	Course title:	Steel Structures I		
Course code	**Course status**	**Semester**	**Number of ECTS credits**	**Number of classes (weekly)**
PL1IČK1	**Compulsory**	**VII**	**8**	**2L+2E**

Study programs for which it is organized: Faculty of Polytechnics, postgraduate level

Prerequisites: None.

Course study idea: Steel Structures I covers the foundations necessary for understanding the basic principles of modern design, taking into account the fundamental principles of higher education as well as further professional development in practice. The first principle is that specialist students find contemporary foundations for designing steel structures as a highly creative activity. The second principle, which is also included, is presenting certain problems related to designers in practice in a way that enables their further professional development.

Course objectives: Acquiring basic knowledge in the design of steel structures.

Learning outcomes: A student who successfully completes this course will be able to:

1. Understand the basic principles of designing steel structures, including material properties, types of steel, and methods of joining them;

2. Apply modern standards and calculation methods (Eurocode) in the analysis of load-bearing capacity and stability of steel structure elements;

3. Analyze and design the basic elements of steel structures, considering limit states, load effects, and operating conditions.

Name and surname of the lecturer and associates: Assoc. Prof. Dr. Dragomir Miljanić

Teaching and learning methods: lectures, exercises, seminar work.

WORK PLAN

Week:		Title of methodological units for lectures (L), exercises (E), and other teaching content (O); Planned form of knowledge assessment (Ka)
Preparatory week		Introduction, preparation, and semester enrollment.
Week I	**L/E**	Steel production, steel processing and its properties. Material testing
II	**L/E**	Types of structural steels, Classification of steel by purpose, Structural steels for general use, Types of steel products and their application
III	**L/E**	Joining materials, Application of welding in construction structures, Advantages and disadvantages of welding, Basic principles in design, Types of joints and welds, Welding procedures
IV	**P/V**	Welding joint defects, Contrala quality of welded joints, Protection of steel structures against corrosion
V	**P/V**	Inspection and reception of steel structures in the workshop, Preparation of installation, Installation procedure, Receipt of steel structure after completed assembly
VI	**P/V**	Design process of structures. Eurocodes for steel structures. Design according to limit states (limit state of capacity and usability, combinations of effects).
VII	**P/V**	Classification of cross-sections. Capacity. Capacity of cross-section. Capacity of elements to bending.
VIII	**P/V**	Limit state of bearing capacity. Capacity of cross-sections – introduction. Characteristics of cross-sections – gross, net section. Tensioning.
IX	**P/V**	Compression. Bending
X	**P/V**	Shear. Torsion
XI	**P/V**	Bending and shear. Bending and axial force. Bending, shear and axial force.
XII	**P/V**	Bending and shear. Bending and axial force. Bending, shear and axial force
XIII	**P/V**	Capacity of bending elements – introduction. Compressed elements - check of buckling. Elastic critical load. Imperfections and plastic region. Torsional and flexural-torsional bending.
XIV	**P/V**	Compressed elements of constant cross-section - EN 1993-1-1. Buckling curves. Slenderness for flexural bending. Flexural buckling of lattice structure elements. Slenderness for torsion and flexural-torsional buckling.
XV	**P/V**	Compressed elements of constant multi-part cross-section. Calculation procedure. Lattice compressed elements. Frame pressed elements. Multi-day elements with closely spaced belts.
XVI	**PZ**	**Final exam.**
XVII		**Supplementary examination period**

Student obligations during classes: lectures, exercises, seminar work.

Consultations by e-mail: YES

Student workload

Weekly:

8 credits x 40/30 = 10 hours 40 minutes

Structure:

- 2 hours of lectures
- 2 hours of exercises
- 6 hours 40 minutes of independent work, including consultations.

In the semester:

Total workload for the subject 8x30 = 240h

Structure:

Teaching and final exam: 10h40m x 16 weeks = 170h40m

Necessary preparations before the semester begins (administration, enrollment, verification):

10h40minx2=21h20min

Additional work for preparation and taking the exam in the supplementary period: 0-48h

Literature:

1. MEST EN 1993-1-1 – Eurocode 3 - Design of steel structures – Part 1-1: General rules and rules for buildings 2. MEST EN 1990 – Eurocode 0 - Basis of structural design 3. MEST EN 1993-1-10 – Eurocode 3 - Design of steel structures – Part 1-10: Material strength and properties by thickness 4. N. Trahair, M. Bradford, et al: The behaviour and design of steel structures to EC3 (internet edition) 5. L.S. Da Silva, R. Simoes, H. Gervasio: Design of steel structures EC3: Part 1-1-General rules and rules for buildings 6. L. Gardner, D. Nethercot: Designers guide to Eurocode 3: Design of steel buildings (internet edition) 7. Z. Marković: Limiting states of steel structures, Faculty of Civil Engineering, Belgrade, 2014.

Forms of knowledge testing and assessment:

Seminar work 50%, exam 50%.

Grade	**A**	**B**	**C**	**D**	**E**
Points	**90-100**	**80-89**	**70-79**	**60-69**	**50-59**