Steel and Composite Structures - BMEEOHSAS47

I. Subject Specification

1. Basic Data

1.1 Title

Steel and Composite Structures

1.2 Code

BMEEOHSAS47

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

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/BMEEOHSAS47
https://fiek2.mywire.org/course/view.php?id=2611

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

1.12 Prerequisites

Strong prerequisites:

- Steel Structures (BMEEOHSAT42)
- Reinforced Concrete Structures (BMEEOHSAT43)

1.13 Effective date

5 February 2020

2. Objectives and learning outcomes

2.1 Objectives

The aim of the Subject is to teach the structural speciality, layout and design of plated girders, including the followings: effect of internal forces and moments interaction on the cross-sectional resistance and stability phenomenon; the configuration and design of simple connections.
The further aim is to teach the configuration, behaviour and the basis of the elastic and plastic design methods of composite girders.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. knows the general terminology of the steel and composite structures,
2. knows the design methods of welded plate girders,
3. knows the cross-sectional and stability phenomenon interaction of steel structures,
4. knows the configuration of simple steel structural joints,
5. knows the configuration of composite girders,
6. knows the elastic design method of composite girders,
7. knows the plastic design method of composite girders,
8. knows the elastic and plastic design methods of shear connections.

B. Skills

1. able to design of steel plate girders,
2. able to design of steel columns under eccentric compression,
3. able to design the simple joints of steel structures,
4. able to determine the elastic and plastic resistance of composite beam cross-section,
5. able to do design the shear connections by elastic and plastic methods.

C. Attitudes

1. opened to gain new knowledge, increase their knowledge by continuous learning,
2. opened to used IT devices,
3. pursue to accurate and error-free solutions

D. Autonomy and Responsibility

1. design the steel and composite beams individually based on given source materials,
2. apply systematic thinking

2.3 Methods

The theoretical background of the design of the steel and composite structures are explained on the lectures and numerical examples are solved on the exercise classes. Homework examples should be solved individually by the Student and check the correct results online with the aim to be prepared for the mid-term exams.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	Local plate buckling: class 4 sections, shear buckling.
2.	Welded plate girders: configuration, design concepts.
3.	Beam-columns: cross-section classification, cross-sectional resistances.
4.	Beam-columns: stability behaviour and design.
5.	Simple connection: beam splices and column bases.
6.	Simple connection: pinned column base connection.
7.	Simple connection: beam-to-beam connections.
8.	Concept of composite construction, structural layout and behaviour.
9.	Design of composite structures: basis.
10.	Composite beams: elastic calculation for short and long term loadings.
11.	Composite beams: cross-section classification.
12.	Composite beams: cross-sectional resistances
13.	Configuration of shear connectors and design by elastic and plastic method.
14.	Steel and composite structures: examples.

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

Online materials
1. ESDEP Course WG.10. Composite structures
2. Slides of Lectures.
3. Solved examples.
4. Sample for midterm exams

2.6 Other information

Attendance to lectures and exercise classes is compulsory. The signature and credits of the subject will be refused to students attending less than 70% of the classes.

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:

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kovacs.nauzika@emk.bme.hu or seres.noemi@emk.bme.hu

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 midterm tests and homework assignments.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
1. midterm test	MT1	A.1-A.2; B.1
2. midterm test	MT2	A.3-A.4; B.2-B.3
3. midterm test	MT3	A.5-A.8; B.4-B.5
1-3. homework	HW1	A.1-A.4; B.1-B.5; C.1-C.3; D.1-D.2
attendance and activity (optional; positive only)	A	A.1-A.8; B.1-B.5

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	40%
MT2	40%
MT3	40%
HW1	5%
HW2	5%
HW3	5%
A (bonus)	10%
Sum	**100%**

Midterm exams:

- All midterm exams have theoretical and practical parts.
- Two midterm exams should be completed ≥ 50% among the three midterms, theoretical and practical part separately.
- The best two theoretical and practical parts are not necessarily from the same midterms (e.g. MT1 and 3 theories and MT2 and 3 practices are the two bests).

Home works:

- Home works are optional.
- The aim of the home works are the preparation for hte practical part of the midterms. They are parametric practical examples, unique for each students.
- Max. 15 points are gained by Home works.

Bonus points:

- By completing the third midterm (less gained points) successfully (≥50%) bonus points are gathered.
- The theoretical and practical parts of the third midterm (less gained points) max 5-5 points are gathered.

3.4 Requirements and validity of signature

Signature is not gained in this Subject.

3.5 Grading system

Student fullfilled the attendance requirements, and completed the two midterm exams with results ≥ 50%, the semester grade is calculated by as follows:

Achiavble max. points:

Abbreviation	**Max points**
Mt best:	40 point (theory:16 point + practice: 24 point)
Mt second best:	40 point (theory:16 point + practice: 24 point)
Home works:	15 point
Bonus:	10 points
Sum:	**105 point**

The grade of the semester based on the gained points:

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. No repetition or retake of the Midterm exams are available.
2. No repetition or retake of the Home works are available.

3.7 Estimated workload

Activity	**Hours/semester**
contact hours	14×3=42
preparation for the courses	7×2=14
preparation for the midterm tests	2×14=28
homework	18
home studying of the written material	18
Sum	**120**

3.8 Effective date

6 September 2021

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2023/2024 semester I