



COURSE SPECIFICATION

Course code	full-time:	B1-6-KB-608
	part-time:	BN1-7-KB-711
Course title in Polish	Podstawy dynamiki i stateczności budowli	
Course title in English	Principles of Dynamics and Stability of Structures	
Valid from academic year	2023/2024	

CURRICULAR ALIGNMENT

Programme	CIVIL ENGINEERING
Level	first-cycle
Programme profile	academic
Mode of attendance	full-time; part-time
Specialism	Building Structures
Academic unit responsible for the course	Department of Theory of Structures and BIM
Course coordinator	dr hab. inż. Paulina Obara, prof. PŚk
Approved by	prof. dr hab. inż. Grzegorz Świt

COURSE DESCRIPTION

Teaching block	specialism specific	
Course status	required	
Language of instruction	Polish	
Semester of delivery	full-time	semester VI
	part-time	semester VII
Prerequisites	Computational Methods in Structural Mechanics, Structural Mechanics 1 and 2	
Exam (YES/NO)	NO	
ECTS	3	

Mode of teaching		lecture	class	lab	project	other
Number of hours per semester	full-time:	15			30	
	part-time:	10			20	

LEARNING OUTCOMES

Category	Code	Learning outcomes	Corresponding programme outcome code
Knowledge	W01	Students know the basic exact and approximate methods of stability analysis and dynamic analysis of bar structures.	B1_W07
Skills	U01	Students can determine areas of stability.	B1_U10 B1_U12
	U02	Students can determine cross-sectional forces taking into account the second-order effects.	B1_U09 B1_U10 B1_U12
	U03	Students can determine eigenfrequencies of structures taking into account continuous mass distribution.	B1_U11 B1_U12
Competence	K01	Students are able to work independently.	B1_K01
	K02	Students are responsible for the reliability of the results obtained.	B1_K02
	K03	Students formulate conclusions and describe the results of their work.	B1_K04

COURSE CONTENT

Teaching mode	Topics covered
lecture	Elastic energy of a frame element considering axial force - determination of linear stiffness matrix and geometric stiffness.
	Kinetic energy of a frame element - determination of inertia matrix.
	Transformation formulas of the displacement method considering continuous mass distribution.
	Energy criterion of stability - determination of critical loads and preparation of equilibrium paths.
project	Determination of critical values of the loading parameter of a frame. Determination of stability areas.
	Impact of second-order effects on section forces.
	Determination of eigenfrequencies for continuous systems. Determination of the effect of axial forces on the frequency of vibrations.

METHODS OF LEARNING OUTCOMES VERIFICATION

Learning outcome	Verification methods					
	Oral exam	Written exam	Test	Project	Report	Other
W01			X	X		
U01			X	X		
U02			X	X		
U03			X	X		
K01			X	X		
K02			X	X		
K03			X	X		

ASSESSMENT

Teaching mode*	Assessment type	Criteria
lecture	mark-based	<i>Obtaining at least 50% of points on the in-class written test.</i>
project	mark-based	<i>Obtaining at least a passing grade on each project and test.</i>

STUDENT WORKLOAD

ECTS weighting													
	Activities	Student workload											
		full-time					part-time						
		W	C	L	P	S	W	C	L	P	S		
1.	Scheduled contact hours	15			30		10			20			h
2.	Other (office hours, exams)	2			2		2			2			h
3.	Total number of contact hours	49					34					h	
4.	Number of ECTS credits for contact hours	2					1,4					ECTS	
5.	Independent study hours	26					41					h	
6.	Number of ECTS credits for independent study	1					1,6					ECTS	
7.	Practical hours	50					50					h	
8.	Number of ECTS credits for practical hours	2					2					ECTS	
9.	Total workload	75					75					h	
10.	ECTS credits for the course <i>1 ECTS credit =25 student learning hours</i>	3											

READING LIST

1. Gomuliński A., Witkowski M.: Mechanika budowli kurs dla zaawansowanych, OW PW, Warszawa 1993.
2. Obara P.: Metoda przemieszczeń w analizie konstrukcji prętowych, Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2011.
3. Rakowski G. i inni: Mechanika budowli – ujęcie komputerowe t. I i II, Arkady, Warszawa, 1992.
4. Bogusz J.: Metoda przemieszczeń. Niewyznaczalne konstrukcje prętowe. Przykłady, Politechnika Krakowska, Kraków 2005.
5. Chmielewski T., Górski P., Kaleta B.: Zbiór zadań z mechaniki budowli. Metoda przemieszczeń i metoda elementów skończonych, Wydawnictwo WNT, Warszawa 2002.
6. Nowacki W.: Mechanika budowli, PWN, Warszawa 1976.
7. Langer J.: Dynamika budowli, Politechnika Wroclawska, Wrocław 1980.
8. Nowacki W.: Dynamika budowli, Arkady, Warszawa 1961.