<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>EC – elective courses from the discipline of civil engineering and transport</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Modern Experimental Methods in Concrete Structures</td></tr>
<tr><td>Course name in Polish</td><td>Współczesne metody badawcze w konstrukcjach żelbetowych</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>dr inż. Michał Gołdyn</td></tr>
<tr><td>Course instructors</td><td>dr inż. Michał Gołdyn</td></tr>
<tr><td>Delivery methods and course duration</td><td>
<table>
<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>0</td><td>0</td><td>0</td><td>5</td><td>0</td><td>0</td><td>5</td></tr>
<tr><td>E-learning</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td><td>no</td></tr>
<tr><td>Assessment criteria (weightage)</td><td>0</td><td>0</td><td>0</td><td>100%</td><td>0</td><td>0</td><td>100%</td></tr>
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<tr><td>Course objective</td><td>The aim of the course is:

1. to acquaint the participants of the course with the scientist's work and preparation for independent development of the concepts and programs of experimental research

2. to acquaint with experimental methods for determination of strength and physical properties of building materials as well as load carrying capacity and deformability of structural elements

3. to familiarize with the contemporary measuring techniques</td></tr>
<tr><td>Learning outcomes</td><td>After completing the course PhD student can:

1. use the current state of knowledge and critically evaluate the results of previous research – effects W1, W2, U1, U2, K1

2. design a simple test setup (selection of static scheme, equipment of the test setup - supports, actuators) – effects U1, U4

3. make a selection of measuring techniques appropriate for the assumed research purpose (design of the distribution of selected sensors – strain gauges, linear displacement transducers, digital image correlation system, etc.) – effects U1, U2, K2

4. interpret the test results and measurements carried out – effects W2, U1, U2, K1, K2, K3</td></tr>
<tr><td>Assessment methods</td><td>Effects 1-4 - elaboration of the group project exam

The final grade consists of:

Exam and project - 100%</td></tr>
<tr><td>Prerequisites</td><td>none</td></tr>
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Course content with delivery methods	PROJECT: The course participants will be ordered to collect information on the research techniques used, including their scope, advantages and limitations. Then a group of students will give the task of designing an experimental research of a selected structural element in terms of analysing the parameter specified by course instructor. The students' task would be to: - design of the test setup (selection of static scheme and equipment - supports, actuators) - develop the concept of application of selected measuring techniques (design of the location of selected measuring sensors - strain gauges, linear displacement transducers, etc.) - participate in an experimental (destructive) test of the element / elements under the supervision of an employee - verify the test results in the light of the current state of knowledge
Basic reference materials	1. Reports from the series: Experimental testing of elements and concrete structures. Department of Concrete Structures, Lodz University of Technology, Poland 2. Specialized Technical Journals: Structural Concrete, Magazine of Concrete Research, Engineering Structures, ACI Structural Journal, Beton und Stahlbetonbau
Other reference materials	1. Emerson, L.; Hampton, J. Writing Guidelines for Science and Applied Science Students, 2nd ed.; Thomson/Dunmore Press: Southbank, Vic., 2005. 2. Standards: ▪ EN 206: 2013 + A1: 2018 Concrete - Specification, performance, production and conformity ▪ EN 12390-1:2012 Testing hardened concrete - Part 1: Shape, dimensions and other requirements for specimens and moulds ▪ EN 12390-2:2009 Testing hardened concrete - Part 2: Making and curing specimens for strength tests ▪ EN 12390-3:2009 Testing hardened concrete - Part 3: Compressive strength of test specimens ▪ EN 12390-5 : 2009 Testing hardened concrete - Part 5: Flexural strength of test specimens ▪ EN 12390-6 : 2009 Testing hardened concrete - Part 6: Tensile splitting strength of test specimens ▪ EN 12390-7 : 2009 Testing hardened concrete - Part 7: Density of hardened concrete ▪ EN 12504-1 : 2009 Testing concrete in structures - Part 1: Cored specimens - taking, examining and testing in compression ▪ EN 12504-2 : 2012 Testing concrete in structures - Part 2: Non-destructive testing - determination of rebound number ▪ EN 12504-4 : 2004 Testing concrete - Part 4: Determination of ultrasonic pulse velocity ▪ EN 13791 : 2007Assessment of in-situ compressive strength in structures and precast concrete components ▪ EN 1992-1-1:2004 + Ap:2015 Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings 2. Reports of German Committee for Structural Concrete (DAfStb) 3. *fib* Bulletins 4. Other standard regulations (eg. Eurocode, Model Code, ACI Standard)
Average student workload outside classroom	15h
Comments	Preferred course duration - summer semester
Last update	July 2020