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**Građevinski i arhitektonski fakultet Osijek**
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**Faculty of Civil Engineering and Architecture Osijek**

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# Josip Juraj Strossmayer University of Osijek
# Faculty of Civil Engineering and Architecture Osijek

# UNIVERSITY UNDERGRADUATE STUDY OF CIVIL ENGINEERING

## EXTRACT FROM THE STUDY PROGRAMME PROPOSAL

(this study programme will replace the existing study programme
of the Undergraduate University Study of Civil Engineering)

Osijek, April 2022

# 1. INTRODUCTION

The Faculty of Civil Engineering and Architecture Osijek (hereinafter: GRAFOS) was founded 1976 and has been educating civil engineers ever since. So far, 1,557 bachelors of civil engineering (B.C.E.s), 942 bachelors of science in civil engineering (B.S.C.E.s), 1,444 masters of civil engineering (M.S.C.E.s), 127 professional specialist civil engineers and 31 doctors of technical sciences have graduated from GRAFOS. This great experience in the implementation of study programmes is reflected in the fact that GRAFOS delivers several study programmes at all levels of study. By educating students and conducting scientific research in the field of civil engineering, architecture and urban planning, GRAFOS makes a great contribution to the development of the city of Osijek, Slavonia and Baranja and the Republic of Croatia.
Based on our own research and the latest achievements in the field of civil engineering, basic technical and natural sciences, this study programme has been developed with the aim of making our students competitive in the European and world market.
The proposed University undergraduate Study Programme in Civil Engineering is compatible with similar study programmes of leading higher education institutions. The emphasis in the programme is on practical engineering skills that should ensure students' competitiveness in the labour market.

## 1.1. Data on the higher education institution

**Name of higher education institution:** Josip Juraj Strossmayer University of Osijek, Faculty of Civil Engineering and Architecture Osijek

**Address of higher education institution:** Ulica Vladimira Preloga 3, 31 000 Osijek

**Phone number:** +385 31 540 070

**E-mail**: dekan@gfos.hr
**Website**: http://www.gfos.unios.hr

The Faculty of Civil Engineering and Architecture Osijek provides education in the field of technical sciences.

The following studies are performed in the field of Civil Engineering:
- University undergraduate study of Civil Engineering
- University graduate study of Civil Engineering, with specializations in:
    - Load-Bearing Structures
    - Hydraulic Engineering
    - Construction Management and Technology
    - Transportation Infrastructure
- Professional undergraduate study of Civil Engineering (full-time and part-time)
- Professional graduate study of Civil Engineering – specializations in Construction Management, Supervision and Maintenance of Buildings
- Doctoral study of Civil Engineering
- University specialist study of Civil Engineering

The following study is performed in the field of Architecture and Urban Planning:
- University undergraduate Study of Architecture and Urban Planning

## 2. GENERAL INFORMATION ON THE STUDY PROGRAMME

### 2.1 Name of the study
University undergraduate Study of Civil Engineering

### 2.2. Institution providing/delivering the study

Josip Juraj Strossmayer University of Osijek, Faculty of Civil Engineering and Architecture Osijek

### 2.3. Type of study programme

University undergraduate study

### 2.4. Level

6 – university undergraduate study
Level 6 of the Croatian Qualifications Framework

### 2.5. Scientific area

2 - technical sciences

### 2.6. Scientific field

2.05 - civil engineering

### 2.7. Scientific branch

2.05.02 load-bearing structures
2.05.03 hydraulic engineering
2.05.04 transportation infrastructure
2.05.05 organization and construction technology

### 2.8. Admission criteria

Students can enrol within the admission quota determined by the Faculty Council with the approval of the University Senate. Enrolment is carried out on the basis of a public competition published by the University Senate in accordance with the Statute of the University.
Persons who have completed secondary education lasting at least four years and passed the State Matura exams have the right to be funded by the Ministry of Science and Education.

### 2.9. Duration of the study in semesters

The university undergraduate study lasts three years (six semesters), during which the candidate must earn a minimum of 180 ECTS credits.

### 2.10. Total number of ECTS

The minimum number of ECTS credits is 180.

## 2.11. Academic title obtained upon completion of the study

Upon completion of the university undergraduate study of civil engineering, students acquire the academic title of university bachelor of civil engineering.

## 2.12. Language of instruction

The study programme is delivered in Croatian.

## 2.13. Compatibility of the study programme with the strategic goals of GRAFOS

An important part of the Development Strategy of the Faculty of Civil Engineering and Architecture Osijek, in accordance with which this document was drafted, are the Mission and Vision.

**Mission**

The mission of the Faculty of Civil Engineering and Architecture is to contribute to society by advancing knowledge through educating students in undergraduate, graduate and postgraduate studies, and performing scientific and technological research in the field of Civil Engineering. By respecting basic values such as ethics, transparency, affirmative competition, cooperation and communication, the Faculty strives to develop creative abilities and competences in all members of its community, to enable them to work wisely and efficiently, with the goal of furthering the community's overall progress and establishing the Faculty as a desirable place to study in regional, national and European terms. To this end, the Faculty continually takes into account the ever-increasing need for learning and knowledge, and strives to ensure that its vision, organisation, services, monitoring and quality improvement make it a centre of excellence in the fields of education, research and professional work in Civil Engineering.

**Vision**

The Faculty of Civil Engineering and Architecture will continuously align itself with its mission and direct its development towards the formation of an educational and scientific research centre of excellence in the field of Civil Engineering. To this end, the task of the Faculty is to become the leading centre of higher education in Civil Engineering in Eastern Croatia at both the university and professional training levels. It will provide its clients with high quality services in higher education, based on gathering, processing and applying data on learning outcomes, ensuring and developing opportunities for lifelong learning, and encouraging active participation in the European higher education area. It will also strive to the highest degree possible to link the education process with scientific research work and the economic sector, by being actively involved in scientific and technological projects and cooperating with other educational institutions, departments, and experts in practice.

The strategic goals are aligned with the content of the Mission and Vision. The study programme is fully in line with these documents and objectives and with the Development Strategy (contributing to society by improving knowledge through student education, permanently taking into account the growing need for learning and knowledge; becoming a leading centre of higher education in the field of civil engineering).

## 2.14. Competences and qualifications of students upon completion of the study

Upon completion of the university undergraduate study of civil engineering, university bachelors of civil engineering are trained to do the following:

- Identify and describe simpler professional civil engineering problems.
- Calculate and dimension buildings that are not subject to technical control and control of mechanical and technical stability.
- Participate in the planning, design, supervision and maintenance of more complex buildings.
- Participate in the process of construction of buildings in accordance with applicable regulations.
- Prepare, conduct and demonstrate a physical and numerical experiment.
- Know and implement the rules of engineering regulations.

- Understand and anticipate the impact of civil engineering projects on society and the environment.
- Understand and share information on construction problems for further acquisition of knowledge.

## 2.15. Mechanism for ensuring vertical mobility of students in the national and international higher education area

The current configuration of study programmes (Figure 1) was created on the one hand by transforming and adapting the existing programmes that were delivered before the adoption of programmes in line with the Bologna Declaration, and on the other, by modelling them on the basis of similar programmes of leading European universities. During the development of study programmes and curriculum implementation plans, the Faculty participated in the TEMPUS project "Restructuring and Updating of Civil Engineering Curriculum, TEMPUS JEP No. 17062-2002" in which all 4 faculties of civil engineering in Croatia and an international consortium of 10 European faculties worked together.

This cooperation, as well as active participation in the discussion on the progress of adjustment of technical study curriculums in the Republic of Croatia organized by the Ministry of Science, Education and Sports (November 2004) led to the harmonization of proposals for civil engineering study programmes in Croatia.

In the continuation of these activities, the Faculty of Civil Engineering and Architecture Osijek was the coordinator of the project "Development and application of the Croatian Qualifications Framework in the field of higher education of civil engineers". The project partners were all faculties of civil engineering in Croatia: Faculty of Civil Engineering, University of Zagreb, Faculty of Civil Engineering, University of Rijeka and Faculty of Civil Engineering, Architecture and Geodesy, University of Split. The project was implemented within the Operational Programme Human Resources Development 2007-2013, priority 3: Improvement of human capital in education, research and development, and lasted from 19 June 2015 to 30 September 2016 (15 months). In addition to harmonizing civil engineering studies with new needs and qualification standards to achieve a socially acceptable level of knowledge, an important goal of the project was to harmonize study programmes at the national level, to ensure vertical and horizontal mobility and competitiveness of students between these four faculties, but also to harmonize the programme with related studies in Europe.

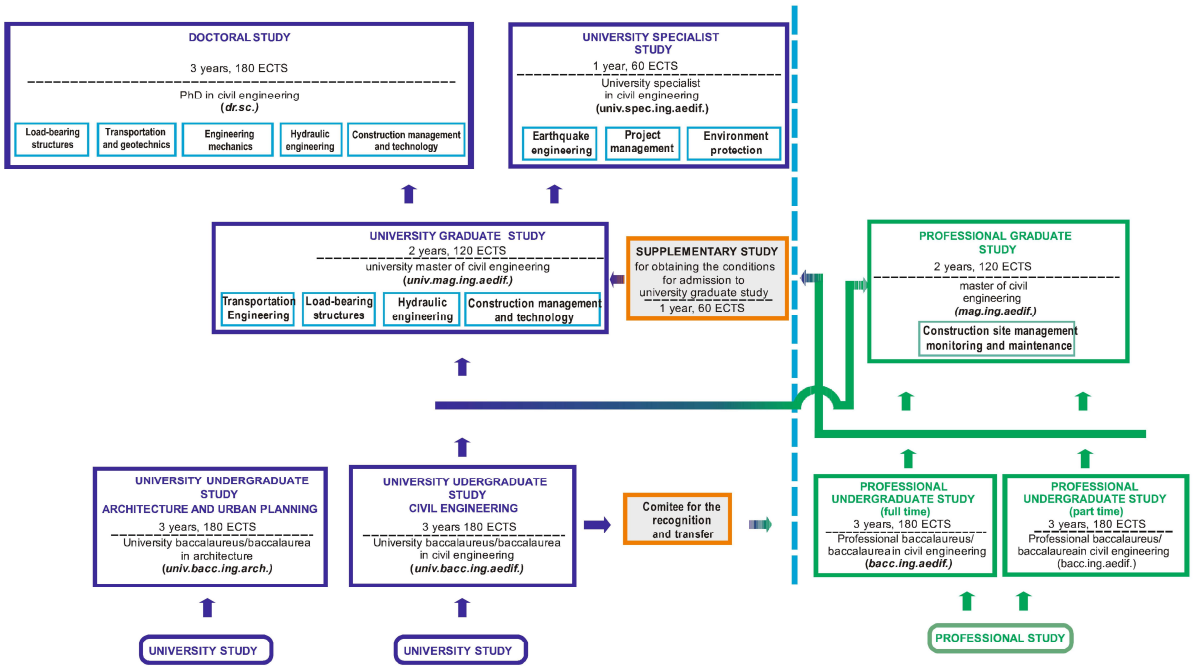


**Figure 1.** Overview of types of study and study programmes at GRAFOS

## 3. DESCRIPTION OF THE STUDY PROGRAMME

### 3.1. Learning outcomes of the programme and the CroQF level

| LO label | Description of learning outcomes – level 6<br>University undergraduate Study of Civil Engineering |
|---|---|
| LO1 | Master theoretical knowledge in basic technical sciences required to resolve engineering issues. |
| LO2 | Recognize and calculate less complex engineering constructions. |
| LO3 | Understand methods of calculating engineering constructions. |
| LO4 | Participate in the production of technical documents of all types and levels. |
| LO5 | Prepare and conduct simple experiments and analyse the results. |
| LO6 | Master basic building regulations. |
| LO7 | Understand the elements of spatial planning documents. |
| LO8 | Analyse and monitor construction costs. |
| LO9 | Understand and analyse the effects of construction on the environment. |
| LO10 | Understand and exchange information in the professional field. |
| LO11 | Participate in the process of erecting and maintaining buildings. |
| LO12 | Use a foreign language in professional communication. |
| LO13 | Apply methods of health protection and preservation of sports culture. |

Linking the learning outcomes of courses with the learning outcomes of the study programme

| COURSE | COURSE LOs | LEARNING OUTCOMES OF THE STUDY PROGRAMME | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 | LO9 | LO10 | LO11 | LO12 | LO13 |
| Mathematics I | 1 | + | | | | | | | | | | | | |
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| | 5 | + | + | + | | | | | | | | | | |
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| Structural Geometry | 1 | + | | | | | | | | | | | + | |
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| Physics | 1 | + | | | | | | | | | | | | |
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| **Basics of Construction Informatics I** | 1 | | | | + | | | | | | + | | | |
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| **Introduction to Building** | 1 | | | | | | | | | + | + | | | |
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| **Geodesy** | 1 | | | | + | | | + | + | + | + | + | + | |
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| **Introduction to Geology** | 1 | | + | | | + | | + | | + | + | | | |
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| **Physical Education I** | 1 | | | | | | | | | | | | | + |
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| **English Language I** | 1 | | | | | | | | | | | | + | |
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| **German Language I** | 1 | | | | | | | | | | | | + | |
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| **Mathematics II** | 1 | | | + | | | | | | | | | | |

