COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S1-ME-403**
	part-time programme:	
Course title in Polish	**Wytrzymałość materiałów**	
Course title in English	**Strength of Materials**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**first-cycle**
Type of education	**academic**
Mode of study	**full-time programme**
Specialism	**all**
Department responsible	**Department of Mechanics and Heat Transfer**
Course leader	**dr inż. Ireneusz Markiewicz**
Approved by	**dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering**

COURSE OVERVIEW

Course type		**programme-specific**
Course status		**compulsory**
Language of instruction		**English**
Semester of delivery	full-time programme	**Semester IV**
	part-time programme	
Pre-requisites		
Examination required (YES/NO)		**YES**
ECTS value		**5**

Mode of instruction		**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	full-time programme	**15**	**30**	**15**		
	part-time programme					

LEARNING OUTCOMES

Category of outcome	**Outcome code**	**Course learning outcomes**	**Corresponding programme outcome code**

Knowledge	W01	The student has a structured advanced knowledge of the issues related to the strength of materials, knows the basic quantities describing deformable bodies and methods of simple strength calculations.	MiBM1_W14
	W02	The student knows the methods of measuring the basic strength quantities, knows the calculation methods necessary to analyze the results of the experiment.	MiBM1_W11 MiBM1_W12
Skills	U01	The student is able to perform simple strength analyses using classical calculation methods.	MiBM1_U13
	U02	The student is able to perform measurements of basic strength quantities, is able to interpret the obtained results, analyze the uncertainty of measurement and draw conclusions.	MiBM1_U11
	U03	The student is able to organize the workstation and operate instruments and devices in accordance with the principles of safety, environmental protection, ergonomics and fire protection regulations, is able to work independently and in a team.	MiBM1_U17 MiBM1_U20
Competence	K01	The student is ready to critically evaluate his knowledge and the need to improve his professional qualifications (through second and third degree studies, postgraduate studies, professional courses).	MiBM1_K01 MiBM1_K03
	K02	The student is aware of the need to acquire new information by independently supplementing and expanding knowledge in the field of physical issues and the measurement of physical quantities.	MiBM1_K01 MiBM1_K03 MiBM1_K04

COURSE CONTENT

Type of instruction lecture	Topics covered
lecture	Basic concepts and principles of strength of materials. Beam cross-section geometry. Integral internal forces in statically determinable bar and beam systems. Concepts: stresses, deformations and displacements, physical relationships. Basic equations of linear elasticity using the plane stress problem as an example. Strength hypotheses, allowable stresses. One-dimensional issues (beams and bars). Simple cases of analysis of two-dimensional structures. Stability of bars (beams) in terms of Euler. Basic tasks and results of the theory of ultimate bearing capacity.
class	Solving tasks within the scope covered by the lecture.
laboratory	Performing laboratory tests: Introduction, static tensile test, basic mechanical parameters of the material. Determination of the shear center of a channel profile and testing of changes in the load-bearing properties of thin-walled beams under various mounting conditions. Determination of strains and stresses in a bending plate using the strain gauge method. Photoelasticity I (including determination of the model constant and the stress-concentration factor in the notch). Photoelasticity II (testing the deformation field in the model, point measurements, Frocht method). Determination of Euler's critical force.

ASSESSMENT METHODS

Outcome code	Methods of assessment *(Mark with an X where applicable)*					
	Oral examination	Written examination	Test	Project	Report	Other

W01		X				
W02		X				
U01			X		X	
U02			X		X	
U03					X	
K01		X				
K02					X	

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	Assessment criteria
lecture	examination assessment	The pass mark is a minimum of 50% for the final in-class test.
class	non-examination assessment	The pass mark is a minimum of 50% for all the in-class tests.
laboratory	non-examination assessment	Obtaining at least 50 points from each entrance test. Obtaining positive grades on all reports.

OVERALL STUDENT WORKLOAD

ECTS weighting												
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
1.	Scheduled contact hours	L	C	Lb	P	S	L	C	Lb	P	S	h
		15	30	15								
2.	Other contact hours (office hours, examination)	4	2	2								h
3.	**Total number of contact hours**	**68**										h
4.	**Number of ECTS credits for contact hours**	**2,7**										ECTS
5.	**Number of independent study hours**	**57**										h
6.	**Number of ECTS credits for independent study hours**	**2,3**										ECTS
7.	**Number of practical hours**	**94**										h
8.	**Number of ECTS credits for practical hours**	**3,8**										ECTS
9.	**Total study time**	**125**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**5**										ECTS

READING LIST

1. W. Bodaszewski: *Wytrzymałość materiałów z elementami mechaniki konstrukcji*, tom 1: *Podstawy i zastosowania - kurs klasyczny*, Wyd. Politechniki Świętokrzyskiej, 2005.
2. W. Bodaszewski: *Wytrzymałość materiałów z elementami mechaniki konstrukcji*, tom 2: *Zbiór zadań,* Wydawnictwo Bel Studio, Warszawa, 2007.

3. W. Bodaszewski (koordynator merytoryczny i redaktor całości), I. Markiewicz, D. Bojczuk: *Wytrzymałość materiałów – badania doświadczalne*, Bel Studio 2011.
4. S. Piechnik: *Wytrzymałość materiałów*, podręcznik, Wyd. Politechniki Krakowskiej, 2000.
5. Z. Dyląg, A. Jakubowicz, Z. Orłoś: *Wytrzymałość materiałów*. Warszawa, WNT, 1996.
6. Z. Brzoska: *Wytrzymałość materiałów*. Warszawa, PWN, 1974.
7. M. Bijak-Żochowski [red.]: *Mechanika materiałów i konstrukcji*, Tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, 2013.
8. F. P. Beer et al.: *Mechanics of Materials*, McGraw-Hill Education, 2015.
9. Z. Orłoś: *Doświadczalna analiza odkształceń i naprężeń*, PWN 1977.
10. J.W. Dally, W.F. Riley: *Experimental Stress Analysis*, McGraw-Hill Inc. 1991.