Reinforced Concrete Structures - BMEEOHSAT43

I. Subject Specification

1. Basic Data

1.1 Title

Reinforced Concrete Structures

1.2 Code

BMEEOHSAT43

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	3

1.5 Evaluation

Midterm grade

1.6 Credits

3

1.7 Coordinator

name	István Völgyi
academic rank	Associate professor
email	volgyi.istvan@emk.bme.hu

1.8 Department

Department of Structural Engineering

1.9 Website

https://epito.bme.hu/BMEEOHSAT43
https://fiek2.mywire.org/course/view.php?id=450

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

1.12 Prerequisites

Strong prerequisites:

- Introduction to Strength of Materials (BMEEOTMAT42)
- Basis of Design (BMEEOHSAT41)

Weak prerequisites:

- Construction Materials I. (BMEEOEMAT43)

1.13 Effective date

1 September 2020

2. Objectives and learning outcomes

2.1 Objectives

The aim of the subject is to acquire the basis of structural reinforced concrete design. Simple structural members and slabs subjected to simple and complex forces will be discussed in serviceability limit states and ultimate limit states.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. knowing the terms and notations of reinforced concrete design,
2. knowing the behaviour and modelling of reinforced concrete material,
3. knowing the design principles of reinforced concrete (RC) cross sections,
4. knowing the typical behaviour modes of RC cross sections,
5. knowing the methods of verification and design.

B. Skills

1. one is able to verify and design simple RC members subjected to shear, bending, torsion, eccentric compression and combination of them.
2. one is able to verify and design one way RC slabs,
3. one is able to verify and design RC beams,
4. one is able to verify and design RC columns subjected to eccentric compression and combined forces.
5. one is able to analyse elements of complex structures,
6. one is able to solve complex problems using the knowledge in informatics,
7. one is able to express his thought in written and oral form.

C. Attitudes

1. one shows interest in traditional and modern tools and methods.
2. one aims to get acquainted with and apply methods for problem solving.
3. one aims to solve problems precisely.

D. Autonomy and Responsibility

1. One uses system approach.

2.3 Methods

Lectures and exercise classes. Communication in oral and written form, application of IT tools and methods. Project for single student (or for groups, optional).

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Deflection of RC members.
2.	Behaviour of RC cross sections subjected to bending (I and II. behaviour phase).
3-5.	Behaviour of RC cross sections subjected to bending III. behaviour phase; design, verification, beams, slabs). + test
6-8.	Behaviour of RC cross sections subjected to shear (formulae, important parameters).
9-10.	Verification of RC members subjected to combined forces (bending + shear, shift of bending moment diagram, verifiaction of end support, torsion). + test
11-12.	Verification of cross section and member subjected to eccentric compression.
13.	Basic idea of prestressing.
14.	Drawing technics + test

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Online materials:

1. Electronic notes: http://edu.epito.bme.hu/mod/folder/view.php?id=8396
2. EN 1990, EN 1991, EN 1992
3. Martin, Purkiss: Concrete design to EN1992. Elsevier. 2006.
4. Mosley, Bungey, Hulse: Reinforced Concrete Design to Eurocode 2.

2.6 Other information

1. Visit of contact classes is obligatory. Absence <30% is accepted.

2.7 Consultation

The instructors are available for consultation during the lecture and occasionally during their office hours, as advertised on the department website.

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This Subject Datasheet is valid for:

2023/2024 semester I

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via tests and homework project (HW) assignments.
Date of tests and deadlines for the HW: see the website of the subject.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test (summary evaluation)	T1	A.1-A.5; B.1-B.2, B.7; C.1-C.2; D.1
2. midterm test (summary evaluation)	T2	A.1-A.5; B.2-B.3, B.7; C.1-C.2; D.1
3. midterm test (summary evaluation)	T3	A.1-A.5; B.4-B.5, B.7; C.1-C.2; D.1
1-3. homework	HW1-3	A.1-A.5; B.4-B.6, B.7; C.1-C.3; D.1
attendance and activity (optional; positive only)	A	A.1-A.5; B.5, B.7; D.1

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
T1-3	82% (82 points) (average of the best two tests; test has practical and theoretical parts)
HW1-3	18% (18 points)
A	10% (10 points)
Sum	100%+10%

Average of the best two theoretical part of the tests should be >40%.
Average of the best two tests (practical + theoretical) should be >50%.
Total result should be >50%.
Attendance should be >70%.
Best two theoretical and best two test (theoretical + practical) can be chosen separately. For example best two theoretical part: first and second, best two test: first and third.
If the requirement for the test is fulfilled after the second test, bonus can be realised if the result of the third test is above 50%. The bonus is the 10% of the third best test (max 8.2 points). For example: if the individual test results are 90%; 70%; 80%, bonus is 82 points*10%*70%=5.74 points. If the individual test results are 90%; 70%; 40%, bonus is 0.
There is no individual requirement for the HW. (If the test requirement is fulfilled, but the test result is close to minimum, additional HW points are neccessary.)

3.4 Requirements and validity of signature

The subject is passed if the student meets the requirements detailed in part 3.3.

3.5 Grading system

If the subject is passed, the grade is calculated the following way:

There is no limit for the homework project.	Grade	Points (P)
	excellent (5)	90<=P

good (4)	75<=P<90%
satisfactory (3)	60<=P<75%
passed (2)	50<=P<60%
failed (1)	P<50%

3.6 Retake and repeat

1. There is no minimum requirement for individual mid-term benchmarking, therefore retake of the tests is not possible.
2. The HW is part of the systematic learning. There is no late submission. The method of the solution is shown after the deadline.
3. No retake of attendance and activity is available.

3.7 Estimated workload

Activity	Hours/semester
contact hours	13×3=39
preparation for the courses	14×2=28
preparation for the tests (homework)	7+8+8=23
Sum	**90**

3.8 Effective date

1 September 2021

This Subject Datasheet is valid for:

2023/2024 semester I