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| **Elements of Building Construction** | 1 | | + | | + | | | | | | + | + | | |
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| **Materials Science** | 1 | | | | | | | | | | | | | |
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| **Basics of Construction Informatics II** | 1 | | + | + | + | | | | | | | | | |
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| **Energy in Building Design** | 1 | | | | + | | | | | + | | | | |
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| **Construction Regulations** | 1 | | | | + | | + | | | | + | + | | |
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| **Physical Education II** | 1 | | | | | | | | | | | | | + |
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| **Probability and Statistics** | 1 | | | | | + | | | | | | | | |
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| **Building Statics I** | 1 | | + | + | | | | | | | | | | |
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| **Mechanics II** | 1 | | | | | | | | | | | | | |
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| **Strength of Materials I** | 1 | | | | | | | | | | + | | | |
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| **Hydrology I** | 1 | | | + | | | | | | + | + | | + | |
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| **Construction Materials** | 1 | | | | | | | | | | | | | |
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| **Building Statics II** | 1 | | + | + | | | | | | | | | | |
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| **Soil Mechanics** | 1 | | + | + | + | | + | | | | + | + | | |
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| **Fluid Mechanics** | 1 | | | | | | | | | | + | | | |
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| **Introduction to Structural Engineering** | 1 | | | + | | | | | | | | | | |
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| **Urban Planning and Design** | 1 | | | | | | + | + | | + | + | | | |
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| **Field Instruction** | 1 | | | | | | + | | | | + | | | |
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| **English Language III** | 1 | | | | | | | | | | | | + | |
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| **German Language III** | 1 | | | | | | | | | | | | + | |
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| **Introduction to Timber Structures** | 1 | | | | + | | | | | | | | | |
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| **Introduction to Steel Structures** | 1 | | | | | | | | | | + | | | |
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| **Water Supply and Sewage Systems I** | 1 | | + | + | | | | | | | + | | | |
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| **Geotechnical Engineering** | 2 | | + | + | | | + | | | | + | | | |
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| | 7 | | + | + | | | | | | | + | | | |
| | 8 | | + | + | | | | | | | + | + | | |
| **Building Technology I** | 1 | | | | + | | + | | + | + | + | + | | |
| | 2 | | + | + | | | | + | + | | + | + | | |
| | 3 | | | | + | | + | | + | + | + | | | |
| | 4 | | + | | + | | | | + | | + | + | | |
| | 5 | | + | | + | | + | | + | + | + | + | | |
| | 6 | | | | + | | | | + | | + | + | | |
| | 7 | | | | + | | | | + | | + | | | |
| **Introduction to Concrete Structures** | 1 | | | | | | | | | + | + | | + | |
| | 2 | | | | | | | | | | + | | + | |
| | 3 | | | | | | | | + | | + | | + | |
| | 4 | | | | | | | | + | | + | | + | |
| | 5 | | | | | | | | + | | + | + | + | |
| **Construction Management I** | 1 | | | | + | | + | + | | | + | + | + | |
| | 2 | | | | + | | + | | + | | + | + | | |
| | 3 | | + | | + | | + | | + | | + | + | | |
| | 4 | | + | | + | | + | | + | | + | + | | |
| | 5 | | | | + | | + | + | + | | + | + | | |
| | 6 | | | | + | | + | + | + | | + | + | | |
| **Student Internship** | 1 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 2 | | | | + | | + | | | + | + | + | | |
| | 3 | | + | | + | + | + | | | + | + | + | | |
| | 4 | | + | | + | + | + | | | + | + | + | | |
| | 5 | | + | | + | + | | | | + | + | + | | |
| | 6 | | | | | | | | | | | | | |
| **Bachelor's Thesis** | 1 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 2 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 3 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 4 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 5 | | + | + | + | + | + | + | + | + | + | + | + | |
| | 6 | | + | + | + | + | + | + | + | + | + | + | + | |
| **Introduction to Masonry Structures** | 1 | | | | | | | | | + | + | | | |
| | 2 | | | | | + | | | | | + | | | |
| | 3 | | | + | | + | | | | | + | + | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | | + | + | | + | | | | | + | + | | |
| | 5 | | | | | | | | | | + | + | | |
| **Project Workshop** | 1 | | | | + | | | | | | | | | |
| | 2 | | | + | | | + | | | | | | | |
| | 3 | | | + | | | + | | | | | | | |
| | 4 | | + | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | | |
| **Engineering Economics** | 1 | | | | | | + | | | | + | + | | |
| | 2 | | | | | | | | + | | + | + | | |
| | 3 | | | | | | | | + | | + | | | |
| | 4 | | | | + | | | | + | | | + | | |
| | 5 | | | | + | | | | + | | | | | |
| | 6 | | | | + | | | | + | | + | + | | |
| | 7 | | | | + | | | | + | | + | | | |
| | 8 | | | | | | | | + | | + | + | | |
| **Construction Business in the Digital Environment** | 1 | | | | + | | + | | | | + | + | + | |
| | 2 | | | | + | | + | | | | + | | + | |
| | 3 | | | | + | | + | | | | + | + | + | |
| **Introduction to Hydraulic Engineering** | 1 | | | | | | | | | + | + | | | |
| | 2 | | | | + | | + | | | + | + | | | |
| | 3 | | | + | | + | | | | | + | | | |
| | 4 | | | + | | + | | | | | + | | | |
| | 5 | | + | + | | | | | | | + | | | |
| | 6 | | | + | | | | | | | + | | | |
| **Water Protection** | 1 | | | | | | + | | | + | + | | | |
| | 2 | | | | | | + | | | + | + | | | |
| | 3 | | | | | | + | | | + | + | | | |
| | 4 | | + | | | | | | | + | + | | | |
| | 5 | | + | + | | | | | | + | + | | | |
| **Road Infrastructure** | 1 | | + | | | | | | | | + | | + | |
| | 2 | | + | + | + | | | | | | + | | + | |
| | 3 | | + | + | + | | + | | | | + | + | | |
| | 4 | | | | + | | + | | | | + | + | | |
| **Laboratory Soil Testing** | 1 | | | | + | + | + | | | + | + | + | | |
| | 2 | | | | + | + | + | | | | + | | | |
| | 3 | | | | + | + | | | | + | + | + | | |
| | 4 | | | | + | + | | | | + | + | | | |
| | 5 | | | | + | + | + | | | + | + | | | |
| **Professional Ethics, Sociology of** | 1 | | | | + | | | | | | + | + | | |
| | 2 | | | | + | | + | | | | + | + | | |
| | 3 | | | | + | | | | | | + | + | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Work and Organizational Psychology** | 4 | | | | + | | | | | | | + | | |
| | 5 | | | | + | | | | | | + | + | | |
| | 6 | | | | | | | | | | + | + | | |
| **Procedures and Methods for Building Condition Assessment** | 1 | | | | + | | + | | | | + | | + | |
| | 2 | | | | + | | | | | | + | | | |
| | 3 | | | | + | | | | | | + | | | |
| | 4 | | | | + | | | | | | + | | + | |
| | 5 | | | | + | | | + | | | + | + | | |
| **Introduction to Railways** | 1 | | | + | + | | + | | | | + | | + | |
| | 2 | | + | + | + | | + | | | | + | | + | |
| | 3 | | | | + | | + | | | + | + | + | + | |
| | 4 | | + | | + | | + | | | | + | | + | |
| **Introduction to Geotechnical Design** | 1 | | + | + | + | | + | | | + | + | | | |
| | 2 | | + | + | + | | + | | | | + | | | |
| | 3 | | + | + | + | | + | | | + | | | | |
| | 4 | | + | + | | | + | | | | + | | | |
| | 5 | | + | | + | | | | | + | | | | |
| | 6 | | + | + | + | | + | | | | + | | | |
| | 7 | | + | + | + | | + | | | + | + | | | |
| **Concrete Technology** | 1 | | | | | | | | | | | | | |
| | 2 | | | | | + | | | | | | | | |
| | 3 | | | | | + | + | | | | + | | | |
| | 4 | | | | + | | | | | | + | | | |
| | 5 | | | | | | | | | | | | | |
| **Hydraulic Engineering Practicum** | 1 | | | | | + | | | | | + | | | |
| | 2 | | | | | + | | | | | + | | | |
| | 3 | | | | | + | | | | | + | | | |
| **Waste Management** | 1 | | | + | | | + | + | | + | + | | | |
| | 2 | | | | | | + | + | | + | | | | |
| | 3 | | | | | + | | + | | + | + | | | |
| | 4 | | | | | + | | | | + | | | | |
| | 5 | | | + | | + | + | | | + | + | | | |
| **Building Installations** | 1 | | + | + | + | | + | | + | + | | | | |
| | 2 | | + | | + | | | | + | + | + | | | |
| | 3 | | + | + | + | | + | | + | | | | | |
| | 4 | | + | + | + | | | | | + | + | | | |
| **English Language IV** | 1 | | | | | | | | | | | | + | |
| | 2 | | | | | | | | | | | | + | |
| | 3 | | | | | | | | | | | | + | |
| | 4 | | | | | | | | | | | | + | |
| | 1 | | | | | | | | | | | | + | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **German Language IV** | 2 | | | | | | | | | | | | + | |
| | 3 | | | | | | | | | | | | + | |
| | 4 | | | | | | | | | | | | + | |
| | 5 | | | | | | | | | | | | + | |
| **Computer Programming in Civil Engineering** | 1 | | + | + | | | | | | | + | | | |
| | 2 | | + | + | | | | | | | | | | |
| | 3 | | + | + | | | | | | | | | | |
| | 4 | | + | + | | | | | | | | | | |
| | 5 | | + | + | | | | | | | | | | |
| | 6 | | + | + | | | | | | | | | | |
| | 7 | | + | + | | | | | | | + | | | |
| **TOTAL** | | 203 | 127 | 130 | 128 | 60 | 83 | 37 | 39 | 75 | 183 | 73 | 75 | 9 |

### 3.2. List of core and elective courses with the number of contact hours and ECTS credits

The required number of ECTS credits during the studies is 180 (30 ECTS credits per semester; additionally acquired credits are registered in the diploma supplement).

**Table 1** List of courses by semesters

| LIST OF COURSES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 1 | | | | | | | |
| Semester: I | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Mathematics I | | 45 | 45 | 0 | 7 | C |
| | Structural Geometry | | 30 | 45 | 0 | 5 | C |
| | Physics | | 30 | 30 | 0 | 5 | C |
| | Basics of Construction Informatics I | | 15 | 10 | 5 | 2 | C |
| | Introduction to Building | | 30 | 0 | 0 | 2 | C |
| | Geodesy | | 30 | 30 | 0 | 4 | C |
| | Introduction to Geology | | 30 | 0 | 0 | 2 | C |
| | Physical Education I | | 0 | 30 | 0 | 1 | C |
| | Foreign language I (English language I/German language I) | | 15 | 15 | 0 | 2 | C |

| LIST OF COURSES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 1 | | | | | | | |
| Semester: II | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Mathematics II | | 30 | 30 | 0 | 5 | C |
| | Mechanics I | | 45 | 30 | 0 | 6 | C |
| | Elements of Building Construction | | 30 | 30 | 0 | 5 | C |
| | Materials Science | | 30 | 30 | 0 | 4 | C |
| | Basics of Construction Informatics II | | 15 | 15 | 0 | 2 | C |
| | Energy in Building Design | | 30 | 10 | 5 | 3 | C |
| | Construction Regulations | | 30 | 0 | 0 | 2 | C |
| | Physical Education II | | 0 | 30 | 0 | 1 | C |
| | Foreign Language II (English Language II/German Language II) | | 15 | 15 | 0 | 2 | C |

| LIST OF COURSES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 2 | | | | | | | |
| Semester: III | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Probability and Statistics | | 30 | 30 | 0 | 5 | C |
| | Building Statics I | | 45 | 25 | 5 | 6 | C |
| | Mechanics II | | 30 | 30 | 0 | 5 | C |
| | Strength of Materials I | | 45 | 30 | 0 | 6 | C |
| | Hydrology I | | 15 | 15 | 0 | 3 | C |
| | Construction Materials | | 30 | 30 | 0 | 5 | C |

| LIST OF COURSES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 2 | | | | | | | |
| Semester: IV | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Strength of Materials II | | 30 | 30 | 0 | 5 | C |
| | Building Statics II | | 30 | 25 | 5 | 5 | C |
| | Soil Mechanics | | 45 | 30 | 0 | 6 | C |
| | Fluid Mechanics | | 30 | 45 | 0 | 6 | C |
| | Introduction to Structural Engineering | | 30 | 20 | 10 | 4 | C |
| total core courses | | | | | | **26** | |
| ELECTIVE COURSE | Environmental Protection | | 20 | 0 | 10 | 2 | E |
| | Urban Planning and Design | | 15 | 30 | 0 | 3 | E |
| | Field Instruction | | 0 | 15 | 0 | 1 | E |
| | Foreign Language III (English III / German III) | | 15 | 15 | 0 | 2 | E |

| LIST OF COURSES | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: V | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Introduction to Timber Structures | | 30 | 25 | 5 | 5 | C |
| | Introduction to Steel Structures | | 30 | 20 | 10 | 5 | C |
| | Water Supply and Sewage Systems I | | 30 | 30 | 0 | 5 | C |
| | Roads | | 30 | 45 | 0 | 5 | C |
| | Geotechnical Engineering | | 30 | 30 | 0 | 5 | C |
| | Building Technology I | | 30 | 15 | 15 | 5 | C |

