

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Strength of Materials I		Code 1010604231010214311
Field of study Mechanical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time,part-time) part-time	
No. of hours Lecture: 18 Classes: 9 Laboratory: - Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 100 4% 100 4%
Responsible for subject / lecturer: Piotr Kędzia email: piotr.kedzia@put.poznan.pl tel. +48 61 665 20 44 Faculty of Mechanical Engineering and Management https://www.dmfef.put.poznan.pl/		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic in the field of mathematics, strength of materials, engineering graphics and other areas of education in the field of study. Ordered theoretical knowledge in the field of study.
2	Skills	Solving basic tasks from geometry and mathematical analysis. Solving basic issues of solid state mechanics. The ability to search for the necessary information in literature, databases and catalogs. Using information and communication techniques appropriate to the implementation of engineering tasks. Ability to learn independently.
3	Social competencies	Understanding the need for lifelong learning and acquiring new knowledge. Understanding the general social effects of engineering activities. Understanding the need for team collaboration. The student is aware of mutual dependencies between mathematical knowledge, physical knowledge and technical sciences.
Assumptions and objectives of the course: Understanding the methods of testing the strength of materials and checking the strength of a structure. Mastering basic principles in the field of mechanics and strength analysis. Understanding the theoretical and practical problems related to strength analysis based on the mechanical properties of materials as the basis for the proper design of the structure. Passing in a simple form selected endurance issues, i.e. modeling statically indeterminate systems or solving complexity problems. Indication of limitations necessary in constructing due to safety and reliability, regulations, standards. Indication of the areas of acceptable solutions and effective solutions to the problem. Awareness of the complexity of construction: the need to build and test prototypes, formulate the conditions for safe operation, the need for a systematic approach to problems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. has knowledge in the field of physics, covering the basics of classical mechanics, solid state physics, necessary to understand specialized lectures in the theory of construction materials - [K1A_W02]		
2. has basic knowledge in technical mechanics: statics and strength of materials, including the basis of the theory of elasticity and plasticity, performance hypotheses, methods for calculating beams, shafts, joints and other simple structural elements, as well as methods for testing the strength of materials and the state of deformation and stresses in structures - [K1A_W04]		
3. has basic knowledge of metal, non-metallic and composite materials used in machine construction, in particular their structure, properties - [K1A_W06]		

Skills:
1. can obtain information from literature, the Internet, databases and other sources. Can integrate the information obtained and interpret conclusions and create and justify opinions - [K1A_U04]
2. can use formulas and tables, technical and economic calculations using a spreadsheet and running a simple relational database - [K1A_U05]
Social competencies:
1. understands the need to learn throughout life; can inspire and organize the learning process of other people - [K1A_K01]
2. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions - [K1A_K02]
3. can interact and work in a group, taking on different roles in it - [K1A_K03]

Assessment methods of study outcomes
Passing the lecture (end of semester, last lecture - 10 theoretical issues from lectures): <50% - ndst, >51-60% - dst, >61-70% - dst plus, >71-80% - db, >81-90% - db plus, >91% - bdb
Passing of the calculation exercises (test in the last classes): - <50% - ndst, >51-60% - dst, >61-70% - dst plus, >71-80% - db, >81-90% - db plus, >91% - bdb

Course description
Basic concepts from statics. Definition of strength, division of forces, systems of forces. Ties and reactions of bonds. Internal forces. One-axis state of stresses and strains. Stress- strains curve. Hooke's law. The conditions of the equilibrium of flat systems of forces. Statically determinate and indeterminate rod systems and rod-beam systems. Shear stresses, deformations. Generalized Hooke's law. Permissible stresses, safety factor of the structure and strength condition. Hypothesis of material effort. Moments of inertia of flat figures, center of gravity of the cross-section, main central axes of inertia. Steiner's theorem.

Basic bibliography:
1. Zielnica J., Wytrzymałość Materiałów, WPP, wyd. III, Poznań 2000
2. Ostwald M., Podstawy wytrzymałości materiałów, Wydawnictwo PP, Poznań, 2007
3. Magnucki K., Szyc W., Wytrzymałość materiałów w zadaniach: pręty, płyty i powłoki obrotowe, Wydawnictwo Naukowe PWN, 2000.
4. Leyko J., Mechanika ogólna t.1, PWN, Warszawa, 1997
5. Jakubowicz A., Orłoś Z., Wytrzymałość materiałów, WNT, Warszawa, 1984

Additional bibliography:
1. Banasik M., Grossman K., Trombski M., Zbiór zadań z wytrzymałości materiałów. PWN 1992
2. Osiński Z., Mechanika ogólna, PWN, Warszawa, 1994
3. Ostwald M., Wytrzymałość materiałów. Zbiór zadań. Wydawnictwo PP, Poznań, 2008
4. Dyląg Z., Jakubowicz A., Orłoś Z., Wytrzymałość materiałów t.1 i 2, WNT, Warszawa, 2000
5. Niezgodziński M. E., Niezgodziński T., Wzory, wykresy i tablice wytrzymałościowe, Wydawnictwo Naukowo-Techniczne Warszawa 2004.
6. Willems N., Easley T. J., Rolfe S. T., Strength of Materials, Mc GrawHill Book Company, 1981
7. Gere M., Timoshenko S., Mechanics of Materials, PWS-Kent Publishing Company, Boston, 1984.

Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	9	
2. Classes	9	
3. Consultations	2	
4. Preparation for classes	20	
5. Preparation for tests	10	
6. Preparation for passing the lecture	15	
Student's workload		
Source of workload	hours	ECTS
Total workload	65	4
Contact hours	20	1

Practical activities	45	3
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