

Study program / course: Mechanical Engineering			
Type and level of study: Master academic studies			
Course: Dynamics of Structures			
Lecturers: Slavković B. Radovan, Mićunović V. Milan			
Status of course: Obligatory for module M ₅ , I semester			
Number of ECTS: 6			
Precondition: none			
The objective of course: The goal of this subject is to provide students, basic methods of solving problems of dynamics of structures. Application of software tools based on Finite Element Method in analysis of response-supported structures under given loadings.			
The outcome of course: Student after taking course and passing exam is able to solve dynamics problems of supporting structures using the modern software tools.			
Syllabus Theoretical study: Basics of theory of vibrations, vibrations of system with one degree of freedom. Free, forced and damped vibrations. Resonance importance and examples. Vibrations of systems with n degrees of freedom. Mass, stiffness and dumping matrix. Eigenvalues and eigenvectors and methods for solutions of eigenvalue problems. Finite element method application for stiffness and mass matrix calculation. Analytical methods for stiffness and mass matrix calculation for truss and beam elements. Structural response for given dynamics loading. Numerical method for integration of system of differential equations. Newmark method. Central differences method. Finite element method (FEM): Application of FEM for solution of real engineering problems. Dynamic analysis using FEM. Practical work: Tutorials. Other teaching methods. Research work. Solution of examples. Project work for dynamic analysis of supporting structures. Application of computers technologies and numerical methods for dynamic analysis of structures. Students are included in research work in current research projects to be able to conduct basic research work for field of dynamics of structures.			
Recommended reading 1. Vlatko Brčić: Dynamics of structures, University of Belgrade, Belgrade, 1985. 2. M. Kojić, R. Slavković, M. Živković, N. Grujović: Finite element method, Faculty of Mechanical engineering, Kragujevac 3. Anil Chopra: Dynamics of structures, Prantice Hall International 4. Eurocode 8: Calculation of seismic resistant structures			
The number of hours of active teaching:			Other classes: 1
Theory: 2	Practical classes: 1.6	Other forms of teaching: 0.4	Research study: 0
Methods of teaching Classes are divided into lectures, exercises and standalone work of students. Lectures part gives theoretical basics of elements calculation of supporting structures which are based on FEM standards. Exercises part includes solving examples for field of dynamics of supporting structures using modern software packages.			
Evaluation of knowledge			
Pre-final exam obligations	Points	Final exam	points
Activities during the classes:	10	Written exam	
Practical classes:		Oral exam	30
Colloquiums(s) :	40 (20x2)		
Seminar(s) :	20		