| LIST OF COURSES / CORE COURSES FOR ALL STUDENTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: VI | | | | | | | |
| | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Introduction to Concrete Structures | | 30 | 30 | 0 | 5 | C |
| | Construction Management 1 | | 30 | 45 | 0 | 5 | C |
| | Student Internship | | 15 | 90 | 0 | 4 | C |
| | Bachelor's Thesis | | 0 | 60 | 0 | 5 | C |
| total core courses | | | | | | **19** | |

| LIST OF COURSES IN THE LOAD-BEARING STRUCTURES (LBS) MODULE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: VI | | | | | | | |
| MODULE | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Introduction to Masonry Structures | | 30 | 15 | 0 | 4 | C |
| | Project Workshop | | 0 | 0 | 30 | 2 | C |
| | | | | | | | |
| total core courses of the module | | | | | | **6** | |
| ELECTIVE COURSE | Concrete Technology | | 30 | 15 | 0 | 4 | E |
| | Building Installations | | 20 | 15 | 10 | 3 | E |
| | Introduction to Geotechnical Design | | 15 | 30 | 0 | 3 | E |
| | Construction Business in the Digital Environment | | 15 | 30 | 0 | 3 | E |
| | Foreign Language IV (English Lang. IV/German Lang. IV) | | 15 | 15 | 0 | 2 | E |
| | Computer Programming in Civil Engineering | | 15 | 15 | 0 | 2 | E |
| total elective courses of the module | | | | | | **5** | |

| LIST OF COURSES IN THE CONSTRUCTION MANAGEMENT AND TECHNOLOGY MODULE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: VI | | | | | | | |
| MODULE | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Engineering Economics | | 30 | 0 | 30 | 5 | C |
| | Construction Business in the Digital Environment | | 15 | 30 | 0 | 3 | C |
| | | | | | | | |
| total core courses of the module | | | | | | **8** | |
| ELECTIVE COURSE | Professional Ethics, Sociology of Work and Organizational Psychology | | 15 | 15 | 0 | 3 | E |
| | Procedures and Methods for Building Condition Assessment | | 15 | 30 | 0 | 3 | E |
| | Introduction to Masonry Structures | | 30 | 15 | 0 | 4 | E |
| | Project Workshop | | 0 | 0 | 30 | 2 | E |
| | Concrete Technology | | 30 | 15 | 0 | 4 | E |
| | Hydraulic Engineering Practicum | | 0 | 30 | 0 | 2 | E |
| | Waste Management | | 30 | 15 | 0 | 3 | E |
| | Building Installations | | 20 | 15 | 10 | 3 | E |
| | Introduction to Hydraulic Engineering | | 15 | 20 | 10 | 3 | E |
| | Water Protection | | 30 | 15 | 0 | 3 | E |
| | Introduction to Railways | | 30 | 0 | 0 | 3 | E |
| | Introduction to Geotechnical Design | | 15 | 30 | 0 | 3 | E |
| | Road Infrastructure | | 15 | 15 | 0 | 3 | E |
| | Laboratory Soil Testing | | 15 | 30 | 0 | 3 | E |
| | Foreign Language IV (English Language IV/German Language IV) | | 15 | 15 | 0 | 2 | E |
| | Computer Programming in Civil Engineering | | 15 | 15 | 0 | 2 | E |
| total elective courses of the module | | | | | | **3** | |

| LIST OF COURSES IN THE HYDRAULIC ENGINEERING (HE) MODULE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: VI | | | | | | | |
| MODULE | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Introduction to Hydraulic Engineering | | 15 | 20 | 10 | 3 | C |
| | Water Protection | | 30 | 15 | 0 | 3 | C |
| total core courses of the module | | | | | | **6** | |
| ELECTIVE COURSE | Hydraulic Engineering Practicum | | 0 | 30 | 0 | 2 | E |
| | Waste Management | | 30 | 15 | 0 | 3 | E |
| | Building Installations | | 20 | 15 | 10 | 3 | E |
| | Laboratory Soil Testing | | 15 | 30 | 0 | 3 | E |
| total elective courses of the module | | | | | | **5** | |

| LIST OF COURSES IN THE TRANSPORTATION INFRASTRUCTURE (TI) MODULE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Year of study: 3 | | | | | | | |
| Semester: VI | | | | | | | |
| MODULE | COURSE | LECTURER | L | E | S | ECTS | STATUS |
| CORE COURSE | Road Infrastructure | | 15 | 15 | 0 | 3 | C |
| | Laboratory Soil Testing | | 15 | 30 | 0 | 3 | C |
| total core courses of the module | | | | | | **6** | |
| ELECTIVE COURSE | Introduction to Railways** | | 30 | 0 | 0 | 3 | E |
| | Introduction to Geotechnical Design** | | 15 | 30 | 0 | 3 | E |
| | Concrete Technology | | 30 | 15 | 0 | 4 | E |
| | Professional Ethics, Sociology of Work and Organizational Psychology | | 15 | 15 | 0 | 3 | E |
| | Construction Business in the Digital Environment | | 15 | 30 | 0 | 3 | E |
| | Procedures and Methods for Building Condition Assessment | | 15 | 30 | 0 | 3 | E |
| | Hydraulic Engineering Practicum | | 0 | 30 | 0 | 2 | E |
| | Waste Management | | 30 | 15 | 0 | 3 | E |
| | Building Installations | | 20 | 15 | 10 | 3 | E |
| | Foreign Language IV (English Language IV/German Language IV) | | 15 | 15 | 0 | 2 | E |
| | Computer Programming in Civil Engineering | | 15 | 15 | 0 | 2 | E |
| total elective courses of the module | | | | | | **5** | |

N.B.: Core courses are marked as C and electives as E.
Preconditions for the Roads module – select at least 1 elective course of the Roads module /marked **/

### 4.2.1. Description of core and elective courses

| **General information** | | |
|---|---|---|
| Lecturer | Full Prof. Ivan Matić,P M.Sc. (Math.) | |
| Course title | Mathematics I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year / 1st semester | |
| ECTS value and type of instruction | ECTS | 7 |
| | Contact hours (L+E+S) | 45+30+0 |

| **1. 1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| Preparation for the upcoming courses, learning about the basic properties of real numbers, functions of one variable and applying function flow, vectors and matrices to practical problems in everyday life. | | |
| *1. 2. Course enrolment requirements* | | |
| Mastery of high school level mathematics. | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. Examine the basic properties of functions.<br>2. Analyze the convergence of sequences.<br>3. Apply the knowledge of function derivatives to examine the function flow.<br>4. Sketch a graph of a real function of a real variable.<br>5. Sketch vectors given in orthonormal basis in space and determine their scalar, vector and mixed product.<br>6. Determine the number of solutions of a system of linear equations using matrices. | | |
| *1. 4. Course content (syllabus)* | | |
| Set of real numbers. Important subsets of real numbers. The concept of function and basic properties of functions. Sequences of real numbers and limits of sequences of real numbers. Real functions of real variables and their basic properties. Limits and continuity of function. Asymptotes of functions. The basic concept of derivation. Elementary functions, derivatives of elementary functions and derivative rules. Local extremes.<br>Fundamental theorems of the differential calculus. Application of differential calculus to determine local extrema, monotonicity intervals and to examine the function flow.<br>The basic concept of vectors. Plane and space vectors, orthonormal basis. Scalar product, vector product and mixed product.<br>Matrices and matrix operations. Definition and properties of determinants. Regular and singular matrices. Matrix rank.<br>Systems of linear equations. Kronecker-Capelli theorem and Gaussian elimination method. | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
| *1. 6. Comments* | | |
| *1. 7. Student requirements* | | |
| Class attendance, taking revision tests. | | |

| *1. 8. Student performance evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | 1.5 | Oral exam | 1.5 | Essay | | Research | |
| Project | | Continuous assessment | 2.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

| *1. 9. Assessment of student work during classes and at the final exam* | |
|---|---|
| *During classes:*<br>< 40 points = written and oral exam<br>40-100 points = oral exam | *On the exam:*<br>*Written exam: 40% passing grade*<br>*Oral exam:*<br>40-54% = sufficient (2)<br>55-69% = good (3)<br>70-84% = very good (4)<br>85-100% = excellent (5) |

| *1. 10. Required reading (as on submission of the study programme proposal)* |
|---|
| *D. Jukić, R. Scitovski: Matematika 1, Osijek, 2000. (http://www.mathos.unios.hr/~jukicd/ )* |

| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
|---|
| B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1986<br>J. Stewart: Calculus, Brooks/Cole, New York, 2011. |

| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
|---|
| Revision tests. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises. | Attending classes, taking revision tests, written and oral part of the exam. | 1, 2, 3, 4, 5, 6 | Written and oral examination. |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Ivan Matić, M.Sc. (Math.)<br>Assoc. Prof. Malić Brankica, M.Sc. (Geod.) | |
| Course title | Structural Geometry | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year / 1st semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30 + 45 + 0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

- Developing spatial perception skills.
- Training students to draw geometric shapes.
- Training students to make independent conclusions about the position and size of objects in space from drawings.
- Mastering practical knowledge of terrain and road representation by drawing.
- Introduction to the elements of technical drawing.
- Mastering and use the AutoCAD - 2D drawing software package.

*1. 2. Course enrolment requirements*

**None**

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Determine spatial and metric relations of geometric shapes and discuss them.
2. Present a regular geometric shape in orthogonal and oblique projections.
3. Apply oblique projection methods on a timber joint.
4. Solve the road and the intersection.
5. Use the AutoCAD software programme.
6. Apply the acquired knowledge in technical drawing.

*1. 4. Course content (syllabus)*

Basic geometric constructions. Monge's method of projections: point, line, plane and their relationships. Spatial relationships; parallelism and orthogonality; metrics. Side view and isometric view. Plane rotation and application of affinities between the floor plan (or draft) and the rotated position of the 2-dimensional objects. Projections of 3-dimensional objects. Plane cross-sections. Methods of oblique projections. Basics of dimensioning and projection. Methods of contouring.
Technical drawing assignment. Drawing accessories, paper formats, folding up sheets. Computer graphics – Auto CAD – 2D programme. Drawing settings (units, coordinate types, layers, grid points, thicknesses and types of lines). Drawing of basic graphical elements. Hatching. Object editing and duplication. Complex objects. Dimensioning.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☒ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Requirements for obtaining the lecturer's signature for the course:
- compulsory class attendance, both lectures and exercises (minimum 70%);
- completing 3 programmes;
- completing 3 homework assignments;
- independent drawing and solving tasks in AutoCAD.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | (2) | Essay | | Research | |
| Project | | Continuous assessment | 2 | Report | | Practical work | 0.5 |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Criteria for exemption from the final exam:
- passing 3 revision tests (80 points) and points earned during exercises (completing 3 programmes/homework assignments; 20 points);
- revision tests are taken in the 6th or 7th and 14th or 15th week of lectures (maximum 80 points)

Points distribution:
*Structural Geometry*
- 1st revision test – 20 points
- 2nd revision test – 40 points
- programmes/homework assignments – 20 points

*AutoCAD*
- 3rd revision test – drawing using a template in AutoCAD – 20 points

Exemption from the final exam: minimum 50 points.
Oral exam (Construction geometry, technical drawing, or both)
- unrealized material / Construction geometry
- 3rd revision test – drawing using a template in AutoCAD

Grading scale:
- sufficient (2): 50-65 points
- good (3): 66-79 points
- very good (4): 80-89 points
- excellent (5): 90-100 points

*1. 10. Required reading (as on submission of the study programme proposal)*

Stipančić-Klaić, Ivanka (2021): Konstrukcijska geometrija, Osijek, Građevinski i arhitektonski fakultet Sveučilišta Josipa Jurja Strossmayera u Osijeku (in preparation)
Jurkin, Ema; Szirovicza, Vlasta (2005): Deskriptivna geometrija, CD -ROM, HDKGIKG, Zagreb
Babić, Ivanka; Gorjanc, Sonja; Slijepčević, Ana; Szirovicza, Vlasta (2007): Nacrtna geometrija, HDKGIKG, Zagreb
Ištoka Otković, Irena; Koški, Željko; Zagvozda, Martina (2015): Tehničko crtanje s primjenom AutoCAD-a, Osijek, Građevinski fakultet Sveučilišta Josipa Jurja Strossmayera u Osijeku

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Horvatić-Baldasar, Ksenija, Babić, Ivanka, (2007): Nacrtna geometrija SAND d.o.o., Zagreb
Niče, Vilko: Deskriptivna geometrija, Školska knjiga, Zagreb 1992.
www.hdgg.hr (e-textbook in preparation)
Karakašić, Mirko; Kljajin, Milan; Ivandić, Željko; Glavaš, Hrvoje (2019): Modeliranje poduprijeto računalom, Slavonski Brod, Strojarski fakultet u Slavonskom Brodu

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

During the semester, for the purpose of continuous assessment of knowledge, students take three revision tests, and the tasks are completed individually during exercises. Exemption from the final exam is possible if students take revision tests, complete programmes, and do homework assignments.
Students who have not obtained the required number of points take the oral exam.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures (structural geometry) | - class attendance;<br>- active class participation;<br>- developing spatial view;<br>- discussing spatial and metric relations in space. | 1, 2, 3, 4 | - attendance sheets;<br>- continuous assessment (quiz)<br>- two revision tests;<br>- final exam. |
| Exercises (structural geometry) | - class attendance;<br>- application of construction methods;<br>- determining spatial and metric properties of a geometric shape from projections. | 2, 3, 4 | - checking attendance;<br>- homework assignments or programmes. |
| Exercises (technical drawing) | - class attendance;<br>- active drawing in a computer programme. | 5, 6 | - checking attendance;<br>- control exercise;<br>- revision test. |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Dario Hrupec | |
| Course title | Physics | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 1st year/1st semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+30+0 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Adopt basic terms and concepts in the field of kinematics, dynamics, fluid mechanics, thermodynamics, vibration, waves, and optics.

