

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Strength of Materials		Code 1011101231010200134
Field of study Safety Engineering - Full-time studies - First-	Profile of study (general academic, practical) (brak)	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) full-time	
No. of hours Lecture: 30 Classes: 15 Laboratory: 15 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: prof. dr hab. inż. Marian Ostwald email: marian.ostwald@put.poznan.pl tel. 61 665 2176 Faculty of Mechanical Engineering and management ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of mathematics, mechanics and technical drawing.
2	Skills	Ability of solving mathematical problems. Ability of searching information from different sources and using literature related to field of studies. Ability of systemic understanding of technical reality. Abilities of identifying technical problems, conducting analysis and reaching correct conclusions.
3	Social competencies	Understanding of rules of engineer's activity, responsibilities for decisions and consequences. Awareness about the need for self-studying, including multidisciplinary knowledge.
Assumptions and objectives of the course: Concise presentation of the basics of strength of materials and structures. Introduction of the basic terms and calculation methods. Demonstration of the relationships between strength of materials and other fields of study, including basics of machines' and structures' design and mechatronics. Illustrating connections between strength of materials and safety and operational reliability of structures, as well as other types of technical systems.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. The importance of strength of materials in design of structures. - [K1A_W06] 2. The importance of modeling process in mathematical calculations, connecting models with real structures, relationships with basics of machines - [K1A_W05] 3. Basic terms and concepts of the strength of materials. - [K1A_W06] 4. Basic mathematical procedures for solving engineering problems. - [K1A_W06, K1A-W23] 5. Elementary knowledge of current trends, modern materials, and new procedures. - [K1A_W06, K1A_W19] 6. Knowledge and understanding of rules and importance of experiment, verification and validation of solutions. - [K1A_W23] 7. The evaluation of structures from safety and reliability point of view. - [K1A_W20, K1A_W27]		
Skills:		
1. Ability to solve simple examples for selected models (bars, shafts, beams or combined forms). - [K1A_U01] 2. Ability to apply obtained solutions in practical design of structures. - [K1A_U03] 3. Ability of critical analysis of solutions from the safety and reliability point of view. - [K1A_U08, K1A_U13] 4. Ability to apply experimental results in design related calculations. - [K1A_U08] 5. Understanding of relationships the strength of materials, basics of machine design and optimal design. - [K1A_U08]		

Social competencies:
1. Understanding of systemic approach to engineering. - [K1A_K02]
2. Understanding of social and non-technical impact of engineering activities. - [K1A_K02]
3. Understanding of engineer?s responsibilities and its influence on safety and reliability of structures. - [K1A_K03, K1A_K04]
4. Ability to make correct decisions and anticipating their consequences. - [K1A_K03]

Assessment methods of study outcomes
The credit for laboratories: verification of preparations to classes.
The credit for problem solving classes: written tests.
The credit for lecture: written test covering understanding of basic terms and ability to solve a simply example.

Course description
Introduction to statics of rigid bodies. Conditions of equilibrium. Introduction to key topics related to strength of materials. Analysis of states of stresses and strains. Stress-Strain diagrams and their significance. Strength conditions and their applications, conditions of deformation. Calculation procedures for bar structures, circular cross-section shafts and straight beams (internal forces diagrams, stresses, deflections). Calculations of statically indeterminate structures. Analysis of combined stresses of statically determinate structures. Economic aspects of the strength calculations. Safety and reliability of structures. Selected problems ? fatigue of metals, buckling of structures, experimental methods, optimal design of structures. Students should be able to learn the basic theoretical knowledge and possess skills for solving practical engineering problems and perform simple strength experiments: tensile test, hardness teste, fatigue of material, strain gauge test..

Basic bibliography:
1. Ostwald M.: Postawy wytrzymałości materiałów. Wydawnictwo Politechniki Poznańskiej 2012.
2. . Ostwald M.: Wytrzymałość materiałów. Zbiór zadań. Wydawnictwo Politechniki Poznańskiej 2012.

Additional bibliography:
1. Dyląg Z., Jakubowicz A., Orłoś Z.: Wytrzymałość materiałów. Wydawnictwa Naukowo-Techniczne, Warszawa, T. I (2003), T. II (2000)
2. Siuta W.: Mechanika techniczna. WSiP.
3. Niezgodziński M.E., Niezgodziński T.: Wzory, wykresy i tablice wytrzymałościowe. WNT, Warszawa

Result of average student's workload

Activity	Time (working hours)
1. Lectures	30
2. Problem solving classes	15
3. Laboratories	15
4. Preparations to laboratory experiments	12
5. Reports from laboratory experiments	10
6. Preparations to written tests	20
7. Preparations to written test of lecturer?s presentation	20
8. Consultations with lecturers	3

Student's workload		
Source of workload	hours	ECTS
Total workload	125	4
Contact hours	62	3
Practical activities	62	2