

General Information:

Name of Course:	REHABILITATION OF STRUCTURES
Course Code:	MSM408AN
Semester:	1 st
Number of Credits:	2
Allotment of Hours per Week:	2 Lectures /Week
Evaluation:	Signature (with grade)
Prerequisites:	None

Instructor: **Dr. Zoltan ORBAN, associate professor**
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Introduction, General Course Description:

This course is aimed to provide basic and advanced knowledge on the principles of the rehabilitation and strengthening of structures constructed from various types of materials. Topics covered by the course include: deterioration of structural materials and structures, assessment of structures, basic principles of structural rehabilitation and strengthening, concrete and masonry repairs, methods of strengthening steel, concrete and timber structures, introduction of specific technologies such as strengthening with shotcrete, strengthening and repair with high performance concrete (HPC), strengthening with fibre reinforced plastics (FRP), design examples and case studies on strengthening bridges, buildings and other civil engineering structures.

Learning Objectives:

Students will gain from this course:

- Knowledge on the principles of rehabilitation and strengthening of civil engineering structures,
- Understanding of the deterioration processes of structural materials,
- Knowledge on the assessment methods of deteriorated structures,
- Overview on specific repair and strengthening methods of structures built from various construction materials.

Methodology:

- **Lectures:** will give the theoretical knowledge on assessment, repair and strengthening of structures via case studies.
- **Practical class (in group work):** Groups of 2-3 students each will be created. Each group will be assigned tasks to complete. These tasks may expand on design work and may have “research components” where students need to gather information required to complete a task.
- **Students’ presentations:** Each student will give a short presentation on a selected subject related to the repair or strengthening of structures.
- **Exams:** Accumulated knowledge is tested in two exams: a midterm and a final exam. Both feature multiple-choice, true-false or short essay questions.

Schedule:

Week	Topic of lecture
Week 1	Orientation. Introduction.
Week 2	Basic terms. Principles of rehabilitaion.

Week 3	Deterioration and repair of concrete and reinforced concrete structures I.
Week 4	Deterioration and repair of concrete and reinforced concrete structures II.
Week 5	Repair and strengthening of masonry structures and bridges I. 1 st assignment: Essay or presentation.
Week 6	Repair and strengthening of masonry structures and bridges II.
Week 7	Repair and strengthening of structures with shotcrete. Injections.
Week 8	Midterm exam. Submit of 1st assignment.
Week 9	<i>Break – no class</i>
Week 10	Repair and strengthening with high performance concrete.
Week 11	Specific strengthening materials and methods. Strengthening with FRP materials.
Week 12	Specific strengthening materials and methods. Seismic retrofit.
Week 13	Submit of 2nd assignment. Presentations.
Week 14	Final exam.
Week 15	Second exam (only if required). Presentations.

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 from more than 30% of the total number of lesson will be grounds for failing 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

Grade:	5	4	3	2	1
Evaluation in percents:	85%-100%	70%-84.9%	55%-69.9%	40%-54.9%	0-39.9%

Students with Special Needs:

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

Readings and Reference Materials:

IABSE: "Case Studies of Rehabilitation, Repair, Retrofit and Strengthening of Structures", ISBN 978-3-85748-124-6,

M Raupach, Till Büttler: Concrete Repair to EN 1504 - Diagnosis, Design principles and Practice, CRC Press, ISBN-13: 978-1-4665-5746-8

Externally bonded FRP reinforcement for RC structures, fib Bulletin 14., 2001.

EN 1504 European standard series.