*1.2. Course enrolment requirements*

Competences in physics and mathematics acquired at previous levels of education.

*1.3. Expected learning outcomes*

1. Interpret physics as a natural science and explain its application in technical fields.
2. Define basic terms and concepts in the field of kinematics, dynamics, fluid mechanics, thermodynamics, vibration, waves, and optics.
3. Define physical quantities and units of measurement.
4. Interpret the interdependencies of physical quantities and graphical representations of these dependencies.
5. Interpret the laws of conservation of energy, momentum and angular momentum.
6. Describe and interpret the conditions of static equilibrium of a rigid body.
7. Describe and interpret the phenomenon of resonance.
8. Describe and interpret heat transfer.
9. Apply definitions of physical quantities and physical laws to solve specific problems in physics.

*1.4. Course content (syllabus)*

- Introduction. What is science. What is physics.
- Physical quantities and units of measurement. Vectors.
- Kinematics. Displacement and path. Speed. Acceleration.
- Force. Newton's laws of motion.
- Newton’s law of universal gravitation.
- Work, energy and power. Conservation of energy.
- Momentum. Collisions.
- Torque. Static equilibrium of a rigid body.
- Angular velocity and angular acceleration. Rotation of rigid bodies.
- An analogy between translational and rotational quantities.
- Moment of inertia. Rotational dynamics of a rigid body.
- Vibration: free, muffled, forced. Resonance.
- Hooke's Law and elastic properties of materials.
- Static fluid pressure. Archimedes' principle. Bernoulli's theorem.
- Temperature and heat. Heat transfer.
- State equation of gas. Specific heat and latent heat.
- Laws of thermodynamics.
- Harmonic waves. Mathematical description of waves. Standing waves.
- Interference and diffraction of waves. Doppler effect.
- Reflection and refraction of light. Basic laws geometrical optics. Mirrors and lenses.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other_____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Class attendance.
Taking a revision test or a written exam.
Taking an oral exam.

*1.8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | (1.5) | Oral exam | 1.5 | Essay | | Research | |
| Project | | Continuous assessment | 1.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

Two revision tests or the written exam: up to 40% of the grade.
Oral exam: up to 60% of the grade.

*1.10. Required reading (as on submission of the study programme proposal)*

Marko Pinterić, Uvod u fiziku s riješenim zadatcima, Element, 2019.

*1.11. Recommended reading (as on submission of the study programme proposal)*

John D. Cutnell, Kenneth W. Johnson, David Young, Shane Stadler, Physics, 12th Edition, Wiley, 2021.

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Student survey

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises. | Attending classes, taking revision tests, written and oral part of the exam. | 1, 2, 3, 4, 5, 6, 7, 8 | Written and oral examination. |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Tihomir Dokšanović | |
| Course title | Basics of Construction Informatics I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/1st semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 15+10+5 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Learning the principles of working on a computer in performing office and other daily tasks during and after studies. Acquire the skill of working with the basic office software package MS Office (or similar), and its modules such as the word processor, spreadsheets and presentations.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Define the purpose and application of standard office tools (word processors, spreadsheets).
2. Create text files and apply different types of formatting, create content and other lists in the document, and use review tools.
3. Create a table file and apply cell formatting, simple aggregate functions and conditional formatting.
4. Create a presentation file and apply different templates, format individual slides and define different animations on elements and transitions between slides.

*1. 4. Course content (syllabus)*

Introduction to the course. Basics of digital records and working with them. Introduction to office programmes with an overview of basic functionalities and example solutions. Basic work with MS Word – word processing, making tables, reviews. Basic work with the MS PowerPoint – designing and creating charts using basic functions. Basic work with MS Excel – use of complex functions. Repetition and preparation with reviewing of the course content.

| *1. 5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☒ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance, active class participation and preparation of a seminar paper.

*1. 8. Student performance evaluation*

| Class attendance | 1.0 | Class participation | 0.2 | Seminar paper | 0.3 | Continuous assessment | 0.5 |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam*** | (0.5) | | | | | | |

*** *If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment*

*1. 9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY* | ECTS | LEARNING OUTCOME** | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 1.0 | 1, 2, 3, 4 | Oral and written presentation | Recording class attendance | 0 | 0 |
| Class participation | 0.2 | 2, 3, 4 | Conversation and discussion | Questions while working on a new topic | 0 | 10 |
| Seminar paper | 0.3 | 2, 3, 4 | Solving tasks | Review of written assignments and the seminar paper | 0 | 20 |
| Written exam*** | 0.5 | 1, 2, 3, 4 | Solving tasks | Review of knowledge assessment | 60 | 100 |
| Continuous assessment | 0.5 | 1, 2, 3 ,4 | Solving tasks | Review of knowledge assessment | 60 | 100 |

*** *If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment*

*1. 10. Required reading (as on submission of the study programme proposal)*

- Šimović, Vladimir, Franjo Maletić, Winton Afrić. Osnove informatike - Uvod. Zagreb: Golden marketing - Tehnička knjiga, Učiteljski fakultet Sveučilišta u Zagrebu, 2010.
- Nadrljanski, Đorđe, Nadrljanski Mila. Osnove informatike. Split: Filozofski fakultet Sveučilišta u Splitu. 2007.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Sagman, Steve. Microsoft Office za Windows. Zagreb: Miš d.o.o., 2004
- Microsoft Office User Manual.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Students' work is monitored through regular class attendance, class participation, seminar paper and written exam/continuous assessment. The results of the activities are evaluated using a scoring and grading system based on criteria.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Oral and written presentation | Class attendance | 1, 2, 3, 4 | Recording class attendance |
| Conversation and discussion | Class participation | 2, 3, 4 | Questions while working on a new topic |
| Solving tasks | Seminar paper | 2, 3, 4 | Review of written assignments and the seminar paper |
| Solving tasks | Written exam*** | 1, 2, 3 ,4 | Review of knowledge assessment |
| Solving tasks | Continuous assessment | 1, 2, 3 ,4 | Review of knowledge assessment |

*** *If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment*

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Sanja Lončar-Vicković | |
| Course title | Introduction to Building | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/1st semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 30+0+0 |

**1. COURSE DESCRIPTION**

*1.1. Course objectives*

Introducing students to the basic building terminology, forms and elements of construction through an overview of world, Croatian and local history of construction.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Name and describe the basic terminology, forms and elements of building structures.
2. Identify the basic stages in the historical development of construction.
3. Highlight the features of each historical stage of construction development.
4. Recognize the most significant examples of buildings and builders of each historical period in Osijek, Croatia and the world.
5. Explain the importance of the principles of sustainable development in construction.
6. Explain the importance of ethics of the construction profession.
7. Highlight different aspects of future construction development.

*1. 4. Course content (syllabus)*

Basic terminology of construction. Basic forms and themes in construction. Materials and structures.
Construction in prehistory. The first preserved built artifacts. National construction. Sustainability in construction.
Antiquity (Egypt, Greece, Rome) – development of civilizations, urban planning, typology of buildings, the relationship of sacred, public and residential architecture, materials and structures, builders and their works. Greek and Roman architecture in Croatia. Middle Ages (early Christianity, Romanesque, Gothic) – period, distribution, typology, architectural forms, the most important buildings in Europe and Croatia.
Modern Age (Renaissance, Baroque, Historicism, Art Nouveau, Modern, Postmodern) – period, distribution, typology, architectural forms, the most important buildings in Europe and Croatia.
Learning about the architecture of Osijek; urban development and an overview of the most important buildings and builders.
Professional ethics in construction. Directions of future construction development.

| *1. 5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☒ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☒ team work |
|---|---|---|

| | |
|---|---|
| *1. 6. Comments* | |

*1. 7. Student requirements*

Class attendance minimum 70%, active class participation, preparation of a seminar paper.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | 0.5 | Seminar paper | 0.5 | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Assessment during classes: class attendance, class participation
Assessment and evaluation of student work during the presentation of the seminar paper: research skills, effective cooperation in the project team, application of acquired knowledge

*1. 10. Required reading (as on submission of the study programme proposal)*

Radić, J.: Uvod u graditeljstvo, Školska knjiga, Zagreb 2016.
Janson, H.W.: Janson, A.F. Povijest umjetnosti, Stanek, Varaždin 2003.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Wood, D.M. Civil Engineering: A Very Short Introduction, OXFORD U.P., Oxford 2012.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Presentation of a seminar paper in front of colleagues and the lecturer, active class participation, and completing smaller individual assignments. Analysis of student performance in these activities at the course level and providing feedback to students, with discussion. Information on student satisfaction from the student survey is used to improve the quality of teaching performance (teaching methods and student assessment).

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1, 2, 3, 4, 5, 6, 7 | Recording class attendance, class participation |
| Team work | Making the semester assignment in a team | 2, 3, 4 | Assessment of the semester assignment |
| Independent work | Presentation of the semester assignment | 2, 3, 4 | Evaluation of the semester assignment presentation |
| Field instruction | Sightseeing of the Osijek Fortress and European Avenue | 1, 2, 4, 5, 6 | Recording class attendance, follow-up knowledge assessment |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Brankica Malić, M.Sc. (Geod.) | |
| Course title | Geodesy | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year / 1st semester | |
| ECTS value and type of instruction | ECTS | 4 |
| | Contact hours (L+E+S) | 30 + 30 + 0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introduction to types of geodetic activity and geodetic terminology. Learning about geodetic institutions in the Republic of Croatia and their functions. Learning about official cartographic editions of the Republic of Croatia. Application of geodesy in civil engineering.

*1. 2. Course enrolment requirements*

None

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. explain the concept of geodesy and geodetic activities and their purpose;
2. show different approximations of the shape of the Earth and its representation in different coordinate systems;
3. explain the purpose and types of map projections;
4. state the types and purpose of geodetic networks;
5. apply the basics of geodetic computation with the assessment of the accuracy of measurements and calculations;
6. describe geodetic instruments and accessories and their application in planimetric survey by bearing and distance/ staking out methods;
7. distinguish the types of photogrammetry and the types of maps and digital systems based on them;
8. specify the application and types of planimetric setting out and contour setting out.

*1. 4. Course content (syllabus)*

Definition of geodesy. Overview of geodesic activities. The shape and size of the Earth. Coordinate systems. Map projections. Gauss-Krüger (HTRS96 / TM Transverse Mercator) projection. Permanent points of geodetic basis (geodetic networks: satellite, terrestrial – positional and altitude). Theory of errors with computation of adjustment. Geodetic computation. Geodetic instruments. Theodolite. Mechanical and optical distance measurement. Electronic distance measurement. Planimetric survey (orthogonal and polar method). Level. Types of levelling (barometric heighting, trigonometric, geometric, hydrostatic levelling). Photogrammetry (terrestrial, aerial photogrammetry, satellite photogrammetry; LIDAR). Cartography. Reproduction of maps. Thematic and digital cartography (demonstration lecture). Elevation display on maps (relief). Planimetric setting out and contour setting out.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Requirements for obtaining the lecturer's signature for the course:
- compulsory class attendance, both lectures and exercises (mandatory 70%);
- all 4 geodetic tasks solved during exercises

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | 1 | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | 0.5 |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Criteria for exemption from the final exam:
- passing 3 revision tests (80 points) and points earned during exercises (completing 4 geodetic tasks; 20 points);
- two theoretical revision tests are taken in the 6th or 7th and 14th or 15th week of lectures (maximum 80 points)
- solving problems of geodetic calculation in experimental exercises (maximum 20 points)

Points distribution:
- 1st revision test – 40 points
- 2nd revision test – 40 points
- solved four geodetic calculation problems – 20 points

Exemption from the final exam: minimum 50 points.
Oral exam (takes place on the same day):
- three theoretical tasks – (1st elimination task) – students write a draft; handing in and correcting the exam and recording the grade.

