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| <b>Study Programme:</b> Civil Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Course Unit Title:</b> Precast Concrete Structures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Course Unit Code:</b> M07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Name of Lecturer(s):</b> Associate Professor Danica Goleš                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Type and Level of Studies:</b> Master Academic Degree                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Course Status (compulsory/elective):</b> Elective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Semester (winter/summer):</b> Winter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Language of instruction:</b> English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Mode of course unit delivery (face-to-face/distance learning):</b> Face-to-face and/or distance learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Number of ECTS Allocated:</b> 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Prerequisites:</b> Undergraduate Academic Studies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>Course Aims:</b></p> <p>Acquiring knowledge about specific aspects of the precast concrete structures - selection of disposition, materials and shape and size of precast members, structural design, production, transport and erection of precast concrete members, design and execution of supports and connections, and structural stability problems in all phases of erection and use.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p><b>Learning Outcomes:</b></p> <p>Students are trained for selection of the disposition of precast concrete structure and materials for precast RC members. They are also trained to make: the preliminary design, an identification of the key phases in execution and use of members and structure, load analysis, design calculations, dimensioning and graphic presentation of precast RC members and structures for the needs of execution project, as well as the execution of precast concrete structures with ensuring the stability of members and structure at all stages of its execution and use.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p><b>Syllabus:</b></p> <p><i>Theory</i></p> <p>Introduction. Development of industrial construction, its advantages and disadvantages. Basic terms. Application of precast concrete structures. Technical regulations in the field of precast concrete structures. Structural systems. Conceptual considerations. Force paths. Structural movements. Quality of the material for precast concrete members. Precast concrete members - Classification; Geometric characteristics and tolerances; Marking. Foundations. Foundation beams. Columns. Beams. Precast and composite concrete floors. Walls. Connections and supports - Definitions; Classification; Damage due to unintended restraints. The flow of forces through connections. Details of connections of precast concrete members: column-foundation, column-column, column-beam, beam-beam, beam-wall. Technological process of assembly - representation of all phases of execution of a precast structure through photo documentation. Examples of assembly of some structures from practice. Modern methods of precast building systems design.</p> <p><i>Practice</i></p> <p>Visit to the facility for the manufacture of precast members. Visit to the construction site. Student's work on the individual assignments under the teacher's guidance.</p> |
| <p><b>Required Reading:</b></p> <ol style="list-style-type: none"> <li>1. Elliott, K. S.: Precast Concrete Structures (Second edition), Taylor &amp; Francis, CRC Press, Boca Raton, FL, 2017.</li> <li>2. Bachmann, H., Steinle, A.: Precast Concrete Structures, Ernst&amp;Sohn, Berlin, 2011.</li> <li>3. Elliot, K. S., Jolly, C. K.: Multi-storey Precast Concrete Framed Structures, Wiley-Blackwell, 2014.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

4. Structural connections for precast concrete buildings, *fib* Bulletin No. 43, 2008.

5. Seismic design of precast concrete building structures, *fib* Bulletin No. 27, 2003.

**Weekly Contact Hours:** 4

**Lectures:** 2

**Practical work:** 2

**Teaching Methods:**

Lectures and individual assignments under the teacher's guidance

**Knowledge Assessment (maximum of 100 points): 100**

| <b>Pre-exam obligations</b> | points | <b>Final exam</b> | points |
|-----------------------------|--------|-------------------|--------|
| Active class participation  | 10     | written exam      |        |
| Practical work              |        | oral exam         | 30     |
| Preliminary exam(s)         |        | .....             |        |
| Seminar(s)                  | 60     |                   |        |

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.