

**COURSE SYLLABUS SEMESTER FALL 2019/2020**

|                                    |   |
|------------------------------------|---|
| <b>Name of Course</b>              | <b>Reinforced concrete III</b>                          |
| <b>Course Code</b>                 | <b>MSB394AN</b>   |
| <b>Allotment of Hours per Week</b> | <b>2 Lectures /Week</b>                                 |
| <b>Number of Credits</b>           | <b>4</b>  |
| <b>Program</b>                     | <b>BSc. in Civil Engineering (Bachelor)</b>             |
| <b>Evaluation</b>                  | <b>Signature (with grade)</b>                           |
| <b>Semester</b>                    | <b>7th</b>  |
| <b>Prerequisites</b>               | <b>No</b>   |
| <b>Department</b>                  | <b>Civil Engineering</b>                                |
| <b>Instructor</b>                  | <b>Dr. Orban Zoltan, Saied Kashkash, Andras Dormany</b> |

**OBJECTIVES**

Students will gain from this course:

- Knowledge on the principles of precast prestressed concrete technology and its applications in civil engineering structures,
- Understanding of the construction technology using precast structural elements,
- Knowledge on the different precast building systems,

- preliminary design of precast structural elements.
- Understanding the types and effects of lateral action on reinforced concrete structures.
- basic knowledge of structural stiffening systems to resist lateral forces.

## CONTENTS

### Short description:

This course is aimed to provide basic and advanced knowledge on the principles of the precast concrete technology and different types of precast building systems. Topics covered by the course include: precast frame analysis, precast concrete floor system, basic principles of designing precast structural elements, basic conceptual design principles to resist lateral action (wind & earthquakes), Types of structural connection between precast elements,

### Methodology:

- **Lectures:** will give the theoretical background on precast technology advantages and the differences between precast and cast in place concrete, second part will be about stiffening of structural systems, calculate and distribute the lateral action on structures.

- **Practical class:** to design structural element slabs beams columns and demonstrate the theoretical knowledge second part calculate the designed lateral action on high-rise building.

- **Exams:** Accumulated knowledge is tested in two exams: a midterm and a final exam. Both feature multiple-choice, true-false questions or structural design calculations.

### Schedule:

| Week   | Topic of lecture  |
|--------|---|
| Week 1 | Orientation.  |
| Week 2 | Introduction of precast technology                            |
| Week 3 | Manufacturing and advantages/disadvantages of precast systems |
| Week 4 | Principle of prestressing for precast slabs systems.          |

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|---------|---|
| Week 5  | Precast structural frame analysis (column)                          |
| Week 6  | Precast structural frame analysis (beam)                            |
| Week 7  | Types of joints and connections between precast structural elements |
| Week 8  | <b>Midterm exam.</b>  |
| Week 9  | <i>Break – no class</i>   |
| Week 10 | Introduction of lateral actions on a structure                      |
| Week 11 | Calculate the wind load on high-rise building                       |
| Week 12 | Structural systems to resist seismic actions                        |
| Week 13 | Seismic static analysis Equivalent static force method              |
| Week 14 | Seismic Dynamic analysis response spectrum                          |
| Week 15 | <b>Final exam, Submit of assignments</b>                            |

## ATTENDANCE AND GRADING

### **Attendance:**

Attending is required all classes, and will impact the grade (max. 10%). Unexcused absences will adversely affect the grade, and in case of absence more than 30% of the total number of lessons will cause the student to fail the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

### **Grading:**

10% - Attendance

40% - Assignments

25% - Midterm Exam

25% - Final Exam

**Offered exam grade:**

| Evaluation in percents | Numeric grade |
|------------------------|---------------|
| 89%-100%               | 5             |
| 77%-88%                | 4             |
| 66%-76%                | 3             |
| 55%-65%                | 2             |
| 0-54%                  | 1             |

READINGS AND REFERENCE MATERIALS

- **Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions**
- **Planning and design handbook on precast building structures. Manual/Textbook (313 pages, ISBN 978-2-88394-114-4, September 2014. No. 74.**
- **Eurocode 8 General Rules and Seismic Actions (EN.1998:2004)**