Grading scheme:
- sufficient (2): 50-65 points
- good (3): 66-79 points
- very good (4): 80-89 points
- excellent (5): 90-100 points

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Macarol, S. (1985): Praktična geodezija, Tehnička knjiga, Zagreb
2. Pribičević, B., Medak, D. (2003): Geodezija u građevinarstvu, W.B.Z., Zagreb
3. Kapović, Z. (2010): Geodezija u niskogradnji; Geodetski fakultet, Zagreb

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Feil, L. (1989): Teorija pogrešaka I, Geodetski fakultet, Zagreb
2. Feil, L. (1990): Teorija pogrešaka II, Geodetski fakultet, Zagreb
3. Janković, M. (1982): Inžinjerska geodezija I dio, SNL, Zagreb
4. Janković, M. (1981): Inžinjerska geodezija II dio, SNL, Zagreb

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

During the semester, for the purpose of continuous assessment of knowledge, students take three revision tests, and the tasks are completed individually during exercises. Exemption from the exam is possible if students pass the revision tests.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | - class attendance<br>- active class participation | 1, 2, 3, 4, 6, 7, 8 | - checking attendance;<br>- 2 revision tests;<br>- final exam |
| Exercises | - class attendance;<br>- solving geodetic tasks;<br>- field work exercises | 5, 6, 8 | - checking attendance;<br>- review of solved tasks;<br>- active participation |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Zoran Nakić, M.Sc. (Geol.) | |
| Course title | Introduction to Geology | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year / 1st semester | |
| ECTS value and type of instruction | ECTS | 2 |
| | Contact hours (L+E+S) | 30+0+0 |

| 1. **COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| The main goal is to introduce students to geosciences and the origin of the Earth and its current state. The rocks will be classified according to composition and formation type. The focus will be on the context of the use of minerals and rocks in civil engineering. The types of geological structures will be singled out, the geological map will be interpreted.<br>Students will also be introduced to endodynamic and exodynamic processes and phenomena, as well as problems that may affect engineering structures. | | |
| *1. 2. Course enrolment requirements* | | |
| None. | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. Distinguish between individual types of rocks and minerals<br>2. Identify different types of geological structures<br>3. Comment on certain surface processes and their consequences for people and the environment<br>4. Identify geological phenomena and processes in order to solve problems in civil engineering | | |
| *1. 4. Course content (syllabus)* | | |
| Introduction to geology. The origin and structure of the Earth, temperature, pressure, gravity and magnetism. Basic concepts of crystallography and mineralogy. Systematics of minerals. Systematics of petrogenic minerals. Systematics of non-silicate minerals.<br>Basics of petrology. Igneous, metamorphic and sedimentary rocks. Mechanical, chemical and biological rock weathering. Diagenesis of sediments.<br>Geotectonics. Primary forms of occurrence, position and distribution of rocks in the lithosphere. Layers, folds, faults and thrust faults. Dynamics of the Earth. Endodynamic and exodynamic processes and phenomena.<br>Use of rocks in civil engineering. Dynamics of the Earth's crust, movements of litospheric plates, seismic and volcanic activity. Deposits of technical and architectural stone in the Republic of Croatia. Stratigraphic geology. Life development and geological environments.<br>Geological mapping and geological maps. Geological columns and profiles.<br>Introduction to hydrogeology, hydrological cycle, the way water appears underground.<br>Investigation methods. Engineering-geological investigations for foundations, spatial planning, transportation infrastructure, landfills and water engineering facilities.<br>Environmental pollution and environmental protection. | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other |

| | | |
|---|---|---|
| | | |

*1. 6. Comments*

*1. 7. Student requirements*

Students are required to attend classes and complete assignments in addition to revision tests and the final exam.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

During the classes/semester, there are two revision tests, and there is a final exam at the end. All students have the right to take written tests. The final grade is the average value of written test results, with possible correction in the oral part of the exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Vazdar, T. (2010): Geologija za građevinare, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu
2. Šestanović, S. (2001): Osnove geologije i petrografije, Građevinsko-arhitektonski fakultet u Splitu
3. Šestanović, S. (1993): Osnove inženjerske geologije primjena u graditeljstvu, Građevinsko-arhitektonski fakultet u Splitu

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Plummer, Ch.C., McGeary, D. & Carlson, D. (2001): Physical Geology, 8th Ed., Mc Graw Hill, Boston
2. Urumović, K. (2000): Fizikalne osnove dinamike podzemnih voda, Rudarsko-geološko naftni fakultet, Zagreb

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Based on:
1. Results of the exam (results of the revision tests and the final exam)
2. Results of class attendance
3. Results of the student survey

| 2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 4 | Recording class attendance |
| Final examination | Answering oral and written questions | 1, 2, 3, 4 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Zoran Malečić, M.Ed. | |
| Course title | Physical Education I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 1st year / 1st semester | |
| ECTS value and type of instruction | ECTS | 1 |
| | Contact hours (L+E+S) | 0+30+0 |

| 1.COURSE DESCRIPTION | | |
|---|---|---|
| *1.1. Course objectives* | | |
| Satisfying of one of the primary human needs, the need for movement. Establishing the current status of students and intervening in that state by adding new motor knowledge, nurturing and repeating already acquired motor knowledge and harmonious and moderate development in the field of motor achievements and functional motor abilities. | | |
| *1.2. Course enrolment requirements* | | |
| None | | |
| *1.3. Expected learning outcomes* | | |
| 1. Apply ways to preserve health through PE programmes.<br>2. Encourage responsibility and independence.<br>3. Demonstrate working with sports equipment for developing motor skills.<br>4. Use healthy work and hygiene habits. | | |
| *1.4. Course content (syllabus)* | | |
| Kinesiology, Physical and Health Education, Kinesiological Recreation, Sport and Methodology of Sports Training, Kinesitherapy, Object of research and structure of kinesiology, Structure of anthropological space, Health status, Functions of the respiratory and vascular system.<br>Assessment of functional abilities and measuring instruments, Assessment of motor abilities and measuring instruments, Assessment of morphological characteristics and measuring instruments, Planning and programming of transformation processes, Locomotor system – role of muscles and physiology of posture, Measuring and evaluation of cumulative effects of recreational training programmes, Basic methods of aerobic training, Basic methods of anaerobic training, Models of various sports and recreational programmes. | | |
| *1.5. Type of instruction* | ☐ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☒ other_____ |
| *1.6. Comments* | | |
| *1.7. Student requirements* | | |
| Attending classes and participating in sports competitions. Students exempted from the PE course for medical reasons write a seminar paper. | | |

| *1.8. Student performance[1] evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

Assessment and evaluation of the initial status. Assessment of immediate and cumulative effects of training.

*1.10. Required reading (as on submission of the study programme proposal)*

1. Vukić, Ž., S. Jančić: Priručnik za samostalno ciljano vježbanje studenata, Osijek, 1999.

*1.11. Recommended reading (as on submission of the study programme proposal)*

1. Mraković, M.: Uvod u sistematsku kineziologiju, Zagreb, 1997.
2. Milanović, D.: Dijagnostika u sportu, Rovinj, 1996.
3. Andrijašević, M.: Sportska rekreacija u mjestu rada i stanovanja, Zagreb, 1996.
4. Horga, S.: Psihologija sporta, Zagreb, 2009.
5. Rastovski, D.: Kako plivati, Osijek, 2016.

*1.12. Number of copies of required literature in relation to the number of students currently attending the course*

| *Title* | *Number of copies* | *Number of students* |
|---|---|---|

*1.13. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Records of training assignments and records of class attendance. Assessment and evaluation of the initial status. Assessment of immediate and cumulative effects of training.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Exercises | Class attendance and individual physical training. | 1, 2, 3, 4 | Records of training assignments and records of class attendance. |

[1] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Lidija Kraljević, M.Ed., Anamarija Štefić, M.Ed. | |
| Course title | English Language I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/1st semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Number of hours (L+E) | 15+15 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Expanding the general vocabulary of English, adopting basic civil engineering terminology, developing translation skills from Croatian into English and from English into Croatian, developing skills of understanding field-specific texts, navigating dictionaries, revising and mastering grammatical structures of English.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Interpret basic field-specific terminology in English, at the level of words and collocations.
2. Interpret a text in English.
3. Translate and interpret field-specific terminology and texts from English into Croatian and from Croatian into English.
4. Distinguish and use basic grammatical structures of the English language in translation.

*1. 4. Course content (syllabus)*

Introduction (2); Architect Imhotep (2); The Great Pyramid of Cheops (4); The Majestic Taj Mahal (2); Astonishing Cathedrals (4); Revision test (2); Steel and structures never possible before (4); What is Civil Engineering? (2); Structural engineering (2); Petronas Twin Towers (4); Preliminary exam (2);

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

| *1. 9. Assessment of student work during classes and at the final exam* |
|---|
| Grading scheme for revision tests:<br>10% regular class attendance, submitted translations, completed exercises<br>35% 1st revision test<br>35% 2nd revision test<br>20% oral exam (mandatory only for students who want an excellent or a very good grade)<br><br>Grading scheme for exams:<br>10% regular class attendance, submitted translations, completed exercises<br>70% written exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade) |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Kraljević L: Structures in Time & Space I, Faculty of Civil Engineering and Architecture Osijek, J.J. Strossmayer University of Osijek, 2002. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Kralj-Štih A.: English in Civil Engineering, Croatian University Edition 2004.<br>Internet sources |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Keeping records of class attendance and student activities<br>Written exercises (translations, abstracts, vocabulary and grammar exercises)<br>Oral expression (reading, oral communication) |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance<br><br>Completing written vocabulary exercises, silent and loud reading<br>Translation from and into a foreign language<br>Discussions, debates, speaking exercises<br>Translation of professional texts from and into a foreign language, reading and listening comprehension | 1, 2, 3, 4 | Class attendance records.<br><br>Formative assessment during the teaching process. |
| Final summative knowledge testing | Taking the exam | 1, 2, 3, 4 | Grading exams according to grading criteria |

| General information | | |
|---|---|---|
| Lecturer | Anamarija Štefić, M.Ed. | |
| Course title | German Language I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | core | |
| Year/Semester | 1st year/1st semester | |
| ECTS value and type of instruction | ECTS | 2.00 |
| | Contact hours (L+E+S) | 15 + 15 + 0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

- learning and revising grammatical and linguistic structures of technical German
- learning about features the field-specific texts
- adopting and expanding field-specific terminology of the civil engineering domains
- developing reading and comprehension skills for field-specific texts

*1. 2. Course enrolment requirements*

Basic knowledge of grammar and general vocabulary

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. understand a shorter technical text
2. analyze the text in different forms of written communication (answer questions, fill in the blanks, group terms, write an abstract)
3. analyze the text in different forms of oral communication (short discussions on a given topic, pair/group work)
4. define field-specific terminology
5. use field-specific terminology
6. use grammatical constructions in written texts and oral communication

*1. 4. Course content (syllabus)*

- Allgemeines zum Bauwesen
- Baustelle
- Bauholz
- Fachwerkhäuser
- Notre Dame Kapelle, Ronchamp
- Beton hat viele Gesichter
- Stahlbau
- Supergras Bambus

| | | |
|---|---|---|
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |

*1. 6. Comments*

*1. 7. Student requirements*

| |
|---|
| class attendance (minimum 70%), doing exercises and translating in class,<br>occasional individual assignments (not obligatory but to earn additional points) |
| *1. 8. Student performance evaluation* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| During the semester, there are two (2) revision tests, and the average grade on revision tests is taken as the final grade. If the student does not pass (gets a negative grade) or is not satisfied with the grade on the revision test he/she can/must take the final exam. Only students who want to get an excellent grade or those who want a higher grade take the oral exam.<br>Students can collect 45 points on each revision test and 10 points by completing additional individual assignments<br>The final grade is the sum of all points earned during the semester based on the following grading scheme:<br>sufficient (2): 44 – 57<br>good (3): 58 – 71<br>very good (4): 72 – 85<br>excellent (5): 86 - 100 |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Štefić, Anamarija (2015.) Deutsch im Bauwesen, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski fakultet Osijek, Osijek |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| • Kralj Štih, Alemka (2005). Deutsch im Bauingenieurwesen, Hrvatska sveučilišna naklada, Zagreb<br>• Ritoša, M. – V. Sekula (1989.) Njemački za građevinare, Škola za strane jezike, Zagreb<br>• Tecilazić, Franci (1986.) Deutsch für Studenten der Architektur, Arhitektonski fakultet Sveučilišta u Zagrebu, Zagreb<br>Journals from the Faculty library: Detail, Institut für Internationale Architektur – Dokumentation<br>• Bautechnik, Ernst & Sohn, Berlin<br>• Bauingenieur, Springer Verlag, Berlin<br>• Bauen mit Holz, editor: Klaus Fritzen, Berlin<br>• Beton und Stahlbeton, editor: Konrad Bergmeister et al., Berlin |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Keeping records of class attendance and student activities<br>Written exercises (translations, abstracts, vocabulary and grammar exercises)<br>Oral expression (reading, oral communication) |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance | 1, 2, 3, 4, 5, 6 | Recording class attendance |
| | Written exercises (translations, abstracts, vocabulary and grammar exercises) | 1, 2, 4, 5 | Formative assessment during the teaching process |
| | Oral communication | 3, 4, 5, 6 | Formative assessment during the teaching process |
| | Individual assignments | 1, 2, 3, 4, 5, 6 | Formative assessment during the teaching process |
| Final summative knowledge testing | Answering written and oral questions | 1, 2, 3, 4, 5, 6 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Ivan Matić, M.Sc. (Math.) | |
| Course title | Mathematics II | |
| Study programme | University undergraduate study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Preparation for the upcoming courses in the curriculum, acquisition of basic knowledge of essential properties of multidimensional Euclidean space and functions of several variables. Application of single and multiple integrals in practical problems in everyday life.

*1. 2. Course enrolment requirements*

Mathematics 1.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Apply the Newton-Leibniz formula to calculate the value of a definite integral
2. Recognize the use of integrals in calculating the area in particular problems
3. Find extrema of multivariable functions
4. Recognize the application of appropriate coordinates in determining double and triple integrals
5. Use double and triple integrals in geometric and physical problems, such as determining the volume or centre of gravity of a body.

