STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Strength of Materials		**1011105331010210134**
Field of study	Profile of study (general academic, practical)	Year /Semester
Engineering Management - Part-time studies -	**(brak)**	**2 / 3**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**part-time**	
No. of hours		No. of credits
Lecture: **18** Classes: **14** Laboratory: **6** Project/seminars: **-**		**4**
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**	A student has basic knowledge about mathematics and other areas of studies. A student has theoretical knowledge of areas of studies.
2	**Skills**	A student can solve basic problems of geometry and mathematical analysis. A student can solve basic problems of solid mechanics. A student can search for necessary information and facts in literature, scientific databases and catalogues. A student can use information and communication techniques for realizing engineering tasks. A student has the ability to self-study.
3	**Social competencies**	A student understands a need for lifelong learning and acquiring knowledge. A student understands general social results of engineering activities. A student understands a need for teamwork. A student is aware of connections between mathematics, physics, technical sciences, biology and medicine.

Assumptions and objectives of the course:

The aim of a course:

- familiarizing students with strength of materials and strength tests,
- teaching students basic concepts of mechanics and strength of materials,
- presenting theoretical and practical engineering methods of analysing the strength of structures that are based on material properties,
- showing the restrictions imposed on structures due to their strength, safety and regulations (standards, law),
- discussing the methods of solving strength problems in an effective and proper way,
- highlighting the importance of building and testing prototypes,
- showing a system approach to solving engineering problems.

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

Knowledge:

1. A student knows the basic concepts of statics and understands the principles of statics and conditions for the equilibrium of a rigid body subjected to coplanar forces. - [K1A_W24 (InzA_W02)]

2. A student can describe basic strength tests of materials and structures. - [K1A_W24 (InzA_W02)]

3. A student can calculate external and internal forces and moments, knows how to determine stresses and displacements in bars and trusses, can solve problems of torsion of cylindrical shafts. - [K1A_W24 (InzA_W02)]

4. A student can determine normal stresses in beams subjected to bending. A student has theoretical and practical knowledge about basic strength tests. - [K1A_W24 (InzA_W02)]

5. A student has a basic knowledge about life cycle of the machine. - [K1A_W21 (InzA_W01)]

6. A student has a basic knowledge about life cycle of the industrial products. - [K1A_W22 (InzA_W01)]

7. He knows the typical industrial technologies and in-depth manner knows technologies of construction and operation of machinery. - [K1A_W27 (InzA_W05)]

Skills:

1. A student can plan and make basic strength experiments. - [K1A_U13 (InzA_U02) K1A_U18 (InzA_U07)]

2. A student can formulate and solve problems of strength of materials considering axial, torsional and bending loads. A student can easily convert between different SI units. - [K1A_U13 (InzA_U02) K1A_U17 (InzA_U06)]

3. A student can assess and make a critical analysis of existing technical solutions. Basing of those analyses a student can suggest improvements in their strength. - [K1A_U13 (InzA_U02) K1A_U19 (InzA_U08)]

Social competencies:

1. A student can understand the need for lifelong learning, can inspire others to do this and can organise learning for others. - [K1A_K01 (S1A_K01)]

2. A student takes into account technical issues in the creation of products and is aware of their importance - [K1A_K09 (InzA_K02)]

Assessment methods of study outcomes

Lectures and classes: There are three or four tests in a semester. They consist of five theoretical questions and three computational tasks. In order to receive a positive grade and pass the course a student needs to achieve more than 50% of total points in each test. The final grade is based on the following rules:

5.0 ? if the ratio of sums of achieved and total points is bigger than 91%,

4.5 ? if the ratio is between 81-90%,

4.0 ? if the ratio is between 71-80%,

3.5 ? if the ratio is between 61-70%,

3.0 ? if the ratio is between 51-60%.

Students who receive a negative grade can take an additional test and correct their grades.

Laboratories: A positive result is based on discussion led when doing tests (questions on the theory of those tests).Moreover, students need to conduct all tests and all their reports from tests must be approved.

Course description

Lectures and classes.

Fundamentals of statics. Definitions of force, system of forces. Constraints and reaction forces / moments. Internal forces. Uniaxial stress state. Stress-strain curve. Hooke?s law.Conditions for the equilibrium of a rigid body subjected to coplanar forces. Statically determinate and indeterminate trusses. Shear stresses and non-dilatational strain. Generalized Hooke?s law. Feasible stresses and factor of safety. Mohr's circle. Moments of inertia of plane figures, centre of gravity of plane figures, principal axes of inertia. Steiner?s theorem. Torsion of rectangular, open and closed section beams. Bending moment and shear force diagrams. Normal and shear stresses in beams. Deflection of beams. Statically indeterminate beams ?? Clebsch's method, method of superposition. Strength criteria.

Laboratories

Tensile strength test. Brinell, Vickers, Rockwell hardness tests. Fatigue of materials. Strain gauge measurements.

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	18
2. Tutorials	14
3. Laboratories	6
4. Consultations	20
5. Preparing for tutorials and laboratories	40
6. Final assessment	4

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	102	4
Contact hours	52	2
Practical activities	40	2