



POSTGRADUATE UNIVERSITY SPECIALIST PROGRAMME

UNIVERSITY OF ZAGREB
FACULTY OF CIVIL ENGINEERING

no 2, 2024

POSTGRADUATE UNIVERSITY SPECIALIST PROGRAMME

**CIVIL
ENGINEERING**

Hydro
Engineering

Structural
Engineering

Bridges

Organisation and
Management in
Construction

Fire
Engineering

**EARTHQUAKE
ENGINEERING**

**WATER LOSS
MANAGEMENT**



University of Zagreb
Faculty of Civil Engineering



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About Us

The University of Zagreb Faculty of Civil Engineering is the oldest civil engineering faculty in Croatia. It offers university education at undergraduate, graduate and postgraduate levels in all branches of civil engineering. It continuously develops higher education, scientific research and general education and actively participates in the development of the profession and the introduction of new technologies. It currently offers three university specialist programmes: Civil Engineering, Earthquake Engineering and Water loss management.





— Pelješac Bridge

Civil Engineering

01

University Specialist Study Programme

Duration:

2 semesters

Admission requirements:

Completed university graduate studies with at least 60 ECTS credits from the field of civil engineering, of which at least 30 ECTS credits from the specialization to be enrolled. Exceptionally, the specialization in *Fire Engineering* and the specialization in *Organization and Management in Construction* may be enrolled by persons who have completed a university graduate study and have obtained at least 60 ECTS credits from subjects belonging to the field of technical sciences.

Exceptionally, a person who has completed a professional graduate programme may enrol in the university specialisation study programme after passing the additional examinations established by the university and having at least five years of professional experience in the field related to the studies. Individuals who have not earned the required number of ECTS credits must enrol for and pass an additional examination.

Postgraduate specialist studies are carried out in several modules:

Hydro Engineering

Structural Engineering

Bridges

Fire engineering

Organization and Management in Construction

The title acquired upon completion of the studies:

University Specialist in Civil Engineering, univ. spec. aedif.

Information about the study:

Hydro Engineering

Construction of the passenger terminal at seaport Gazenica in Zadar



Construction of the Lesce hydropower plant on the river Dobra



Hydro Engineering

The specialist study Hydro Engineering is carried out through course modules, where one compulsory module and one elective module are enrolled. In the context of the practical application of recent scientific and professional knowledge, the modules deal with specific aspects of the design and management of hydrotechnical structures, whether they are intended for the use of water, for the protection against harmful effects of water or for water protection. In this sense, the study is focused on understanding and solving specific problems according to the needs or affinities of the participants.

Within the compulsory module Fundamental Hydrotechnics, new and advanced methods for complex hydraulic and hydrological analyses are interpreted and applied as a basis for solving specific problems of hydraulic engineering.

The Environmental Engineering module teaches multiple connections between the built and natural environment, with an emphasis on implementing the concept of sustainability.

The Engineering Modelling module includes the practical application of mathematical models and computer programs in analysing and planning specific technical solutions, as well as modelling interactions between different structures and the environment. The River Hydrotechnics module deals with advanced procedures for analysing and modelling hydromorphological processes in watercourses and their restoration by applying "green" solutions, as well as obtaining energy mainly from small hydropower plants as a renewable source.

The Ports and Waterways module teaches modern trends in port and harbour engineering from the aspects of design, building technologies, and construction problems, with emphasis on maintenance and the impact of these structures on the environment.

The Drainage & Irrigation Systems module includes the process of optimization in specific conditions, in order to ensure comprehensive water management in the context of sustainable agricultural production.

Structural Engineering



— Timber truss roof structure of the Crafts school and City of Samobor sport hall