*1. 4. Course content (syllabus)*

Primitive function and indefinite integral. Substitution and partial integration methods. Definite integral and Newton-Leibniz formula. Properties of a definite integral and application to surface area calculation.
Euclidean space and multivariable functions. Sequences in Euclidean space. Second-order surfaces. Limits and continuity of multivariable functions, partial derivatives. Derivability and differentiability of multivariable functions. Extrema of multivariable functions.
Multiple integrals. Polar, spherical and cylindrical coordinates. Substitution of variables in the triple integral. Using double and triple integrals to find volumes, moments and centre of gravity.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance, taking revision tests.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | 1 | Oral exam | 1 | Essay | | Research | |
| Project | | Continuous assessment | 2 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

| | |
|---|---|
| *During classes:*<br>< 40 points = written and oral exam<br>40-100 points = oral exam | *On the exam:*<br>*Written exam: 40% passing grade*<br>*Oral exam:*<br>40-54% = sufficient (2)<br>55-69% = good (3)<br>70-84% = very good (4)<br>85-100% = excellent (5) |

*1. 10. Required reading (as on submission of the study programme proposal)*

*S. Suljagić: Matematika 2 (*http://www.grad.hr/nastava/matematika/mat2/mat2.html)
*I. Slapničar: Matematika 2 (* http://www.fesb.hr/mat2)

*1. 11. Recommended reading (as on submission of the study programme proposal)*

B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1986
J. Stewart: Calculus, Brooks/Cole, New York, 2011.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Revision tests.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises. | Attending classes, taking revision tests, written and oral part of the exam. | 1, 2, 3, 4, 5 | Written and oral examination. |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Aleksandar Jurić | |
| Course title | Mechanics I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 6 |
| | Number of hours (L+E) | 45+30 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Master the basic definitions, units and methods of solving exercises in statics and thus acquire theoretical and practical knowledge about the behaviour and procedures of calculating statically determinate problems. Recognize a statically determinate problem, sketch it if necessary and apply the appropriate method to solve it. Prepare well for the upcoming core and field-specific courses.

*1. 2. Course enrolment requirements*

Mastery of the elements of linear algebra, differential and integral calculus, trigonometry and elements of physics and descriptive geometry.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Define and explain the basic theorems and axioms in mechanics, the concepts of force, moment and couple, and apply the basic elements of vector calculus for force and moment. Analytically solve the resultant and the resolution of forces and reduce the system of forces and moments to a point.
2. Set up and solve a system of equilibrium equations and calculate the forces for a particle and a body in space and plane.
3. Explain and apply the basic elements of graphostatics to the assembly of systems of forces and moments, the resolution of forces and some equilibrium tasks in a plane.
4. Define and calculate the position of the centre of gravity, lines, surfaces and bodies in plane and space, analytically and graphically.
5. Define and calculate reactions and internal forces in sections of solid construction systems and draw diagrams of internal forces.
6. Define and calculate forces in supports and sections as well as the geometry of polygonal, parabolic and hyperbolic catenaries.
7. Apply the principle of virtual work through kinematics shift plans and physical models to determine forces in supports and internal forces in sections of full structural systems.
8. Define and calculate active and passive response forces as well as friction coefficients for sliding, rolling and rope friction tasks.

*1. 4. Course content (syllabus)*

Basic definitions and units, (ad.1.). Force and moment, couple, Varignon's theorem, reduction of force to a point, (ad.1.). Analytical addition of a system of forces, (ad.1.). Analytical resolution of forces into components, (ad.1.). Analytical equilibrium conditions, (ad.2.). Elements of graphic statics for the plane force system, (ad.3.). Analytical and graphical determination of the centre of gravity, (ad.4.). Statics of rigid bodies, mechanical systems, simple construction systems and loads, (ad.5.). Internal forces in cross sections and diagrams of internal forces of full structural systems, (ad.5.). Calculation of a catenary, (ad.6.). Virtual work, (ad.7.). Friction, (ad.8.).

| | | |
|---|---|---|
| *1. 5. Type of instruction* | X lectures<br>☐ seminars and workshops<br>X exercises<br>☐ distance learning | x individual assignments<br>☐ multimedia and e-learning<br>x lab work<br>x tutorials |

| | | |
|---|---|---|
| | ☐ field work | ☐ other _____ |

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance, submitting a neat and accurate independent programme, taking the exam.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (2.0) | Oral exam | (1.0) | Essay | | Research | |
| Project | | Continuous assessment | 3.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

During exercises, students write two revision tests. The student can get the final grade based on revision test results according to the total number of points (%), or partially, i.e. satisfy the prerequisite for taking the oral exam. The highest number of points (%) per revision test is 50, i.e. a total of 100 points. The following grading scale applies to the total number of points (%) earned on revision tests: 50-54.9% – required for taking the oral exam, 55-62.9% – sufficient (2), 63-69.9% – good (3), 70-84.9% – very good (4), 85-100% – excellent (5). The student can take the final exam as a written and oral exam. 50% is lowest passing grade on the written exam, and the grading scheme for the written exam is the same as for the revision tests. Provided that the grade of the oral exam is positive, the final grade is the average grade of the written and oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

Mehanika I – Statika, A. Jurić, Građevinski fakultet Osijek, 2006. – university textbook.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Grafomehanika – primjena u statici i kinematici, A. Jurić, Đ. Matošević, J. Zovkić, GF Osijek, 2007.

Mehanika I - Ž. Nikolić, Građevinsko-arhitektonski fakultet u Splitu, Split 2009,
Statics and Dynamics – A. Ruina and R. Pratap, Oxford University Press, 2002.
Statics - F.P. Beer, E.R. Johnston, Jr., McGraw, Hill Publishing Company, New York, 1988.;
Statics - J.L. Meriam, John Wiley & Sons, Inc., New York, 1975.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Continuous assessment of knowledge during lectures and exercises.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1 – 8 | Recording class attendance |
| Seminar paper | Individual assignments | 1 – 8 | Evaluation of the semester assignment |
| Final examination | Answering oral and written questions | 1 – 8 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Ivana Brkanić Mihić | |
| Course title | Elements of Building Construction | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

The aim of the course is to introduce students to the basic elements of buildings and ways of presenting these elements in different types of projects.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Identify the basic elements of a building in different types of designs.
2. Define and analyse structures of basic elements of a building.
3. Recognize the role of load-bearing and non-load-bearing building elements.
4. Draw parts of preliminary, main and detailed designs of simple buildings.
5. Use different building designs in professional work.

*1. 4. Course content (syllabus)*

Introduction (actions on buildings, types of building elements and structural systems, types of designs) [2]; Foundations and waterproofing [2]; Walls and pillars (brick, stone, concrete and reinforced concrete; arches, lintels and formwork, chimneys and vents) [6]; Massive and light mezzanine load-bearing structures [4] revision test [2]; Massive and light staircases [2]; Flat and pitched roofs and cover [3]; Partition walls [1]; Windows and doors [2]; Finishing floors and ceilings [2]; Thermal insulation and facade coverings [2] 2nd revision test [2]

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance, independent development of two programmes, written exam.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Project | 1.0 | Continuous assessment | 2.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

| | Class participation | Programme I | Progarmme II | Revision test 1 or Written exam part 1 | Revision test 2 or Written exam part 2 | TOTAL |
|---|---|---|---|---|---|---|
| point range | 0-10 | 0-15 | 0-15 | 0-30 | 0-30 | 0-100 |
| minimum no. of points | 3 | 8 | 9 | 16 | 16 | 51 |

**Points/range**
**0-50** insufficient (1); **51-62** sufficient (2); **63-75** good (3); **76-87** very good (4); **88-100** excellent (5)

*1. 10. Required reading (as on submission of the study programme proposal)*

Ž. Koški, N. Bošnjak, I. Brkanić: Elementi visokogradnje I, Sveučilište J. J. Strossmayera u Osijeku - Građevinski fakultet Osijek, Osijek, 2012. (course materials) – SELECTED CHAPTERS
Ž. Koški, V. Slabinac, D. Stober, N. Bošnjak, I. Brkanić: Elementi visokogradnje II, Sveučilište J. J. Strossmayera u Osijeku - Građevinski fakultet Osijek, Osijek, 2013. (course materials) – SELECTED CHAPTERS

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Ištoka Otković, I., Koški, Ž., Zagvozda, M.: Tehničko crtanje s primjenom AutoCAD-a, Građevinski fakultet Sveučilišta J.J. Strossmayera u Osijeku, Osijek, 2015.
Neufert, E.: Elementi arhitektonskog projektiranja, Goldeng Marketing, Zagreb, 2002.
Peulić, Đ.: Konstruktivni elementi zgrada, UPI-2M plus, Zagreb, 2013.
Richarz, C., Schulz, C., Zeitler, F.: Energy-Efficiency Upgrades (Detail Practice), Birkhäuser Architecture, 2003.
Štulhofer, A., Veršić, Z.: Crtanje arhitektonskih nacrta: pribor i osnove, UPI-2M, d.o.o., Zagreb, 1998.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Quality Assurance Office of the Faculty of Civil Engineering and Architecture Osijek.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Project | Project development | 1, 2, 3, 4, 5 | Project review and assessment |
| Final examination | Answering written questions | 1, 2, 3, 4 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Ivana Miličević | |
| Course title | Materials Science | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | core | |
| Year | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 4 |
| | Contact hours (L+E+S) | 30+30 |

## 2. COURSE DESCRIPTION

*1.1. Course objectives*

Introduce students to the basic knowledge about the properties of building materials. Teach students how to examine and determine the properties of materials and how to understand the use of a material in construction based on their properties. Specific competencies are developed doing individual tasks in laboratory exercises.

*1.2. Course enrolment requirements*

-

*1.3. Expected learning outcomes*

Upon successful completion of this course, students will be able to:

1. distinguish building materials according to their purpose
2. examine and determine the properties of materials
3. assess the advantages and disadvantages of using materials in specific conditions
4. understand the use of materials in construction in accordance with the identified properties

*1.4. Course content (syllabus)*

Introduction to building materials. Physical properties of materials. Mechanical properties of materials. Chemical bonds. Chemical properties of materials. Thermal, acoustic and optical properties of materials. Surface properties: surface stress, adsorption, capillary phenomena. Development of microstructure. Material fatigue. Durability of materials.
Norms and standardization. Materials testing. Statistical analysis of testing results.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | - | |

*1.7. Student requirements*

- lecture attendance (75%)
- attendance of exercises (75%)
- completed and submitted laboratory forms
- submission of an accurate semester assignment

*1.8. Student performance[2] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | 0.25 | Seminar paper | 0.25 | Experimental work | 0.5 |
| Written exam | 0.5 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

Assessment using revision tests:

- 2 revision tests = 100 points (50 points practical tasks + 50 points theoretical part)
- the theoretical part of one revision test has a maximum of 25 points
- the practical tasks on one revision test are a maximum of 25 points
- to be exempted from the final exam, it is necessary to collect a minimum of 15 points on the practical tasks in each of the two revision tests
- to be exempted from the final exam, it is necessary to collect a minimum of 15 points on the theoretical part in each of the two revision tests

Final examination:

- based on revision tests (passing both revision tests, theory + assignments)
- taking written and oral exam; the oral exam can be taken on condition that you have passed the written exam.

Grading scheme: (1st revision test + 2nd revision test) or written exam:

- 60 - 69 points = sufficient (2)
- 70 - 79 points = good (3)
- 80 - 89 points = good (4)
- 90 - 100 points = excellent (5)

*1.10. Required reading (as on submission of the study programme proposal)*

Netinger, I.; Vračević, M.; Bačkalić, Z., Opeka – od sirovine do gotovog proizvoda, Sveučilište J. J. Strossmayera u Osijeku, Građevinski fakultet Osijek, 2014.
Netinger, I.; Miličević, I., Zbirka riješenih zadataka iz Gradiva, Građevinski fakultet Osijek, Osijek, 2014.
Mikoč, M., Građevni materijali, Građevinski fakultet Sveučilišta u Osijeku, Osijek, 2006.
Ukrainczyk, V., Poznavanje gradiva, Alkor, Zagreb, 2001.

*1.11. Recommended reading (as on submission of the study programme proposal)*

Illston, J. M.; Domone, P. L. J.: Construction Materials: Their Nature and their Behaviour, 4th Edition. New York: Spon Press, 2010.
Muravljov, M., Građevinski materijali, Građevinska knjiga, 2007.
Muravljov, M. Građevinski materijali: zbirka rešenih ispitnih zadataka, Građevinska knjiga, 1998.
Ashby, Michael F.; Joneas David R, H.; Engineering Materials 1, Butterworth-Heinemann, Oxford - Boston - Johannesburg - Melbourne - New Delhi - Singapore, 1996.

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The learning outcomes will be achieved through:

- submitted and accepted laboratory exercise forms,
- submitted and accepted seminar/semester assignment,
- passing both revision tests or written and oral exams.

