shear stress and strain

10. Deflections of Beams.

11. Buckling.

12. Basic of kinematics of particle and rigid body.

13. Basic of dynamics of particle and rigid body.

14. 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.

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

Magnucki K., Szyc W., Wytrzymałość materiałów w zadaniach: pręty, płyty i powłoki obrotowe, Wydawnictwo Naukowe PWN, 2000.

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	150	5,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests) [1]	75	2,0

[1] delete or add other activities as appropriate