



Subject card

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|---|---|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code | Structural Dynamics, PG_00048222 | | | | | | |
| Field of study | Civil Engineering | | | | | | |
| Date of commencement of studies | October 2022 | Academic year of realisation of subject | | | 2022/2023 | | |
| Education level | second-cycle studies | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Part-time studies | Mode of delivery | | | at the university | | |
| Year of study | 1 | Language of instruction | | | Polish | | |
| Semester of study | 2 | ECTS credits | | | 7.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Marek Jasina | | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 20.0 | 0.0 | 0.0 | 0.0 | 50 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM | | |
| | Number of study hours | 50 | 7.0 | 118.0 | 175 | | |
| Subject objectives | The aim of the course is to solve problems of structural dynamics using discrete models with one and n degrees of freedom. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K7_U03] can perform classic statical and dynamical analysis of rod structures stability (trusses, frames and ties), both statically determined and undetermined as well as surface structures (plates, membranes and shells) | Student creates dynamic models of plane frames and trusses. Student computes stiffness and flexibility matrices of dynamic system. Student compute the frequency of vibrations of the structure. | | | [SU1] Assessment of task fulfilment | | |
| | [K7_W03] knows basics of Continuum Mechanics, knows rules of static analysis, stability and dynamics of complex rod, shell and volume structures, both in linear and basic nonlinear regime | Student designs simple engineering structures considering free and forced vibration due to initial conditions and external excitation. | | | [SW1] Assessment of factual knowledge | | |
| Subject contents | Introduction. Basic definitions. Modelling of dynamic systems Basic dynamics laws. Forces in dynamic systems. Equation of motion. Introduction to MATLAB Free vibrations of 1-DOF systems Forced vibrations of 1-DOF systems. Design of 1-DOF system under dynamic loading Free vibration of N-DOF systems. Forced vibrations of N-DOF systems Vibration measurement technology. Vibrations reduction systems in engineering structures Experimental dynamic analysis | | | | | | |
| Prerequisites and co-requisites | Completion of previous courses: Mechanika Ogólna, Wytrzymałość Materiałów, Mechanika Budowli. | | | | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | | | Percentage of the final grade | | |
| | exam | 60.0% | | | 50.0% | | |
| | tests | 60.0% | | | 50.0% | | |

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| Recommended reading | Basic literature | 1. Chopra A.K.: Dynamics of structures. Upper Saddle River, New Jersey: Prentice Hall 2001 |
| | Supplementary literature | 1. Clough R.W., Penzien J.: Dynamics of structures. McGraw-Hill Inc. 1993 |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | <p>Determine the natural frequency of a frame system with one dynamic degree of freedom. Determine the damping ratio based on the measured displacement of free vibrations. Determine the frequencies and mode shapes of the frame system with n-dynamic degrees of freedom</p> | |
| Work placement | Not applicable | |