

UNIVERSITY NORTH, UNIVERSITY CENTRE VARAŽDIN, DEPARTMENT OF
CIVIL ENGINEERING

Graduate Study of Civil Engineering, Master Program

Civil engineering heritage and technique - course coordinator: Matija Orešković

- Describe the development of art in architecture.
- Recognize the functional, constructive, stylistic and aesthetic categories of individual periods and types of buildings.
- Compare artistic and architectural endeavors during different historical periods.
- Distinguish, draw, organize, compile, conclude the basic stages of the activities of arranging a construction site, connecting and foundation structures, and building a single-unit building body.
- Construction of a reinforced concrete building part;
- Construction of a wooden structure; layering and cladding of a building part, and renovation works of traditional stone and wooden houses.

Thermodynamics - course coordinator: Tomislav Veliki

- It is expected that, having mastered the course syllabus, the future Master of Civil Engineering will be competent and appropriately effective in applying the acquired knowledge in recognizing, identifying, analyzing and solving problems related to the use of traditional and renewable energy sources and energy efficiency in the design of construction facilities within the framework of systematic energy management as well as in
- It is expected that the knowledge acquired in this course will make the future Master of Civil Engineering capable of making an appropriate contribution to designing an increase in the level of energy efficiency in the renovation of existing buildings, especially cultural and historical monuments of secular and sacral provenance that have been endangered by the ravages of time.

Construction regulations - Eurocodes - course coordinator: Marko Šrajbek

- Analyze and calculate statically determinate and statically indeterminate beam systems.
- Explain the differential equations of an elastic beam. Calculate displacements and rotations in a beam.
- Describe and apply the force method for determining statically indeterminate beams.
- Recognize structural systems and spatial stability of engineering structures. Describe and apply the displacement method for determining statically indeterminate beams.
- Use the dimensioning of structural elements and characteristic details according to Eurocode regulations.

Theory of construction - course coordinator: Aleksej Aniskin

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- Use the dimensioning of structural elements and characteristic details according to Eurocode regulations.

Structural modelling and analysis - course coordinator: Jelena Bleziffer

- Recognize how individual structural systems function.
- Master the properties of various materials.
- Identify the influence of boundary conditions on the final result.
- Choose the optimal method of discretization of the structural model in order to achieve satisfactory accuracy.

Building physics and energy efficiency - course coordinator: Tomislav Veliki

- Define the elements of energy consumption in buildings and explain the principles of energy consumption management.
- Name and describe the energy certification systems of buildings. Recommend measures to improve the energy efficiency of buildings.

Technical diagnostics - course coordinator: Matija Orešković

- Define and connect basic concepts from the field of operations research.
- Model problems from the field of civil engineering as appropriate mathematical problems.
- Distinguish, select and apply basic methods of operations research in the field of civil engineering.
- Analyze production processes and model certain segments using operations research models.
- Analyze, interpret and optimize the results of applying individual methods and models of operations research.

Geotechnical engineering - course coordinator: Božo Soldo

- Understanding the connection between geotechnical tests and geostatic characteristics of geotechnical structures.
- Calculations of geostatic characteristics in geotechnical interventions and structures.
- Analyze geotechnical calculations with geotechnical software.
- Prepare proposals for solutions for geotechnical repairs of geotechnical elements and structures.
- Organize geotechnical interventions and assess their success based on geotechnical tests and observations.

Dynamics of Civil Engineering and Earthquake engineering - course coordinator: Marko Šrajbek

- Describe the origin and structure of the Earth as a planet.
- Understand how tectonic plates form and move, and how earthquakes occur.
- Become familiar with current technical regulations in earthquake protection and the relevant Eurocode.
- Apply the basic principles of structural dynamics calculation and design structural elements for earthquake resistance in accordance with legal regulations.
- Meet the requirements for structural modelling for dynamic analysis.
- Evaluate the justification for modelling structures using a single-degree-of-freedom equivalent system.
- Explain the role of damping and its influence on structural response.
- Predict the possibility of resonance in observed structures.
- Analyse dynamic models with multiple degrees of freedom.
- Apply existing or develop specialised computer applications for the calculation, analysis, and evaluation of dynamic behaviour.

Water systems - course coordinator: Bojan Đurin

- Formulate basic concepts of water management.
- Describe the development and explain the characteristics of water systems.
- Apply basic theoretical knowledge of water management, water management systems, and practical calculation methods to solve problems in the subject area.
- Plan the optimal use and management of water systems.

Revitalization, conservation and restoration of buildings - course coordinator: Matija Orešković

- Recognize the problems of protecting architectural heritage.
- List the methods and understand the possibilities of arranging and restoring individual building elements of buildings.
- Recommend and apply specific methods of restoring and protecting architectural heritage when solving a practical project task.

Foundations in building construction - course coordinator: Božo Soldo

- Understanding the connection of geotechnical tests with geostatic characteristics on shallow and deep foundations of buildings.
- Calculations of shallow foundation structures using analytical and numerical methods.
- Analyze geotechnical calculations of foundation structures using geotechnical software.
- Prepare proposals for solutions for geotechnical rehabilitation of geotechnical elements and buildings using modern methods.
- Design applications of modern geotechnical materials and interventions in the rehabilitation of foundation structures and protection from negative external influences

Water Protection and Treatment - course coordinator: Domagoj Nakić

- Define basic ecological principles, water quality indicators and identify sources of water pollution.
- Acquire fundamental knowledge of wastewater treatment process and apply this knowledge to the practical sizing and design of wastewater treatment plants in accordance with required levels of treatment.

**Methodology of scientific-research work - course coordinator: Božo Soldo i
Ivanka Netinger Grubeša**

- Apply methods of producing scientific and professional work,
- Recognize the research problem when producing a work,
- Explain the research process, learn about the phases of research,
- Explain the techniques and methods of producing a scientific work,
- Master the ethical aspects of producing a work, carry out the development of a conceptual and executive project.