## Course Name: STEEL STRUCTURES II

| Course Code | Course Status | Semester | ECTS Credits | Number of classes |
|---|---|---|---|---|
| | Compulsory | VI | 5 | 2P+1V+1L |

**Study programmes:** Undergraduate academic studies - study programme Civil Engineering; 6 semesters / 180 ECTS credits.

**Conditioned by other courses:** Building materials, Strength of materials I & II.

**Aims of the course:** Getting basic knowledge in steel structures design.

**Learning outcomes:** After passing this exam, student will be able to: 1. Know basic terms regarding joints and connections by mechanical fasteners. 2. Know historical development of mechanical fasteners and their production technology. 3. Know advantages and disadvantages of different mechanical fasteners. 4. Know basic terms regarding welded joints and connections. 5. Know historical development and technology of welding. 6. Know advantages and disadvantages of welding. 7. Design different types of joints and connections in steel structures. 8. Know basics of cold formed steel profiles design. 9. Know basics of steel plated structural elements design.

**Teacher and assistant:** Prof. Duško Lučić, Dr-Ing. – teacher
Mladen Muhadinović, MSc; Petar Subotić, MSc – assistants

**Methods of teaching and learning:** Lectures, exercises, laboratory exercises, consultations, semester project.

**Course content:**

| | |
|---|---|
| I teaching week | Basics of cold-formed members and sheeting design. Cross section shapes, dimensions and conventions. Stiffeners shapes. Materials and properties of cold-formed members and sheeting. |
| II teaching week | Resistance of cold-formed members and sheeting cross sections. Buckling resistance of cold-formed members and sheeting. |
| III teaching week | Basics of plated structural elements design. Shear lag. Plate buckling effects due to direct stresses. Resistance to direct stresses. Effective cross section. Plate elements with and without longitudinal stiffeners. |
| IV teaching week | Resistance to shear. Resistance to transverse forces. Stiffeners and structural detailing. |
| V teaching week | Recapitulation and practice. |
| VI teaching week | Basics of joints design. Mechanical fasteners. Categories of bolted connections. Position of bolts and rivets holes. Design resistance of individual fasteners. Long joints. |
| VII teaching week | Slip-resistant connections. Deductions for fastener holes. Connections by pins. |
| VIII teaching week | Welded connections. Weld types. Welding techniques. |
| IX teaching week | Deign resistance of fillet/butt/plug welds. Forces distribution. |
| X teaching week | Classification of joints by stiffness and by strength. Modelling of beam-to-column joints. |
| XI teaching week | Structural joints connecting H or I sections. Design resistance of basic components. |
| XII teaching week | Structural joints connecting H or I sections. Design moment resistance of beam-to-column joints and splices. Design resistance of column bases with base plates. Rotational stiffness and rotation capacity. |
| XIII teaching week | Hollow section joints. |
| XIV teaching week | Software application in design. Commercial and free software. Advantages, challenges and dangers. |
| XV teaching week | Semester wrap-up and final preparation for the examination. |

**Student's obligations:** Attending of lectures and exercises, elaboration of semester project, tests.

STUDENTS LOAD

| Per week | In semester |
|---|---|
| 5 credits x 40/30 = 6.67 hours<br>Structure:<br>2 hours lectures<br>2 hours exercises<br>2.67 hours individual work, including consultations | Teaching and final exam: (6.67 hours) x 16 = 106.67 hours<br>Necessary preparations before semester (administration, enrolment etc) 2 x (6.67 hours) = 13.33 hours<br>Total load for the course: 5x30 =150 hours<br>Additional work for exam preparation in the additional exam session, including passing of correctional exam between 0 and 30 hours (remaining time from the previous issues to the final load for the course of 150 hours)<br>Load structure:<br>106.67 hours (teaching) + 13.33 hours (preparation) + 30 hours (additional work) |

**Literature:**


1. MEST EN 1993-1-1.
2. MEST EN 1993-1-3.
3. MEST EN 1993-1-5.
4. MEST EN 1993-1-8.
5. N. Trahair, M. Bradford, et al: The behaviour and design of steel structures to EC3.
6. L. Gardner, D. Nethercot: Designers guide to Eurocode 3: Design of steel buildings.
7. Z. Marković: Granična stanja čeličnih konstrukcija


**Examining system and grading:**

Examining is continuous during the semester and in the final exam.
Maximum number of points in semester: 100.
The structure of examination and points is as follows:

- semester project: up to 30 points;
- tests: up to 10 points;
- final exam: up to 60 points.

Defence of semester project is in oral form. Tests and final exam are in written form.
Following grading system is applied: A for ≥ 90 points, B for 80 ≤ points < 90, C for 70 ≤ points < 80, D for 60 ≤ points < 70, E for 50 ≤ points < 60, F for < 50 points. Positive grade is obtained for min 50 points. F = failed.

**Special notes for the course:**

**Data prepared by teacher:** Prof. Duško Lučić Dr-Ing.

**Note:** Additional information on course may be obtained from course teacher, assistant, head of the study programme and vice-dean for teaching.