## 3. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1, 2, 3, 4 | Recording class attendance |

[2] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | |
|---|---|---|---|
| | Class participation | 2, 3, 4 | Records of students volunteering to solve set tasks |
| Exercises | Class attendance | 1, 2, 3, 4 | Recording class attendance |
| | Class participation | 2, 3 | Records of students volunteering to solve set tasks |
| | Experimental work | 2 | Review of completed testing forms |
| | Seminar paper | 2, 3, 4 | Review of submitted seminar papers |
| Knowledge testing | Written and oral exam/revision tests | 1, 2, 3, 4 | Checking the alignment of achieved results with the pre-established scoring system |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Tihomir Dokšanović | |
| Course title | Basics of Construction Informatics II | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 15+15+0 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Mastering computer modelling of simple construction systems in Autodesk Robot and SCIA Engineer. Learning about types of computer models and modelling methods. Learning about ways determine geometry, materials, and cross-sections. Learning about possibilities of setting boundary conditions and types of loads. Mastering ways of presenting and evaluating results.

*1.2. Course enrolment requirements*

None.

*1.3. Expected learning outcomes*

1. Create a geometric model of a simple 2D construction
2. Define the type of material and cross section and associate them with numerical elements
3. Distinguish and apply boundary conditions of a model
4. Distinguish and apply model loads
5. Evaluate calculation results

*1.4. Course content (syllabus)*

Introduction to computer programs for the design and dimensioning of structures. Description of Autodesk Robot and SCIA Engineer computer programs. Introduction (interface and types of designs). Screen layout and description of toolbars. Defining geometric axes and constructing grids. Showing 2D and 3D displays. Defining geometry and drawing line elements. Defining the type of material and cross sections. Defining supports and boundary conditions. Types, assignments and load combinations. Starting calculations. Viewing, displaying, evaluating and printing results.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☒ distance learning<br>☐ field work | ☐ individual assignments<br>☒ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | - | |

*1.7. Student requirements*

Regular class attendance, active class participation and preparation of a seminar paper.

*1.8. Student performance[3] evaluation*

[3] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | 0.1 | Seminar paper | 0.3 | Continuous assessment | 0.6 |
| Written exam | (0.6)*** | | | | | | |

*** If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment

*1.9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY * | ECTS | LEARNING OUTCOME ** | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 1.0 | 1, 2, 3, 4, 5 | Oral and written presentation | Recording class attendance | 0 | 0 |
| Class participation | 0.1 | 1, 2, 3, 4, 5 | Conversation and discussion | Questions while working on a new topic | 0 | 5 |
| Seminar paper | 0.3 | 1, 2, 3, 4, 5 | Solving tasks | Review of written assignments and the seminar paper | 10 | 15 |
| Continuous assessment | 0.6 | 1, 2, 3, 4, 5 | Solving tasks | Review of knowledge assessment | 50 | 80 |
| Written exam*** | 0.6 | 1, 2, 3, 4, 5 | Solving tasks | Review of knowledge assessment | 60 | 100 |

**** If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment*

*1.10. Required reading (as on submission of the study programme proposal)*

- Lectures on the course website
- Autodesk Robot User Guide
- SCIA Engineer User Manual

*1.11. Recommended reading (as on submission of the study programme proposal)*

- Online courses in Autodesk Robot and SCIA Engineer software packages
- Morris, Alan. A Practical Guide to Reliable Finite Element Modelling. John Wiley & Sons, 2008.

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The learning outcomes will be achieved through:

- regular attendance of lectures and exercises
- class participation
- submitted and accepted seminar paper
- continuous knowledge assessment/written exam

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Oral and written presentation | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Conversation and discussion | Class participation | 1, 2, 3, 4, 5 | Questions while working on a new topic |
| Solving tasks | Seminar paper | 1, 2, 3, 4, 5 | Review of written assignments and the seminar paper |
| Solving tasks | Written exam*** | 1, 2, 3 ,4, 5 | Review of knowledge assessment |
| Solving tasks | Continuous knowledge assessment | 1, 2, 3 ,4, 5 | Review of knowledge assessment |

**** If the student is not exempted from the written part of the exam on the basis of continuous knowledge assessment*

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Hrvoje Krstić | |
| Course title | Energy in Building Design | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 30+10+5 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Describing the basic principles of building physics. Defining energy consumption in buildings. Describing energy efficient building design. Identifying energy saving opportunities in buildings. Identifying current legislation on energy efficient building design. Explaining the concept of a nearly zero- energy building. Learning about laboratory and in situ measurements in energy efficient building design.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Define the basic terms in the field of building physics.
2. Identify technical building systems that consume energy.
3. Define the value of the heat transfer coefficient.
4. Apply basic procedures for calculating heat loss and water vapour diffusion in building elements.
5. Explain the concept of a nearly zero-energy building.

*1. 4. Course content (syllabus)*

Field and goals of building physics. Basic terms and units of thermal science. Methods of energy transfer. Convective heat transfer coefficients. Renewable energy sources. Energy for the operation of technical systems in the building. Heat transfer coefficient of building materials. Thermal insulation of building elements. Calculation of the heat transfer coefficient. Linear heat transfer coefficient. Heat transfer coefficient for the whole building. Temperature curve. Heat accumulation. Properties of humid air. Water vapour condensation. Thermal bridges. Diffusion of water vapour through the building elements. Effects of solar radiation on building elements. Temperature operation and thermal stresses. Basic principles of nearly zero-energy building design. Acoustics. Physical properties of sound. Noise. Lighting. Indoor thermal comfort. Laboratory and in situ measurements in energy efficient building design.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance. Development and presentation of an assignment.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | 0.25 | Seminar paper | | Experimental work | 0.25 |
| Written exam | (0.25) | Oral exam | (0.25) | Essay | | Research | |
| Project | | Continuous assessment | 0.50 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

*Class attendance, class participation and revision tests are scored according to the grading scheme shown in Table 1.*

*Table 1 Evaluation of student work during classes*

| Activity | Student activity | Points | Point range | Share in the final grade |
|---|---|---|---|---|
| Class attendance | 91% and more | 5 | 0-5 | 10% |
| | 70% - 90% | 2 | | |
| | Less than 70% | 0 | | |
| Class participation | Frequent participation, discussion | 5 | 0-5 | 10% |
| | Occasional participation, questions | 2 | | |
| | No active participation in classes | 0 | | |
| Revision tests | Revision test 1 | 20 | 0-40 | 80% |
| | Revision test 2 | 20 | | |
| Total number of points | | 50 | 0-50 | 0-100% |

*Assessment of student work during classes and at the final exam is done according to the grading scheme in Table 2.*

*Table 2 Grading and evaluation of student work on the final exam*

| % | Grade |
|---|---|
| 0-59 | Insufficient (1) |
| 60-69 | Sufficient (2) |
| 70-79 | Good (3) |
| 80-89 | Very good (4) |
| 90-100 | Excellent (5) |

*Students are entitled to get a signature if they collect a sufficient number of points by attending lectures, participating in classes and taking revision tests. The minimum number of points required to exercise the right to get a signature is 30% of the total number of points (which is 15 points) with mandatory class attendance. Absence from classes is tolerated up to 70% of the total number of hours.*

*Students who earn a sufficient number of points by attending lectures, participation in classes and passing revision tests are evaluated on the basis of the number of points expressed as a percentage according to the grading scheme in Table 2.*

*1. 10. Required reading (as on submission of the study programme proposal)*

Zakon o gradnji (Building Act)
Tehnički propis o racionalnoj uporabi energije i toplinskoj zaštiti u zgradama (Technical regulations on thermal energy savings and thermal protection in buildings)
Zakon o energetskoj učinkovitosti (Energy Efficiency Act)
Smjernice za zgrade gotovo nulte energije (Guidelines for nearly zero-energy buildings)

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Šimetin, V. Građevinska fizika, Zagreb, Fakultet građevinskih znanosti, 1983.
Pinterić, M. Building physics: from physical principles to international standards, Cham, Springer, cop. 2017.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Conditions set by the study programme of the University undergraduate Study of Civil Engineering and conditions set by the quality assurance system of the Faculty.

| 2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 5 | Class attendance/Class participation/Oral exam |
| Exercises | Active participation in exercises | 3, 4 | Class attendance/Class participation/Oral exam |
| Individual assignments | Completing an assignment | 3, 5 | Review of the assignment |
| Lab work | Working in a laboratory | 1, 3 | Review of measurement results |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Hrvoje Krstić, M.S.C.E. | |
| Course title | Construction Regulations | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 2 |
| | Contact hours (L+E+S) | 30+0+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Describe basic legal terms and get acquainted with basic construction regulations. Recognize and define the role of participants in construction. Define the obligations of the contractor and construction supervision. Name the basic requirements for buildings. Identify the Construction Contract. Define the role of construction inspection. Learn about the basic concepts of public procurement. Learn about the stakeholders in spatial planning. Explain the basic principles of safety at work.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Recognize and define the role of participants in construction.
2. Describe basic building requirements.
3. Identify the Construction Contract.
4. Recognize the spatial planning stakeholders.

*1. 4. Course content (syllabus)*

Zakon o gradnji (Building Act). Participants in construction. Relationship between participants in construction. Construction site, land, land registry, cadastre. Main and detailed design. Building permit. Use permit. Site documentation. Construction site diary. Physical Planning Act. Physical planning. Physical planning documents. Location permit. Role of the Croatian Chamber of Civil Engineers. Protection of public interest. Environmental Protection Act. The Occupational Health and Safety Act. Civil Obligations Act. Construction Contract. Public Procurement Act.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance. Development and presentation of an assignment.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.00 | Class participation | 0.15 | Seminar paper | | Experimental work | |
| Written exam | (0.75) | Oral exam | (0.10) | Essay | | Research | |
| Project | | Continuous assessment | 0.85 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

*Class attendance, class participation, seminar paper and revision tests during classes are scored according to the data in Table 1.*

*Table 1 Evaluation of student work during classes*

| Activity | STUDENT ACTIVITY | Points | Point range | Share in the final grade |
|---|---|---|---|---|
| Class attendance | 91% and more | 5 | 0-5 | 7% |
| | 70% - 90% | 2 | | |
| | Less than 70% | 0 | | |
| Class participation | Frequent participation, discussion | 5 | 0-5 | 7% |
| | Occasional participation, questions | 2 | | |
| | No active participation in classes | 0 | | |
| Seminar paper | Submitted on time, error-free | 20 | 0-20 | 29% |
| | Submitted on time, with minor errors | 15 | | |
| | Submitted on time, with major errors | 10 | | |
| | Not submitted | 0 | | |
| Revision tests | Revision test 1 | 20 | 0-40 | 57% |
| | Revision test 2 | 20 | | |
| Total number of points | | 70 | 0-70 | 0-100% |

*Assessment of student work during classes and at the final exam is done according to the grading scheme in Table 2.*

*Table 2 Grading and evaluation of student work on the final exam*

| % | Grade |
|---|---|
| 0-59 | Insufficient (1) |
| 60-69 | Sufficient (2) |
| 70-79 | Good (3) |
| 80-89 | Very good (4) |
| 90-100 | Excellent (5) |

*Students are entitled to get a signature if they collect a sufficient number of points by attending lectures, class activities, making a seminar paper and taking revision tests. The minimum number of points required to exercise the right to get a signature is 30% of the total number of points (which is 21 points), with a seminar paper submitted and mandatory class attendance. Absence from classes is tolerated up to 70% of the total number of hours.*

*Students who earn a sufficient number of points by attending lectures, class participation, seminar paper and passing revision tests are evaluated on the basis of the number of points expressed as a percentage according to the grading scheme in Table 2.*

*1. 10. Required reading (as on submission of the study programme proposal)*

Constitution of the Republic of Croatia
Environmental Protection Act
Building Act
Physical Planning Act
Public Procurement Act
Civil Obligations Act
The Occupational Health and Safety Act

*1. 11. Recommended reading (as on submission of the study programme proposal)*

| |
|---|
| Not required. |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Conditions set by the study programme of the University undergraduate Study of Civil Engineering and conditions set by the quality assurance system of the Faculty. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3 | Class attendance/Class participation/Oral exam |
| Individual assignments | Assignment | 4 | Review of the assignment |

| General information | | |
|---|---|---|
| Lecturer | Zoran Malečić, M.Ed. | |
| Course title | Physical Education II | |
| Study programme | University undergraduate study of Civil Engineering | |
| Course status | Core | |
| Year | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 1 |
| | Contact hours (L+E+S) | 0+30+0 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Satisfying one of the primary human needs, the need for movement. Assessing the current status of students and improving their motor knowledge, nurturing and repeating already acquired motor knowledge and harmonious and moderate development in the field of motor achievements and functional motor abilities.

*1.2. Course enrolment requirements*

None

*1.3. Expected learning outcomes*

1. Apply ways to preserve health through PE programmes.
2. Encourage responsibility and independence.
3. Demonstrate and master working with sports equipment for developing motor skills.
4. Create an individual fitness program.
5. Use healthy work and hygiene habits.

