

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Structural Dynamics</b>		Code <b>1010102111010111035</b>
Field of study <b>Civil Engineering Second-cycle Studies</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Structural Engineering</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>15</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 1000%</b>
<b>Responsible for subject / lecturer:</b> prof. dr hab. inż. Roman Lewandowski, prof. nadzw. email: roman.lewandowski@put.poznan.pl tel. +61 6652472 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		<b>Responsible for subject / lecturer:</b> prof. dr hab. inż. Roman Lewandowski, prof. nadzw. email: roman.lewandowski@put.poznan.pl tel. +61 6652472 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of the integral and differential calculus and the matrix analysis. Knowledge of static analysis of structures. Knowledge of basis of dynamic analysis.
2	<b>Skills</b>	Is able to calculate integrals and derivatives. Is able to solve ordinary differential equations. Is able to do operations on vectors and matrices. Is able to perform the static analysis of structures. Is able to do the dynamic analysis of one degree of freedom systems
3	<b>Social competencies</b>	Students are able to honestly doing an analysis of structures. They are able to clearly describes and presents results of own works.
<b>Assumptions and objectives of the course:</b> The aim of lectures is to acquaint students with modern methods of dynamic analysis of structures.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Students are able to write equations of motion of structures with many degrees of freedom - [[K_W01]]		
2. Students are able to determine the dynamic characteristic of structures - [[K_W01]]		
3. Students are able to do an analysis of steady state and transient vibration - [[K_W01]]		
4. Students are able to do the dynamic analysis of seismically excited structures - [[K_W01]]		
<b>Skills:</b>		
1. Students are able to derive equations of motion of typical dynamic systems - [[K_U004]]		
2. Students are able to determine dynamic characteristics of structures - [[K_U004]]		
3. Students are able to do analysis of steady state and transient vibration - [[K_U004]]		
4. Students are able to do dynamic analysis of seismically excited structures - [[K_U004]]		
<b>Social competencies:</b>		
1. Students are able to do the reliable dynamic calculation of structures - [[K_K0]]		
2. Students are able to do the critical analysis of results of calculation - [[K_K0]]		
3. Students are able to describe and presents results of dynamic analysis - [[K_K0]]		

<b>Assessment methods of study outcomes</b>		
Written tests, valuation of project, written and oral exam		
<b>Course description</b>		
Equations of motion of structures treated as discrete systems. 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. Computer methods of solution of eigenvalue problems. Time integration methods. Dynamic analysis of block foundations. Tuned mass damper. Analysis of structures seismically and para-seismically excited. Introduction to random vibration.		
<b>Basic bibliography:</b>		
1. Dynamika konstrukcji budowlanych, Lewandowski R., Wyd. Pol. Poznańskiej, Poznań, 2006		
2. Podstawy dynamiki budowli, , Chmielewski T., Zembaty Z.: , Arkady, Warszawa, 1999		
3. Structural dynamics for structural engineers, Hart G.C., Wong K.: , Wiley,, New York, 2000		
<b>Additional bibliography:</b>		
1. Structural dynamics. Theory and computation, Paz M., Chapmann and Hall, New York, 1997		
2. Dynamics of structures, HumarJ.L.: , Balkema,, Lisse, 2000		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in lectures	45	
2. Preparation of projects	45	
3. Preparation to the test	10	
4. Preparation to the exam	20	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	120	4
Contact hours	90	2
Practical activities	70	2