

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Structural Dynamics		Code 1010115131010101035
Field of study Civil Engineering Extramural Second-cycle	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty Structural Engineering	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 18 Classes: - Laboratory: 18 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr hab. inż. Zdzisław Pawlak email: zdzislaw.pawlak@put.poznan.pl tel. 616652092 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Students should know the integral and differential calculus and the matrix analysis. Students should know methods of static analysis of structures. Students should know a basis of dynamic analysis.
2	Skills	Students are able to calculate integrals and derivatives and are able to solve ordinary differential equations. Students are able to do operations on vectors and matrices, are able solve a set of linear algebraic equations. Students are able to perform the static analysis of structures.
3	Social competencies	Students are able to clearly describes and presents results of own works.
Assumptions and objectives of the course: The aim of lectures is to acquaint students with modern methods of dynamic analysis of structures.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Students know methods of dynamic analysis of complex structures (in the linear range) - [[K_W03]] 2. Students know methods of dynamic analysis of frame structures with main types of dampers - [[K_W03]] 3. Students know a basis of sensitivity analysis of quantities describing dynamics of structures - [[K_W03]] 4. Students know a basis of analysis of seismically excited structures (in a linear range) - [[K_W03]]		
Skills:		
1. Students are able to perform typical dynamic calculation of frame structures in linear range - [[K_U004]] 2. Students are able to define a computer model of typical frame structures loaded by dynamic forces - [[K_U004]] 3. Students are able to critically check results of dynamic analysis of structures - [[K_U004]]		
Social competencies:		
1. Students are aware of responsibility for results of performed calculation - [[K_K02]] 2. Students are able to describe results of performed calculation and are able to formulate some conclusions - [[K_K02]]		

Assessment methods of study outcomes		
Valuation of project, written and oral exam		
Course description		
<p>Equations of motion of structures treated as discrete systems.</p> <p>Equations of motion written in terms of state variables. Models of chosen types of structures. Damping models. Free vibration analysis, dynamic characteristics of structures with and without damping. Sensitivities of natural frequencies and modes of vibration with respect to design parameters. Analysis of steady state vibration. Normal coordinates and theirs applications. Rayleigh quotients. Time integration methods. Dynamic analysis of block foundations. Tuned mass damper. Analysis of structures seismically and para-seismically excited.</p> <p>Teaching methods: lecture - informative monographic, exercises - exercise and project methods</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Podstawy dynamiki budowli, Chmielewski T., Zembaty Z.: , Arkady, Warszawa, 1999 2. Dynamika konstrukcji budowlanych, Lewandowski R., Wydawnictwo PP, Poznań, 2006 3. R. Skarżyński, S. Labocha, Elementy dynamiki budowli w zadaniach, Wydawnictwo Politechniki Częstochowskiej, 2001 r. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Dynamics of structures, Clough R.W., Penzien J.: , McGraw-Hill,, New York, 1993 2. Dynamics of structures, HumarJ.L.: , Balkema,, Lisse, 2000 3. Computational methods in structural dynamics, Meirovitch L., Sijthoff and Noordhoff, Alpen aan dej Rein, 1980 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	36	
2. Preparation of project	22	
3. Preparation to the test and exam	22	
Student's workload		
Source of workload	hours	ECTS
Total workload	80	4
Contact hours	36	2
Practical activities	44	2