НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ СТРОИТЕЛЬНЫЙ УНИВЕРСИТЕТ

SUMMER SEMESTER `23

« Design of Steel Structures»

Date:	July, 10 – August, 26 2023
Duration:	7 weeks
ECTS credits:	144
Participation fee:	62 000 RUB

Target group: Students of Bachelor's, Specialist's and Master's degrees and postgraduate programs; Persons with higher and secondary special education

Course description

This is an introductory course in the design of steel structures. This course is recommended for juniors or seniors in the Civil Engineering program who are interested in learning the principles of Load and Resistance Factor Design of steel structures. The objectives of this course are:

1. To learn the behavior and design of structural steel components, for example, members and connections in two - dimensional (2D) truss and frame structures.
2. To gain an educational and comprehensive experience in the design of simple steel structures.

The course consists of seven sections:

Section 1: Estimating design forces for members of a structure.

Given the structural layout, plan, and elevations of a 3D structure, you will learn to:

- Identify the types of 2D structural frames that are assembled into a 3D structure
- Determine the nominal dead loads, live loads, snow and roof loads, and wind loads acting on the 3D structure
- Distribute the nominal loads to the 2D structural frames of the 3D structure
- Perform linear-elastic structural analysis to determine the internal axial, shear, and bending moments in all the members of the 2D frames
- Identify the design forces and moments for all members of the 2D frames

Section 2: Designing beams for flexural yielding

In this section, you will learn:

- The behavior of a laterally supported beam subjected to flexural loading
- To calculate the yield moment, elastic section modulus, plastic moment, and the plastic
- section modulus
- To calculate the design strength of a laterally supported beam
- To design the beam using the AISC manual to have adequate strength at factored load
- To design the beam using the AISC manual to have adequate stiffness at service loads

Section 3: Designing beams for lateral torsional buckling

In this section, you will learn:

- The local buckling behavior of beams and the difference between slender, compact, and
- non-compact sections
- To design beams considering the local buckling limit state using the AISC manual
- The lateral torsional buckling behavior of beams and the difference between slender,
- compact, and non-compact members
- To design beams considering lateral torsional buckling and the effects of moment
- gradient through the use of Cb and the AISC manual
- To complete the design of steel beams considering all flexural limit states

Section 4: Designing beams for lateral torsional buckling
In this section, you will learn:

- The elastic and the inelastic buckling behavior of compression members or columns
- To calculate the strength of a compression member depending on the end conditions
- To design a compression member using the AISC manual
- To determine the effective length of a compression member that is part of a frame using
- the alignment chart method
- To design columns in braced or unbraced frames using the AISC manual

Section 5: Designing tension members
Given the design tension force for a member, you will learn to:

- Calculate the gross yield strength of a tension member
- Calculate the net section fracture strength of the tension members
- Calculate the effective net area of the tension members
- Calculate the block shear rupture strength of a tension member
- Design the tension member using the AISC manual

Section 6: Designing bolted connections
In this section you will learn:

- The behavior and various possible failure modes of bolted connections
- To calculate the shear strength, bearing strength, and minimum edge distance and spacing
- requirements for bolted connection
- To design a bolted connection and gusset plate for given design forces
- The behavior of a slip-critical connection and how to calculate the slip-strength of a fully tensioned bolted connection
- To design a slip-critical bolted splice connection for a tension member

Section 7: Designing welded connections
In this section you will learn:

- Different types of welding procedures, welds, and welded connection
- To calculate the shear strength of a fillet weld considering weld and base metal strength
- To design a fillet welded connection considering issues such as minimum weld size, maximum weld size, etc.

Professor and lecture: Vera V. Galishnikova –professor of the Department of Structural and Theoretical Mechanics, Doctor of Eng.Sc.

The price for each program includes:

- Curriculum
- Handouts
- Excursion on the campus of Moscow State University of Civil Engineering
- Excursions, included in the educational program
- Cultural program (three programs of five)

Extra costs:

- Accommodation from 700 rub per day
- Visa support - 800 rub
- Medical insurance - 800 rub

Deadline for registration: June, 20 2023

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Registration