



### 1. Course number and name

RB-S1-19-S51-72, **Maintenance, Repair and Strengthening of Structures**

### 2. Credits and contact hours\*

2 ECTS, lectures: 20 hours\*\*, seminar: 10 hours\*\*

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

Marcin Górski PhD

Szymon Dawczyński PhD

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

- Czarnecki L., Emmons P. E.: „Naprawa i ochrona konstrukcji betonowych”. Polski Cement, 2002

#### a. other supplemental materials

- Hua-Peng Chen, Structural Health Monitoring of large civil engineering structures, Wiley Blackwell, 2018
- Karbhari V. M., Ansari F., Structural Health Monitoring of Civil Infrastructure Systems, Elsevier, 2009
- Fib Bulletin no. 17, Management, maintenance and strengthening of concrete structures, 2002

### 5. Specific course information

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

##### Lectures:

Review of the reasons of deterioration of different structural materials. Structural defects, damages and failures of structures. Effects of deterioration on structures and their state. Deterioration of concrete: types of mechanical, chemical and physical deterioration; examples. Types and reasons of steel corrosion. Repair of concrete, steel, timber, masonry due to different types of deterioration. Rules and methods of repairs. Diagnostic of different types structures. Methods of the evaluation of structures' state. Methods of measuring and surveying of buildings and structures. Non-destructive and destructive methods of diagnostic. Diagnostic equipment use and interpretation of readings. Structural Health Monitoring. Vibration-based, vision-based and innovative methods of SHM. Methods and design of structural strengthening for different types of structures.

##### Seminar:

Individual presentation on case study related to the scope of the subject

#### b. prerequisites or co-requisites



Mechanics, Concrete Structures, Steel Structures, Masonry Structures, Engineering Geology and Soil Mechanics

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

selected elective.

## **6. Specific goals for the course**

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

The student can:

- to define hazardous states for simple structures with use of LSM and USM
- to estimate the risk during construction process and propose appropriate safety measures and monitoring for different types of structures.

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

K1A\_W05, K1A\_W10, K1A\_U14

## **7. Brief list of topics to be covered**

1. Deterioration and damages of structures.
2. Repair of structures.
3. Structural diagnostic.
4. Structural Health Monitoring.
5. Strengthening of structures.

\*- Consultations were not included in the contact hours

\*\* -per semester