Structures 2 - BMEEOHSMT-1

I. Subject Specification

1. Basic Data

1.1 Title

Structures 2

1.2 Code

BMEEOHSMT-1

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2
Seminar	1

1.5 Evaluation

Exam

1.6 Credits

4

1.7 Coordinator

name	Dr. Kovács Nauzika
academic rank	Associate professor
email	kovacs.nauzika@emk.bme.hu

1.8 Department

Department of Structural Engineering

1.9 Website

https://epito.bme.hu/BMEEOHSMT-1
https://fiek2.mywire.org/course/view.php?id=2450

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Specialization of Structures, Strcutural Engineering (MSc) programme

1.12 Prerequisites

Recommended prerequisites:

- Structures 1. (BMEEOHSMS51)

1.13 Effective date

5 February 2020

2. Objectives and learning outcomes

2.1 Objectives

The objective of the subject is the presentation of the hazards, structural reliability and their role in structural design. The behaviour of complex structures, curved steel and concrete shells, 3D truss structures and their design are introduced. The most important analytical solutions and the basics and assumptions of numerical solutions are presented. Additionally, the design methods of cable and membrane structures are concluded in the subject.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. will learn the basic methods of reliability analysis,
2. will learn the probability analysis of loads and resistance,
3. will learn the safety conceptions of design codes and the safety levels of Eurocode,
4. will learn the types of shells and to define curved surfaces,
5. will learn the static behaviour of edge girders,
6. will learn the behaviour of 3D truss-like grids,
7. will learn the behaviour of 3D grids constructed to curved surfaces,
8. will learn the behaviour of cable and membrane structures.

B. Skills

1. will be able to apply the methods of structural reliability,
2. will be able to define the partial factors with the help of reliability analysis,
3. will be able to calculate the internal forces of cylindrical shells loaded with circularly symmetric loads,
4. will be able to solve membrane problems,
5. will be able to define the replacement continuum of 3D grids,
6. will be able to perform basic dynamic wind analysis.

C. Attitudes

1. cooperates with the tutor/lecturer and with fellow students,
2. continuously extends his/her knowledge,
3. is ready to apply numerical computational tools,
4. is intent on learning about structures,
5. is intent on precise and error-free problem solving,
6. is attending to the classes as a responsible member of the community.

D. Autonomy and Responsibility

1. able to autonomously complete design calculations based on the literature,
2. is open to new design procedures, and autonomously evaluates the correctness and applicability of new design procedures,
3. is able to think in system.

2.3 Methods

Lectures, exercises, written and oral communications, application of IT tools and techniques, assignments solved individually.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	Reliability models of loads and resistance. Safety conception of Eurocode. Partial factors.
2.	Uncertainty in structural design, Reliability analysis of structures. Reliability analysis of existing structures. Test based design.
3.	General methods of structural design. Selection of the proper structural material.
4.	Behaviour of shell structures. Membrane forces, shell supports.
5.	Elliptic, parabolic and hyperbolic shells.
6.	Stiffness, static behaviour of edge girders.
7.	3D truss structures, 3D grids, replacement continuum.
8.	3D grids win 3D behaviour, required supports of 3D grids
9.	Behaviour of one and two layered truss systems and 3D grids constructed to curved surfaces.
10.	Grid shells.
11.	Behaviour and types of cable structures.
12.	Behaviour of suspended roofs.
13.	Behaviour and types of membrane structures.
14.	Dynamic wind analysis

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

Textbooks
1. Mérnöki építmények és Szerkezetek. Szerkesztette Kollár Lajos, Akadémiai kiadó, 2000.
2. Prékopa: Valószínűségelmélet. Műszaki Könyvkiadó. 1980.
3. Faber: Risk and safety in civil, environmental and geomatic engineering
4. Sorensen: Structural reliability theory and risk analysis
Online materials
1. Lectures and slides
2. Practices

3. Sample problems

2.6 Other information

1. Attendance to lectures and exercise classes is compulsory. The signature and credits from the subject will be refused to students missing more than what is defined in the Code of Studies of BME.
2. Students are evaluated based on their actual individual performance. Students are required to show evidence of their own knowledge and skills. Submitting a work of others, obtaining or giving unauthorized help (e.g. during an exam or test) cheating and plagiarism in any form is unacceptable. Whoever violate the respective Regulations of the University will be given a failing grade (1), without the possibility of retake and repeat, and will be reported to the Dean's Office.

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail:

kovacs.nauzika@epito.bme.hu pap.zsuzsa@epito.bme.hu

This Subject Datasheet is valid for:

Inactive courses

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 a test and examination.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test	MT1	A.1-A.5; B.1-B.4; C.1-C.3, C.5; D.1-D.3
Written examination	E	A.1-A.8; B.1-B.6; C.1-C.6; D.1-D.3

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
MT1	20%
Total achievable during the semester	20%
E	80%
Sum	**100%**

Criterion for completion of the subject is to collect at least 50% of the total points of the Test. Moreover, unsatisfactory performance during the Exam will lead to a final mark 'failed' (1) independently of the result of the Test.

3.4 Requirements and validity of signature

Criterion for the signature is to collect at least 50% of the total points of the Test according to Section 3.3.
If the applicant does not take the examination course with an earlier acquired signature, his or her points are overwritten by his or her new points.
The previously acquired point can be taken into account in the next 6 semesters.

3.5 Grading system

Grade	Points (P)
excellent (5)	80<=P
good (4)	70<=P<80%
satisfactory (3)	60<=P<70
passed (2)	50<=P<60%
failed (1)	P<50%

3.6 Retake and repeat

1. The midterm test can be repeated – once without fee – at a previously determined date given in the course schedule.
2. In case of repetition of the test, the better result will be taken into account for the calculation of the final mark.

3. If the first repetition is also unsatisfactory (failed), then the test can be repeated once more on the repetition week by paying a fee.

3.7 Estimated workload

Activity	**Hours/semester**
contact hours	14×3=42
preparation for the courses	14×1=14
preparation for the tests	1×16=16
home studying of the written material	8
preparation for the examination	40
Sum	**120**

3.8 Effective date

5 February 2020

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