

COURSE INFORMATION SHEET
(KARTA INFORMACYJNA PRZEDMIOTU)

Course title (Nazwa przedmiotu)	Strength of Materials 1	Wytrzymałość materiałów 1
Course code (Kod przedmiotu)	WMEMXCN1-SM	
Language of instruction (Język wykładowy)	english (angielski)	
Study profile (Profil studiów)	general academic (ogólnoakademicki)	
Study form (Forma studiów)	part-time studies (niestacjonarne)	
Study level (Poziom studiów)	first-cycle studies (studia pierwszego stopnia)	
Course group (Rodzaj przedmiotu)	core / mandatory (podstawowy / obowiązkowy)	
Effective from recruitment (Obowiązuje od naboru)	2024 / 2025	
Form of classes, no. of hours/ evaluation, total no. of hours, ECTS credits (Forma zajęć, liczba godzin/rygor, razem godz., pkt ECTS)	Lectures 10/+ Practical classes 12/+ Total: 22 hrs, 2.5 ECTS	
Introductory courses: prerequisites (Przedmioty wprowadzające: wymagania wstępne)	Mathematics: vectors; differential equations; derivatives and integrals of one variable Engineering mechanics 1: 2D modeling; 3D modeling; reduction and equilibrium of load systems; determining the reactions	
Programme (Program)	3rd semester / mechanical engineering / all specializations	
Author(s) (Autor/autorzy)	dr inż. Piotr SZURGOTT	
Organizational unit administering the course (Jednostka organizacyjna odpowiedzialna za przedmiot)	Institute of Mechanics and Computational Engineering Faculty of Mechanical Engineering Military University of Technology	
Short descriptions of the course (Skrócony opis przedmiotu)	Geometrical properties of plane figures. Two-dimensional modeling and classification of bar systems. Internal loads in cross-section in straight elements. Internal loads in plane frames. Internal loads in spatial frames. Fundamentals of strength of materials. Tension/compression of stocky prismatic bars. Free torsion of prismatic rods.	
Full description of the course / programme content Pełny opis przedmiotu / treści programowe	Lectures / multimedia presentations 1. Geometrical properties of plane figures / 2 hrs / Definitions of the geometrical properties: centroid, moment of area, moment of inertia (second moment of area), product of inertia. Parallel axis theorem (Steiner's theorem). Rotation of centroidal axes. Principal axes. Principal moments of inertia. 2. Two-dimensional modeling and classification of bar systems / 1 hr / Bars, rods, beams. Supports and reactions. 3. Internal loads in cross-section in straight elements / 2 hrs / Tension and compression. Torsion. Simple bending. Differential dependencies. General characteristics of diagrams. Examples. 4. Internal loads in plane frames / 1 hr / Theoretical fundamentals. Examples. 5. Internal loads in spatial frames / 1 hr / Theoretical fundamentals. Examples. 6. Fundamentals of strength of materials / 1 hr / Fundamentals and assumptions of strength of materials. Static tensile test of steel sample. Hooke's law. Designing principles. 7. Tension/compression of stocky prismatic bars / 1 hr / State of displacement, strain and normal stress. Saint-Venant's principle. Designing. Examples. 8. Free torsion of prismatic rods / 1 hr / State of displacement, strain and shear stress. Torsion constants of a rod cross-sections. Designing. Examples. Practical classes / arithmetic exercises 1. Geometrical properties of plane figures / 2 2. Solving of statically determinate bending beams and plane frames / 4 3. Analysis and design of stocky prismatic bars under tension/compression / 1 4. Analysis and design of prismatic rods under torsion / 2	

	5. Test 1: Geometrical properties of plane figures / 1 6. Test 2: Solving of statically determinate bending frame / 1 7. Test 3: Free torsion of prismatic rods / 1
Literature (Literatura)	<u>Primary:</u> Klasztorny M.: Wytrzymałość materiałów dla mechaników. Kurs inżynierski, DWE, 2013. Gieleta R.: Zadania z wytrzymałości materiałów z rozwiązaniami, WAT, 2018. Dyląg Z., Jakubowicz A., Orłoś Z.: Wytrzymałość materiałów, t. 1, WNT, 1997. <u>Complementary:</u> Bansal R.K.: A Textbook of Strength of Materials, Laxmi Publications Ltd., New Dehli, India 2015. Gołoś K., Osiński J., Zbiór zadań z wytrzymałości materiałów, OW PW, 2001. Niezgodziński M.E., Niezgodziński T., Zadania z wytrzymałości materiałów, WNT, 2000.
Learning outcomes (Efekty uczenia się)	Symbol and number of the course outcome / learning outcomes / reference to the major outcome W1 / has knowledge of fundamentals of strength of materials, and knowledge that allows for analysis of typical strength cases in the field of tension/compression and torsion / K_W01, K_W02, K_W05 U1 / is able to solve statically determinate beams and plane frames; is able to solve simple strength cases in the field of tension/compression and torsion based on the principles of the strength of materials / K_U07, K_U09 K1 / understands the need and knows the possibilities of continuous education; can inspire and organize the process of improving own's and other people professional qualifications / K_K01
Methods and criteria of evaluation / manners of verification of the student's achievement of the assumed learning outcomes (Metody i kryteria oceniania / sposób sprawdzania osiągnięcia przez studenta zakładanych efektów uczenia się)	The course is credited based on: credit. Practical classes are credited based on: tests. The condition for passing the course is: passing the theory test (lectures) and the auditorium exercises. The achievement of W1 learning outcome is verified based on the theoretical test from the lectures. The achievement of U1 learning outcome is verified based on tests during practical classes. The achievement of K1 learning outcome is effected based on students' activity. Assessment of the achieved learning outcomes (according to opinion of the Faculty Commission for the Functioning of the Education Quality Assurance System): Very good (A) – grade awarded to students who achieved 91-100% of the learning outcomes. Good plus (B) – grade awarded to students who achieved 81-90% of the learning outcomes. Good (C) – grade awarded to students who achieved 71-80% of the learning outcomes. Satisfactory plus (D) – grade awarded to students who achieved 61-70% of the learning outcomes. Satisfactory (E) – grade awarded to students who achieved 51-60% of the learning outcomes. Unsatisfactory (F) – grade awarded to students who achieved 50% of the learning outcomes or less.
ECTS balance / student workload (Bilans ECTS / nakład pracy studenta)	Activity / student workload in hrs 1. Participation in lectures / 10 2. Participation in practical classes / 12 3. Participation in laboratories / 0 4. Participation in seminars / 0 5. Independent study of the lectures subject-matter / 16 6. Independent preparation for practical classes / 36 7. Independent preparation for laboratories / 0 8. Independent preparation for seminars / 0 9. Project implementation / 0 10. Participation in consultations / 3.3 11. Preparation for the exam / 0 12. Preparation for the credit / 8.8 13. Participation in the exam / 0 Total student workload: 86.1 hrs / 2.87 ECTS, 2.5 ECTS assumed Classes with academic teacher (1+2+3+4+9+10+13): 25.3 hrs / 1.5 ECTS Classes related to scientific skill development ($\Sigma 1+9$): 74 hrs / 2 ECTS