— Masonry shear strength testing with flat jacks

— Construction supervision of the production hall steel structure in Rugvica



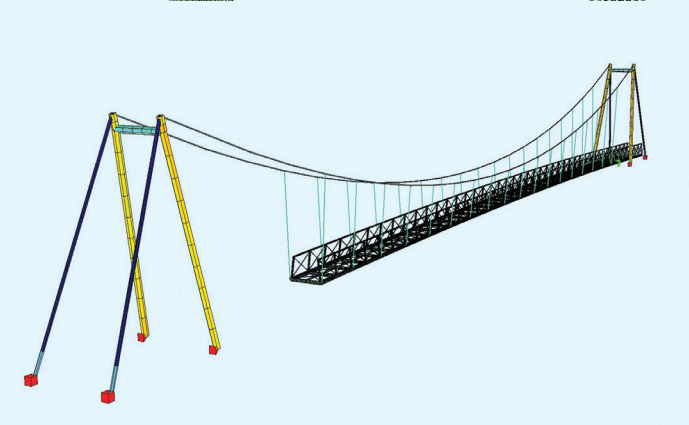
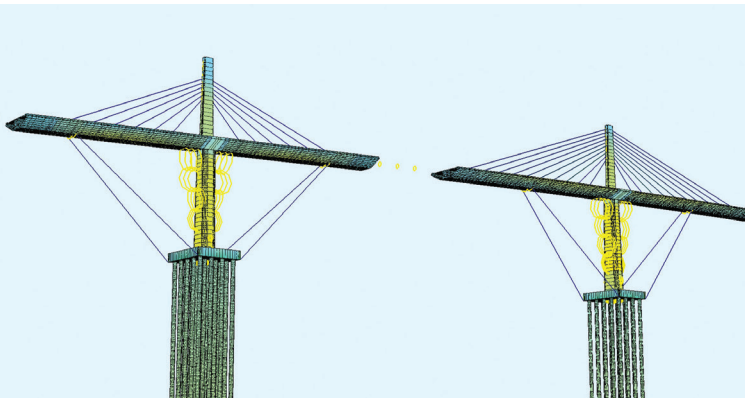
Structural Engineering

The postgraduate specialist study Structural Engineering allows students to acquire knowledge and skills in the design, construction, maintenance, and rehabilitation of load-bearing structures through 11 courses offered. Lecturers of the courses are teachers from the Department of Structures, i.e. the Chair for Concrete and Masonry Structures, the Chair for Timber Structures, and the Chair for Metal Structures.

Within the framework of four compulsory courses, modern knowledge of the modelling of structures using highly specialized computer programs is covered, as well as specific knowledge of the advanced calculation of special concrete, steel, wood, and masonry structures. Elective courses open up the possibility of additional specialization in the areas of restoration of masonry and concrete structures, as well as structural aspects of the protection of cultural, i.e., monumental heritage. Furthermore, participants have the opportunity to acquire knowledge and skills in the complex behaviour of aluminium structures, integral-tensioned structures, reinforced concrete and prestressed concrete structures, as well as composite structures and box girders. The focus is on acquiring knowledge of the behaviour of structures in accidental design situations that occur during construction (assembly phase) and building usage (impact actions and fire design situations).

Bridges

— Cantilever erection of cable-stayed bridge



— Launching erection of suspension bridge

Bridges

The postgraduate specialist study Bridges allows students to acquire knowledge and skills in the field of design, construction and maintenance of bridges through the 12 courses offered. In the area of design, the chapters on determining the load on bridges (static and dynamic actions), bridge dynamics (earthquake safety, vibrations caused by wind and traffic), numerical modelling of bridges (linear and non-linear calculation methods), bridge foundations (shallow and deep foundations) and sizing of bridge elements (steel and composite bridges, reinforced concrete bridges with prestressing) are available. Special chapters on bridge design include the aesthetics of bridges (blending into the environment, harmony of the internal design of the superstructure and substructure elements), experimental methods for testing bridges, the use of materials with special properties, the selection of disposition elements and equipment for typical bridges, bridges with special features and for large bridges, as well as an overview of the history of bridge building. In the context of bridge construction, the details of modern construction methods are presented (free cantilever erection, launching, prefabricated erection, erection in mobile scaffolding, erection with temporary supports), including the calculation of construction stages and sizing of temporary and permanent elements through all critical construction stages. Bridge management includes chapters on the use of bridges under special circumstances, scheduled and unscheduled inspections of bridges, the determination of the remaining load bearing capacity of existing bridges as well as maintenance and rehabilitation works.

Organisation and Management in Construction



Rehabilitation of the building of the elementary school Dr. Ivan Merz in Zagreb

Organisation and Management in Construction

The construction industry is a large and complex industry, strongly organized and currently facing digital transformation. A large capital investment, advanced construction technologies and information systems demand a highly skilled workforce. Construction management programme is designed for anyone who wants to effectively manage construction projects of different complexity and size. The study program is focused on the development of managerial, technical, and social skills of students, with the introduction of practical tools and current approaches in planning, managing, and monitoring of entire construction process.

Acquired knowledge and skills are applicable to the organization and management of projects. The backbone of programme includes comprehensive introduction to construction project management, international standards for project management, as well as techniques and tools for managing main objectives of projects. Special focus is placed on the entire life cycle of buildings, that includes all project stages from feasibility studies, design, construction, operation and maintenance, and removal of building. At the end of this study program, students will be able to apply skills in management, technology, and business to practical knowledge in a range of situations. Students will learn modern construction and project management techniques and gain a holistic understanding of the entire project lifecycle. You will develop new skills for managing Building information modelling (BIM) projects. Construction technology and innovative tools used during the construction phase of a project will be introduced. You will study alongside experienced peers and meet researchers and professionals who could help you to benefit from your obtained knowledge and skills in your career path.

