SUBJECT DATASHEET

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
lectures	1/week
seminars/exercise classes	1/week

1.5 Evaluation

midterm grade

1.6 Credits

3

1.7 Coordinator

name:	Dr. Farkas György
academic rank:	professor emeritus
email:	farkas.gyorgy@epito.bme.hu

1.8 Department

Department of Structural Engineering (http://www.epito.bme.hu/hidak-es-szerkezetek-tanszek)

1.9 Website

http://www.epito.bme.hu/BMEEOHSMT62

1.10 Language of instruction

Hungarian and English

1.11 Curriculum requirements

Compulsory in the Specialization in Structures of the Structural engineering (MSc) programme

1.12 Prerequisites

Recommended subjects

Structures 1. (BMEEOHSMS51)

1.13 Effective date

September 1, 2017.

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

b) Online materials
   1. Farkas György: Feszített szerkezetek, webpage

2.6 Other information

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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: farkas.gyorgy@epito.bme.hu

II. SUBJECT REQUIREMENTS

3 ASSESSEMENT 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	abbrev.	**assessed learning outcomes**
1. midterm test	ZH1	A.1-A.7, B.1-B.3
Homework	HF	A.4-A.7, B.2-B.6; C.1-C.5; D.1-D.2

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

3.3 Evaluation system

abbreviation	**score**
ZH1	70%
HF	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, and at least 50% of the total points of the Assignment.

3.4 Requirements and validity of signature

Signature can't be obtained.

3.5 Grading system

If the student satisfies the attendance criteria, his/her mark will be determined as follows.

The final mark is calculated on the basis test and homework, as shown in the following table:

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	14×2=28
preparation for the courses	14×1=14
preparation for the tests	1×8=8
homework	24
home studying of the written material	16
in total	**90**

3.8 Effective date

September 1, 2017.