

Cracow University of Technology

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies
in the academic year 2022/2023

Information on the course

Name of the course in Polish	Stateczność i dynamika konstrukcji
Name of the course in English	Stability and Dynamics of Structures
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Choosable
Field of education	Engineering and Technology
Discipline of education	Civil Engineering and Transport
Person responsible for the course Contact	Prof. Joanna Dulińska PhD Eng. joanna.dulinska@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical classes	Laboratory	Computer Lab	Project Class	Seminar
2, 3, 4, 5	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	Expanding knowledge on contemporary issues of stability and dynamics of structures with particular emphasis on modelling the work of complex engineering structures
Objective 2	Obtaining a broader view and perception of the role of stability and dynamics of a building in computer-aided design. Indication of the complementarity of theoretical analyses, finite elemental modelling and experimental research on the dynamics of buildings
Objective 3	Developing the ability to interpret and critically analyse the results of calculations in terms of the stability and dynamics of a building.

Learning Outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			

EUW1	A PhD student knows and understands the methodology of solving the problems of stability and dynamics of structures with particular emphasis on complex engineering structures and complex dynamic loads	E_W01, E_W02	Involvement in class activities, a final test grade
EUW2	A PhD student understands the complementarity of theoretical analyses, finite element modelling and experimental research in the stability and dynamics of buildings	E_W01, E_W02	Involvement in class activities, a final test grade
OUTCOMES RELATED TO SKILLS			
EUU1	A PhD student is able to choose the appropriate methods of solving the problems of stability and dynamics of structures, with particular emphasis on complex engineering structures	E_U01	Involvement in class activities, a final test grade
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	A PhD student is ready to interpret and critically evaluate the results of calculations in the field of stability and dynamics of structures and to analyse the results of research described in the subject literature	E_K01	Involvement in class activities, a final test grade
EUK2	A PhD student is ready to recognize the importance of knowledge in the field of stability and dynamics of structures in the implementation of the process of designing buildings.	E_K03	Involvement in class activities, a final test grade

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Study of contemporary research topics in the field of building stability and dynamics. Computational tools and methods in computer mechanics of structures.	EUW1, EUW2, EUU1, EUK1, EUK2	2
W2	The role and complementarity of theoretical analyses, finite-element modelling and experimental studies in the stability and dynamics of buildings. Examples of the implementation of in situ research indicating the completion and verification of theoretical analyses in the mechanics of structures.	EUW1, EUW2, EUU1, EUK1, EUK2	3
W3	Modelling of dynamic loads (including kinematic loads) in the case of complex rod, surface and spatial (large-size) structures; examples of calculations of structures subjected to complex dynamic loads.	EUW1, EUW2, EUU1, EUK1, EUK2	2
W4	The role and complementarity of theoretical analyses, finite-element modelling and experimental studies in the stability and dynamics of buildings. Examples of the implementation of in situ research indicating the completion and verification of theoretical analyses in the mechanics of structures.	EUW1, EUW2, EUU1, EUK1, EUK2	3

W5	Experience from failures and catastrophes caused by errors in the understanding of the stability and dynamics of structures: the role of correct static patterns, boundary conditions, load models, critical analysis of adopting substitute static patterns and technical solutions.	EUW1, EUW2, EUU1, EUK1, EUK2	3
W6	Proper interpretation and critical analysis of the results of calculations in the stability and dynamics of a structure. Examples of control and verification of calculation results of selected buildings. Principles for the preparation of studies and research reports in the field of building dynamics.	EUW1, EUW2, EUU1, EUK1, EUK2	2

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH AN ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	2
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF AN ACADEMIC TEACHER	
Independent study of the course contents	11
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Not specified

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	75% attendance in class.
2	A final test
METHOD OF THE FINAL GRADE CALCULATION	
Final test grade, taking into account the attendance	

Additional information

Not specified

The course reading list

1	Chmielewski T., Zembaty Z., <i>Podstawy dynamiki budowli</i> , Warszawa, 1998, Arkady
2	<i>Metoda Elementów skończonych w dynamice konstrukcji</i> , praca zbiorowa, Warszawa, 1984, Arkady

3	Dulinska J., <i>Ziemne budowle hydrotechniczne na terenach sejsmicznych i parasejsmicznych w Polsce. Wybrane aspekty modelowania i obliczeń</i> , Kraków, 2012, Wydawnictwo PK
4	Olszowski B., Radwańska M., <i>Mechanika budowli</i> , t. 1–2, Kraków 2010, Wyd. Politechniki Krakowskiej.
5	<i>Czasopisma: Engineering Structures, International Journal of Structural Stability and Dynamics, Inżynieria i Budownictwo; Archiwum Inżynierii Lądowej; Shock and Vibrations, Earthquake Engineering and Structural Dynamics,</i>
6	Conference materials