# Silesian University of Technology Civil Engineering Faculty

## **<u>1. Course number and name</u>**

## **RB-S1-17-S7B-E0**, Vibration of Building Structures

#### **<u>2. Credits and contact hours</u>**

2 ECTS, lectures: 30 hours\*\*, classes: 0 hours\*\*, project: 0 hours\*\*

## 3. Instructor's or course coordinator's name

Krzysztof Gromysz PhD, DSc/University Professor

## 4. Text book, title, author, and year

• William J. Palm III.: Mechanica Vibration, John Wiley & Sons, Inc

a. other supplemental materials

- Inman J. D.: Engineering Vibration, Pearson Prentice Hall
- Bishop R.E.D, Gladwell G.M.L., Michaelson S.: The Matric Analysis of Vibration, John Wiley and Sons.
- Gromysz K.: Building dynamics. Calculations of bar systems and systems of concentrated masses, PWN.
- Chmielewski T., Zembaty Z.: Basics of building dynamics, Arkady.
- Lyons R. G.: Introduction to digital signal processing

## 5. Specific course information

a. brief description of the content of the course (catalog description)

Lectures:

Introduction of basic vibration terminology, (2) Concepts of stiffness and damping,
Discussion of equivalent mass and equivalent inertia, (4) Free response of damped and undamped system having a single degree of freedom, (5) Examples of systems having viscous damping and Coulomb damping, (6) Harmonic response of system having one degree of freedom, (7) Models that have more than one degree of freedom, (8) Representing the motion in different coordinate systems, (9) Reducing vibrations and about impact of vibration on people and objects.

Classes:

#### Project:

b. prerequisites or co-requisites

Completion of Structural Mechanics course form former semesters

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program



Required.

#### 6. Specific goals for the course

<u>a. specific outcomes of instruction, ex. The student will be able to explain the significance</u> <u>of current research about a particular topic</u>

The student can:

- use computer programs to support the calculation and design of the structure.,
- use differential equations to describe the oscillatory motion and wave,
- estimate the impact of vibration on people and objects,
- perform the combination of actions according to selected Eurocodes.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

K1A\_W04, K1A\_U05

## 7. Brief list of topics to be covered

- 1. Introduction of basic vibration terminology and the concepts of stiffness and damping. The description of motion in the form of a differential equation.
- 2. Discussion of equivalent mass and equivalent inertia. Free response of damped and undamped system having a single degree of freedom.
- 3. Examples of systems having viscous damping and Coulomb damping. Harmonic response of system having one degree of freedom.
- 4. Models that have more than one degree of freedom. The algebra required to analyze system having more than two degrees of freedom, representing equations of motion in compact matrix form
- 5. Vibration of systems that cannot be described adequately with lumped-parameter models. Representing the motion in different coordinate systems.
- 6. Basic information: the design process; structural materials; factors affecting choice of structural material; comparison of properties of structural materials; basic mechanisms of load transfer; member nomenclature; selected structural systems.

\*- Consultations were not included in the contact hours

\*\*-per semester