Prestressing Technologies - BMEEOHSMT62

I. Subject Specification

1. Basic Data

1.1 Title

Prestressing Technologies

1.2 Code

BMEEOHSMT62

1.3 Type

Module with associated contact hours

1.4 Contact hours

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

1.5 Evaluation

Midterm grade

1.6 Credits

3

1.7 Coordinator

name	Dr. Kovács Tamás
academic rank	Associate professor
email	kovacs.tamas@emk.bme.hu

1.8 Department

Department of Structural Engineering

1.9 Website

https://epito.bme.hu/BMEEOHSMT62
https://fiek2.mywire.org/course/view.php?id=2455

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 prestressed structures and its design procedures. The main types of prestressed structures, applied materials and prestressing technologies are introduced. The effect of prestressing for the design procedures is discussed. Special prestressed structural systems and prestressing technologies for bridges are also presented. The Eurocode based design procedures and their practical application are showed.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. will learn the structural materials of prestressed structures,
2. will learn the different technologies of prestressing,
3. will learn the effect of prestressing in case of beam structures,
4. will learn the effect of prestressing in case of plate structures,
5. will learn the effect of prestressing in case of shell structures,
6. will learn to determine the changing effects of prestressing through the life of the structure,
7. will learn the design procedure of prestressed structures.

B. Skills

1. will be able to determine the internal forces of prestressed beams
2. will be able to design and determine the internal forces of prestressed plates,
3. will be able to design and determine the internal forces of prestressed tanks,
4. will be able to design special prestressed structures, shells with large spans
5. will be able to design prestressed bridges, cable-stayed bridges and extradosed bridges,
6. will be able to apply different prestressing technologies.

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 and applying the relevant tools of designing prestressed structures,
5. is intent on precise and error-free problem solving,

D. Autonomy and Responsibility

1. able to autonomously evaluate the application of prestressed structures and 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.

2.3 Methods

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

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	Brief history of the prestressing technology,
2.	Materials of prestressed structures.
3.	Systems for prestressing.
4.	Determination of the effective prestressing force.
5.	Design of prestressed beams, determination of the required prestressing force.
6.	Analysis of prestressed and post-tensioned beams.
7.	Design of prestressed plates, effect of prestressing.
8.	Load bearing capacity of prestressed plates, the minimum reinforcement of the plate.
9.	Prestressed foundation systems, prestressed industrial floors,
10.	Prestressed tanks, pools.
11.	Special prestressed systems, big span roofs and shells, façade systems
12.	Prestressing technologies in bridge construction, cable-stayed bridges
13.	Prestressing technologies in bridge construction, extradosed bridges
14.	Prestressing technologies in bridge construction, ribbon bridges

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) Textbooks, codes:

- Bölcskei – Tassi: Feszített szerkezetek
- MSZ-EN 1992, Betonszerkezetek
- *fib* Bulletin 30 Acceptance of stay cable systems using prestressing steels
- *fib* Bulletin 31 Post-tensioning in buildings
- *fib* Bulletin 33 Durability of post-tensioning rendons
- *fib* Bulletin 55, 56 *fib* ModelCode 2010, Volume 1, 2

b) Online materials:

- Farkas György: Feszített szerkezetek, webpage

2.6 Other information

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.tamas@emk.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 one test and homework.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
Midterm test	T	A.1-A.7; B.1-B.3
Homework	HW	A.4-A.7; B.2-B.6; C.1-C.5; D.1-D.2

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
Test	70%
HW	30%
Total achievable during the semester	**100%**
Sum	**100%**

Criterion for completion of the subject is to collect at least 50% of the total points of the Test.

3.4 Requirements and validity of signature

Collection at leat 50% of the total points for the Homework (15p) as well as the Test (35p).

3.5 Grading system

Grade	Points (P)
excellent (5)	85<=P
good (4)	75<=P<85%
satisfactory (3)	65<=P<75%
passed (2)	50<=P<65%
failed (1)	P<50%

3.6 Retake and repeat

1. The midterm test can be retaken – once without repetition fee – at a previously determined date given in the course schedule.
2. In case of a retaken test, the better result will be taken into account for the calculation of the final grade.
3. If the first retake is also unsatisfactory (failed), then the test can be repeated once more on the repetition week. This retake is subject to repetition fee.

3.7 Estimated workload

Activity	**Hours/semester**
contact hours	14×2=28
preparation for the courses	14×1=14
preparation for the tests	1×8=8
homework	24
home studying of the written material	16
Sum	**90**

3.8 Effective date

5 February 2020

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