**Composite Structures**

**Code: MFMOS31SM3-EN**

**ECTS Credit Points: 3**

**Evaluation: mid-semester grade**

Year, Semester: 4th year/1st semester

Number of teaching hours/week:

Lecture: **2**

Practice: **0**

**Prerequisites:** Steel structures II: MFACS32SS3-EN**,** Reinforced Concrete Structures II.: MFVBS32SS3-EN

**Topics**:

Materials of steel-concrete composite building structures. Elastic calculation of composite beams. Plastic calculation of composite beams. Design of composite columns. Design of slabs with a trapezoidal sheet.

**Literature:**

EN 1994-1-1:2010 EUROCODE 4: Design of composite steel and concrete structures. Part 1-1: General rules and rules for buildings.

JOHNSON R.P.: Composite structures of steel and concrete Vol1. Crosby Lockwood Stamples, London 1975.

LAWSON R.M.: Design of composite slabs and beams with steel decking, SCI Publications, 1989.

LAWSON R.M., RACKHAM J.W.: Design of haunched composite beams in buildings, Steel Construction Institute, Ascot, England 1989.

HAENSEL J.: Effects of creep and shrinkage in composite construction, Technisch- wissenschaftliche Mitteilung Nr. 75-12, Institut für konstruktiven Ingenierbau, Ruhr-University of Bochum 1975

NEIL S., JOHNSON R., LAWSON R.M., MULLET D.L.: Design of composite trusses, Steel Construction Institute, 1992.

**Schedule**

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| --- | --- |
| **1st week:**General presentation on composite structures in the world.**2nd week:** Calculating the cross sectional data of steel I-beam with a reinforced concrete head-plate.**3rd week:**Calculating elastic stress distribution in the cross section of steel I-beam with a reinforced concrete head-plate.**4th week:**Calculating the elastic stress distribution in the cross section of steel I-beam with a reinforced concrete head-plate, taking creep in account.**5th week:**Calculating the effective width of a head-plate.**6th week:**TEST 1. Issuing a design task.**7th week:**Calculating plastic bending resistance of steel I-beam a with reinforced concrete head-plate. | **8th week:**Calculating plastic bending resistance of steel I-beam with a reinforced concrete head-plate. (further cases)**9th week:**Calculating shear resistance of steel I-beam with a reinforced concrete head-plate. **10th week:**Lateral torsional buckling of steel I-beam with a reinforced concrete head-plate. **11th week:**TEST 2**12th week:**Servicing limit states of steel I-beam with a reinforced concrete head-plate. **13th week:**Composite columns**14th week:**Composite plates with a trapezoidal steel plate.**15th week:**TEST 3. Submitting a design task. |

**Requirements**

**A, for a signature:**

Participation at **lectures** is compulsory. Students must attend the lectures and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance will be recorded. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each lecture. Active participation is evaluated by the teacher in every class. If a student’s behavior or conduct doesn’t meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

Students have to **submit the design task** as scheduled minimum at a sufficient level.

During the semester there are three tests. Students have to reach the minimum level of points on each test.

 If the score of any test is below 10 from 20, the student once can take a retake test on all the topics.

**B, for a grade:**

The course ends in a **mid-term grade (AW5)**, based on the points of the task and the tests.

Based on the points earned during the semester, the grade is given according to the following table:

Score Grade

0-59 fail (1)

60-69 pass (2)

70-79 satisfactory (3)

80-89 good (4)

90-100 excellent (5)