Fire Engineering



SVEUČILIŠNI
SPECIJALISTIČKI
STUDIJ
POŽARNO
INŽENJERSTVO



Fire resistance testing of facades



Study trip of students and teachers, Austria, May 2018

Fire Engineering

Fire engineering is a multidisciplinary field that applies scientific and engineering principles to describe the effects of fires with the goal of reducing loss of life and property damage.

The objectives of fire engineering are:

- the development of scientific methods that lead to a more objective evaluation of the effects of fire on people and buildings in a given situation, thereby increasing the safety of people and buildings;
- the comparison of fire protection measures prescribed by existing codes with fire protection measures determined by fire engineering methods;
- the determination the limit of the so-called acceptable and realistic risk and, in this context, the economic efficiency of the applied measures.

In the compulsory and elective courses, students acquire specific knowledge in the areas of: thermodynamics of fire, fire modelling, fire performance of construction materials and elements, fire safety of structures, active fire protection systems, architectural and structural measures of fire protection, human behaviour in case of fire and fire safety regulations.

After graduation, students are trained for professions in the construction industry prescribed by the Building Act and the Fire Protection Act, such as: urban and architectural design according to fire protection conditions, preparation and revision of fire protection reports, design and implementation of adaptations and reconstructions of old buildings that do not meet the basic fire protection requirements, preparation of fire risk assessment, testing of materials for fire protection in buildings.

02

Earthquake Engineering



Participants and teachers of the university specialist study programme Earthquake Engineering at the invited lecture by prof. Arm Elnashi (April 2024)



Field work of the participants of the university specialist study on the construction site of Zagreb Cathedral (December 2023)

Earthquake Engineering

As a form of continuing professional education, i.e., lifelong learning, the postgraduate specialized study programme in earthquake engineering is primarily aimed at civil engineers and architects involved in the design and construction of earthquake-resistant buildings. The programme focuses on the application of new scientific knowledge on structural behaviour during earthquake and modern design standards for earthquake-resistant structures. The syllabus covers a comprehensive set of topics related to dynamics of structures, numerical analysis, techniques for strengthening existing structures, specifics of heritage buildings, methodology of earthquake risk assessment, testing of structures and materials, earthquakeresistant design of bridges, application of isolators and other devices for energy consumption, and use of modern materials.

Entry requirements: The study can be enrolled by persons who have a university graduate degree or equivalent international degree in the scientific field of technical sciences and have acquired a total of at least 60 ECTS credits from courses in the field of civil engineering, of which at least 15 ECTS credits are related to the courses of structural engineering. Exceptionally, a person who has completed a professional graduate programme may enrol in the university specialisation study programme after passing the additional examinations established by the university and having at least five years of professional experience in the field related to the studies.

Competencies: Upon completion of the programme, graduates will have theoretical and practical knowledge in the field of earthquake engineering applicable in the design, testing and construction of structures.

Duration of the study: 2 semesters

Academic title upon completion of the programme: University Specialist in Earthquake Engineering, spec. aedif. seism.

Information about the study:



Water Loss Management

03



— Water pumping station Kuncuva Greda in Split

Water Loss Management

One of the primary goals of sustainable water management in public water supply systems is to reduce water losses and maintain them at an acceptable level. Water losses occur in all water supply systems and vary considerably in amount. According to current data, average water losses in public water supply in Croatia amount to about 50% of the captured water quantities, while according to the World Bank, the situation is similar at the global level. The main goal of the study is to train students, primarily technical engineers, but also other staff, both public water utilities and interested individuals, as future professionals in water loss management, for independent analysis of water losses, planning and implementation of technical solutions to reduce and control water losses in water supply systems.

Entry requirements:

The study can be enrolled by persons who have completed a Master's degree or an integrated Bachelor's and Master's degree in technical sciences. Exceptionally, a person who has completed a professional graduate programme may enrol in the university specialisation study programme after passing the additional examinations established by the university and having at least five years of professional experience in the field related to the studies.

Competencies:

Upon completion of the studies, a number of general and specific competencies are acquired for detecting and controlling water losses, developing and implementing technical solutions for water loss control, creating hydraulic mathematical models, and other pertinent skills required for water loss management.

Duration of the study:

2 semesters

Information about the study:



Academic title upon completion of the programme:

Specialist in water loss management, spec. aq. dam.



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