

COURSE SYLLABUS AND COURSE REQUIREMENTS

ACADEMIC YEAR 2023/2024 SEMESTER 2

<i>Course title</i>	<i>Basics of Structural Design</i>
<i>Course Code</i>	<i>MSB086ANEP</i>
<i>Hours/Week: le/pr/lab</i>	<i>1 / 0 / 2</i>
<i>Credits</i>	<i>5</i>
<i>Degree Programme</i>	<i>BSc Civil Engineering</i>
<i>Study Mode</i>	<i>full time</i>
<i>Requirements</i>	<i>semester grade with signature</i>
<i>Teaching Period</i>	<i>2nd semester</i>
<i>Prerequisites</i>	<i>---</i>
<i>Department(s)</i>	<i>Department of Civil Engineering</i>
<i>Course Director</i>	<i>Dr. Attila FÜLÖP associate professor</i>
<i>Teaching Staff</i>	<i>Dr. Attila FÜLÖP associate professor Dávid Mansoor Sadrinia invited lecturer</i>

COURSE DESCRIPTION

The goal of the semester is that the students should learn the theoretical background of the structural design, the basic knowledges of probability theories and the structure of the codified design through on the EuroCode Design Code system. Moreover the application of the Axis VM FEM program is presented.

SYLLABUS

1. GOALS AND OBJECTIVES

Brief Syllabus: Structural design theory. Methodology of the engineering design. Structural, material and load modelling. Strength design, approximate and exact calculations. Summary of the structural mechanics. Statically determined and undetermined structures. EN 1990 (2002) (English): Eurocode - Basis of structural design. The Eurocode design code system. General assumptions, objectives, major concepts. Basic knowledges of the probabilistic design. Probability variables, main values, variance, quantile, etc. Limit state design concept, design situations, actions, combination of actions, verification of limit states. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings. Actions on structures - General actions - Snow loads. Actions on structures - General actions - Wind actions. Actions on structures - Traffic loads on bridges. Actions on structures - Actions induced by cranes and machinery

2. COURSE CONTENT

TOPICS

LECTURE

- 1. Introduction*
- 2. Structural design theory. Methodology of the engineering design.*
- 3. Structural, material and load modelling. Strength design, approximate and exact calculations.*
- 4. Summary of the structural mechanics. Statically determined and undetermined structures.*
- 5. EN 1990 (2002) (English): Eurocode - Basis of structural design. The Eurocode design code system. General assumptions, objectives, major concepts.*
- 6. Basic knowledges of the probabilistic design. Probability variables, main values, variance, quantile, etc.*
- 7. Limit state design concept, design situations, actions, combination of actions, verification of limit states.*
- 8. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings, Snow loads, Wind actions*
- 9. Actions on structures - Traffic loads on bridges, Actions induced by cranes and machinery*

LABORATORY PRACTICE

10. Semester exam

1. Introduction to Axis VM finite element program.
2. Geometrical properties and modelling.
3. Truss-design and axial loadings.
4. Simple beam design 1.
5. Simple beam design 2.
6. Frame design.
7. Planar structures

DETAILED SYLLABUS AND COURSE SCHEDULE

LECTURE

<i>week</i>	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Introduction. Structural design theory. Methodology of the engineering design.	[1]		
2.	Structural, material and load modelling. Strength design, approximate and exact calculations.	[1]		
3.	Basic knowledges of the probabilistic design. Probability variables, main values, variance, quantile, etc.	[1]		
4.	EN 1990 (2002) (English): Eurocode - Basis of structural design. The Eurocode design code system. General assumptions, objectives, major concepts.	[1], [2]		
5.	Limit state design concept, design situations, actions, combination of actions, verification of limit states.	[1], [2]		
6.	Actions on structures - General actions - Densities, self-weight, imposed loads for buildings, Snow loads, Wind actions	[1] [3]		
7.	Actions on structures - Traffic loads on bridges, Actions induced by cranes and machinery	[1] [3]		

LABORATORY PRACTICE

<i>week</i>	Topic	Compulsory reading; page number (from ... to ...)	Required tasks (assignments, tests, etc.)	Completion date, due date
1.	Introduction to Axis VM finite element program 1 (geometrical properties and elements)	[1]		
2.	Introduction to Axis VM finite element program 2 (loads and design)	[1]		
3.	Axial loadings 1 (planar trusses)	[1]		
4.	Axial loadings 2 (space trusses)	[1]		
5.	Axial loadings 3 (truss case study)	[1]		
6.	Beam design M-V 1 (planar, spatial simple and multispans beams)	[1]		
7.	Beam design M-V 2 (multispans beam case study)	[1]	HW 1	

8.	Beam design M-V-N 1 (planar and spatial frames)	[1]		
9.	Spring holiday			
10.	National holiday (Easter Monday)			
11.	Beam design M-V-N 2 (frame case study)	[1]		
12.	Plated structures (walls, slabs and shells)	[1]		
13.	Modelling complex structures (trussed frames)	[1]		
14.	Midterm Exam		HW 2	

3. ASSESSMENT AND EVALUATION

ATTENDANCE

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description.

Method for monitoring attendance

attendance sheet

ASSESSMENT

Course resulting in mid-term grade (PTE TVSz 40§(3))

Mid-term assessments, performance evaluation and their ratio in the final grade (The samples in the table to be deleted.)

	Type	Assessment	Ratio in the final grade
1.	Midterm Exam	max 30 points	30 %
2.	Homework 1	max 35 points	35 %
3.	Homework 2	max 35 points	35 %

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

The specific regulations for improving grades and resitting tests must be read and applied according to the general Code of Studies and Examinations. E.g.: all tests and assessment tasks can be repeated/improved at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

The Midterm Exam can be retake once, if it not reaches the min 40%. The homeworks can be resubmit within the given deadline, if they not reach the min 40%.

Grade calculation as a percentage

based on the aggregate performance according to the following table

Course grade	Performance in %
excellent (5)	85 % – 100%
good (4)	70 % – 84%
satisfactory (3)	55 % – 69%
pass (2)	40 % – 54%
fail (1)	0 % – 39%

4. SPECIFIED LITERATURE

COMPULSORY READING AND AVAILABILITY

- [1.] Electric material in TEAMS
- [2.] EN 1990 (2002) (English): Eurocode - Basis of structural design
- [3.] EN 1991 (2002) (English): Eurocode 1: Actions on structures

RECOMMENDED LITERATURE AND AVAILABILITY

[4.] Gulvanessian: Designers' Guide to EN 1990

[5.] B2: The role of EN 1990: the key head Eurocode, <http://eurocodes.jrc.ec.europa.eu>