COURSE INFORMATION SHEET
(KARTA INFORMACYJNA PRZEDMIOTU)

Course title (Nazwa przedmiotu)	***Strength of Materials 1***	***Wytrzymałość materiałów 1***
Course code (Kod przedmiotu)	*WMEMXCNI-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)	*2023 / 2024*	
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 characteristics of plane figures. Plane modeling and classification of bar systems. Internal loads (forces) in straight bars, plane frames, and spatial frames. Fundamentals of the strength of materials. Tension/compression in prismatic stocky bars. Free torsion in prismatic bars.*	
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 the 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 in stocky prismatic bars / 1 hr /*** *State of displacement, strain and normal stress. Saint-Venant's principle. Designing. Examples.* 8. ***Free torsion in prismatic bars / 1 hr /*** *State of displacement, strain and shear stress. Torsion constants of a bar cross-sections. Designing. Examples.* *Practical classes / arithmetic exercises* 1. *Geometrical properties of plane figures / 2* 2. *Solving of bending beams and plane frames statically determinate / 4*	

	3. Analysis and design of stocky prismatic bars in tension/compression / 1 *4. Analysis and design of torsion bars (rods) / 2* *5. Test 1: Geometrical properties of plane figures / 1* *6. Test 2: Solving of statically determinate bending beam / 1* *7. Test 3: Free torsion of prismatic rods / 1*
Literature (Literatura)	*Primary:* 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. *Complementary:* 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 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 Facullty 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 (Σ1÷9): ***74 hrs*** */* ***2 ECTS***