*1.4. Course content (syllabus)*

Kinesiology, Physical and Health Education, Kinesiological Recreation, Sport and Methodology of Sports Training, Kinesitherapy, Object of research and structure of kinesiology, Structure of anthropological space, Health status, Functions of the respiratory and vascular system.
Assessment of functional abilities and measuring instruments, Assessment of motor abilities and measuring instruments, Assessment of morphological characteristics and measuring instruments, Planning and programming of transformation processes, Locomotor system – role of muscles and physiology of posture, Measuring and evaluation of cumulative effects of recreational training programmes, Basic methods of aerobic training, Basic methods of anaerobic training, Models of various sports and recreational programmes.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☐ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☒ other _____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Attending classes and participating in sports competitions. Students exempted from the PE course based on a medical certificate write a seminar paper.

| *1.8. Student performance[4] evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

| *1.9. Assessment of student work during classes and at the final exam* |
|---|
| Assessment and evaluation of the initial status. Assessment of immediate and cumulative effects of training. |
| *1.10. Required reading (as on submission of the study programme proposal)* |
| 1. Vukić, Ž., S. Jančić: Priručnik za samostalno ciljano vježbanje studenata, Osijek, 1999. |
| *1.11. Recommended reading (as on submission of the study programme proposal)* |
| 1. Mraković, M.: Uvod u sistematsku kineziologiju, Zagreb, 1997.<br>2. Milanović, D.: Dijagnostika u sportu, Rovinj, 1996.<br>3. Andrijašević, M.: Sportska rekreacija u mjestu rada i stanovanja, Zagreb, 1996.<br>4. Horga, S.: Psihologija sporta, Zagreb, 2009.<br>5. Rastovski, D.: Kako plivati, Osijek, 2016. |
| *1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Records of training assignments and records of class attendance. Assessment and evaluation of the initial status. Assessment of immediate and cumulative effects of training. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Exercises | Class attendance and individual physical training. | 1-5 | Records of training assignments and records of class attendance. |

[4] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Lidija Kraljević, M.Ed., Anamarija Štefić, M.Ed. | |
| Course title | English Language II | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Number of hours (L+E) | 15+15 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Expanding the field-specific terminology in English, improving the skills of translating from Croatian into English and from English into Croatian, developing the skills of understanding and translating a text in English and using dictionaries.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Translate field-specific terminology and texts from English into Croatian and from Croatian into English.
2. Use new domain-specific terms and collocations in sentences and simpler technical texts in English.
3. Interpret a more complex technical text in English in speech and writing.
4. Recognize and distinguish the basic types of grammatical structures of English in translation from and into Croatian.
5. Interpret short texts orally in English.

*1. 4. Course content (syllabus)*

Introduction (2); Dams - Lords of Water (4); Three Gorges: the Biggest Dam in the World (4); Imposing Bridges (4); The Akashi Kaikyo Bridge (4); Preliminary exam (2); Canals & Aqueducts (2); Tunnels (2); The Simplon (2); Revision (2); Preliminary exam (2)

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

| |
|---|
| Grading scheme for revision tests:<br>10% regular class attendance, submitted translations, completed exercises<br>35% 1st preliminary exam<br>35% 2nd preliminary exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade)<br><br>Grading scheme for exams:<br>10% regular class attendance, submitted translations, completed exercises<br>70% written exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade) |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Kraljević L: Structures in Time & Space I, Faculty of Civil Engineering and Architecture Osijek, J. J. Strossmayer University of Osijek, 2002. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Kralj-Štih, A.: English in Civil Engineering, Croatian University Edition, 2004.<br>Internet sources |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Keeping records of class attendance and student activities<br>Written exercises (translations, abstracts, vocabulary and grammar exercises)<br>Oral expression (reading, oral communication) |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance<br><br>Translation from and into a foreign language<br>Discussions, debates, speaking exercises, pair/group work, filling-in the blanks<br>Translation of technical texts from and into a foreign language, writing abstracts of technical texts, short presentations/retelling of technical texts<br>Translation of sentences and texts from the field-specific domain<br>Vocabulary exercises, retelling exercises, use of synonyms/antonyms, oral or written definition/explanation of terms and expressions | 1, 2, 3, 4, 5 | Class attendance records.<br><br>Formative assessment during the teaching process. |
| Final summative knowledge testing | Taking the exam | 1, 2, 3, 4, 5 | Grading exams according to grading criteria |

| **General information** | | |
|---|---|---|
| Lecturer | Anamarija Štefić, M.Ed. | |
| Course title | German Language II | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | core | |
| Year/Semester | 1st year/2nd semester | |
| ECTS value and type of instruction | ECTS | 2.00 |
| | Contact hours (L+E+S) | 15 + 15 + 0 |

1. **COURSE DESCRIPTION**

*1. 1. Course objectives*

- adopt and expand vocabulary related to construction
- recognize and use domain-specific terminology
- adopt strategies for reading and listening, receiving and giving information
- master more complex grammatical structures of technical German
- develop field-specific oral communication skills

*1. 2. Course enrolment requirements*

Having taken the course German 1

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. analyse a technical text (vocabulary and grammar) in domains listed in the content of the course
2. interpret tables and figures
3. use appropriate domain-specific terminology and phrases in written and oral communication
4. summarize the text in writing, give arguments and definitions
5. interpret individual parts of the text orally
6. translate a simpler technical text from German into Croatian

*1. 4. Course content (syllabus)*

- Die sieben Weltwunder des Altertums
- Die Weltwunder von heute
- Natürliche Bausteine
- Stonehenge
- Höher und höher – der Wettlauf in den Himmel
- Tunnel
- Wunderstoff Lehm

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

- class attendance (minimum 70%)
- doing exercises and translations in class
- occasional individual assignments (not obligatory but for earning additional points)

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

During the semester, there are two (2) preliminary exams and the average grade on preliminary exams is taken as the final grade. If the student does not pass (gets a negative grade) or is not satisfied with the grade on the preliminary exam he/she can/must take the final exam. Only students who want to get an excellent grade or those who want a higher grade take the oral exam. Students can collect 45 points on each preliminary exam and 10 points by completing additional individual assignments
The final grade is the sum of all points earned during the semester based on the following grading scale:
sufficient (2): 44 – 57
good (3): 58 – 71
very good (4): 72 – 85
excellent (5): 86 - 100

*1. 10. Required reading (as on submission of the study programme proposal)*

Štefić, Anamarija (2015.) Deutsch im Bauwesen, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski fakultet Osijek, Osijek

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Kralj Štih, Alemka (2005). Deutsch im Bauingenieurwesen, Hrvatska sveučilišna naklada, Zagreb
- Ritoša, M. – V. Sekula (1989.) Njemački za građevinare, Škola za strane jezike, Zagreb
- Tecilazić, Franci (1986.) Deutsch für Studenten der Architektur, Arhitektonski fakultet Sveučilišta u Zagrebu, Zagreb

Journals from the Faculty library:

- Detail, Institut für Internationale Architektur – Dokumentation
- Bautechnik, Ernst & Sohn, Berlin
- Bauingenieur, Springer Verlag, Berlin
- Bauen mit Holz, editor: Klaus Fritzen, Berlin
- Beton und Stahlbeton, editor: Konrad Bergmeister et al., Berlin

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Keeping records of class attendance and student activities
Written exercises (translations, abstracts, vocabulary and grammar exercises)
Oral expression (reading, oral communication)

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1, 2, 3, 4, 5, 6 | Recording class attendance |
| | Written exercises (translations, abstracts, vocabulary and grammar exercises) | 1, 2, 3, 4, 6 | Formative assessment during the teaching process |
| | Oral communication | 1, 2, 3, 5 | Formative assessment during the teaching process |
| | Individual assignments | 1, 2, 3, 4, 5, 6 | Formative assessment during the teaching process |
| Final summative knowledge testing | Answering written and oral questions | 1, 2, 3, 4, 5, 6 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Mirta Benšić | |
| Course title | Probability and Statistics | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to the basic concepts of probability theory and statistics. The emphasis is on the introduction of basic concepts, their interpretation, adoption, understanding and mastery of basic techniques and methods, and their application in practical tasks and problems.

*1. 2. Course enrolment requirements*

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. distinguish between a deterministic and a random experiment
2. use probability, conditional probability, random variable and random vector and their properties
3. calculate and interpret numerical characteristics of random variables and vectors
4. distinguish dependent random variables from independent ones in classical examples and applications
5. identify conditions for the application of typical distributions in problem tasks and applications
6. recognize the conditions for the application of the weak law of large numbers and the central limit theorem
7. prepare data for statistical analyses
8. apply simpler statistical models for statistical inference

*1. 4. Course content (syllabus)*

Data types. Data collection. Data set description methods. Classical definition of probability and basic combinatorics. Axiomatic definition of probability. Probability properties. Axiomatic definition of probability. Conditional probability and independence. Discrete random variables, numerical characteristics and their meaning. Independent repetition of Bernoulli experiment and binomial random variable, meaning of parameters, normal approximation. Continuous random variables, some parametric families and meaning of parameters (uniform, exponential, two-sided exponential, normal (standardization, central limit theorem -intuitive), $\chi$-square distribution. Sample distribution. Inference based on a single sample. Estimating proportion. Interval estimate of proportion. Estimate of expectations. Interval estimation of expectations. Testing hypotheses about proportion and expectation on large samples. Inference based on two samples. Comparing expectations. Comparing proportions. Comparing distributions. Two-dimensional random vector. Distribution table. Conditional probability. Conditional distributions. Independence. Contingency table analysis. Correlation coefficient. Simple linear regression.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☒ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Students are required to attend lectures, exercises and practicums and are required to take revision tests.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | 1 | Oral exam | 1 | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

a) Grading and evaluation of student work during classes
- class attendance, active participation in exercises, revision tests
b) Grading and evaluation of student work on the final exam
-will be conducted on the basis of the effort during the year and success on the written and oral exam

*1. 10. Required reading (as on submission of the study programme proposal)*

1. M. Benšić, N. Šuvak, Uvod u vjerojatnost i statistiku, Odjel za matematiku, Sveučilište u Osijeku, 2014.
2. M. Benšić, N. Šuvak, Primijenjena statistika, Odjel za matematiku, Sveučilište u Osijeku, 2013.
3. L. E. Bain, M. Engelhardt, Introduction to Probability and Mathematical Statistics, BROOKS/COLE Cengage Learning, 2008.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Nathabandu T. Kottegoda, Renzo Rosso, Applied statistics for civil and environmental engineers, 2nd ed, Blackwell Publishing, 2008
2. Pavlić, Statistička teorija i primjena, Tehnička knjiga, Zagreb, 1988.
3. G.R. Iversen, M. Gergen, Statistics, the Conceptual Approach, Springer, Berlin, 1997
4. S. Lipschutz, J. Schiller, Introduction To Probability And Statistics, Schaum's Outline Series, McGraw-Hill, New York-Toronto, 1998
5. J.T. McClave, P.G. Benson, T. Sincich, Statistics for Bussiness and Economics, Prentice Hall, London, 2001
6. G. McPherson, Applying and Interpreting Statistics, Springer, Berlin, 2001
7. Ž. Pauše, Vjerojatnost, informacija, stohastički procesi, Školska knjiga, Zagreb, 1974

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Revision tests (theory and assignments), homework, practical work with field-specific data

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Class attendance | Class attendance, discussion, teamwork and working on independent assignments | 1-8 | Monitoring class participation |
| Assessment using revision tests | Preparation for the written exam | 1-8 | Checking correct solutions (grading) |
| Final exam | Revision of course content | 1-8 | Oral exam |

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Silva Lozančić | |
| Course title | Building Statics I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 6.0 |
| | Contact hours (L+E+S) | 45 + 25 + 5 |

| **1. COURSE DESCRIPTION** | | |
|---|---|---|
| 1.1 Course objectives | | |
| Preparation for upcoming courses; acquiring knowledge of theoretical assumptions of calculations, methods of calculation of statically determinate systems, numerical calculation of static systems, and the properties of statically determinate systems and their diagrams. | | |
| 1.2. *Course enrolment requirements* | | |
| Mastery of course content of the following courses: Mathematics 1, Mathematics 2 and Mechanics 1. Knowledge of trigonometry, differential calculus, basic principles of mechanics, physics and vector calculus. | | |
| 1.3. Expected learning outcomes | | |
| Upon successful completion of the course, students will be able to:<br>1. Analyze the geometrical invariance and static (in) determinancy of line systems<br>(identify and set the optimal load-bearing system).<br>2. Analyze the basic properties of statically determinate systems and their diagrams.<br>3. Identify and sketch internal force diagrams of internal forces for any statically determinate system.<br>4. Produce a numerical computer model of line structural systems.<br>5. Identify and sketch influence lines of simpler statically determinate systems. | | |
| 1.4. Course content (syllabus) | | |
| Subject, task and methods of building statics. Basic principles. Classification of structural systems. Geometrical invariance of structural systems. Loads. Calculation methods and properties of statically determinate systems: flat girders with joints, lattice girders; multi-disc systems: three-hinged arches and frames - solid and lattice, structural systems with reinforcements, supported and suspended beams, spatial lattice structures. Moving loads. Influence lines. | | |
| 1.5. Type of instruction | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☒ tutorials<br>☐ other _____ |
| 1.6. Comments | | |
| 1.7. Student requirements | | |
| Attending lectures and exercises (doing quizzes and assignments), developing a programme | | |
| 1.8. Student performance evaluation | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
| Written exam | 1.0 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | 1.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

1.9. Assessment of student work during classes and at the final exam

Grading schemes for revision tests and written exams:

| | |
|---|---|
| 0–54 | insufficient (1) |
| 55–65 | sufficient (2) |
| 66–76 | good (3) |
| 77–87 | very good (4) |
| 88–100 | excellent (5) |

1.10. Required reading (as on submission of the study programme proposal)

K. Fresl: Građevna statika 1, Građevinski fakultet, Sveučilište u Zagrebu, 2017.
A. Mihanović, B. Trogrlić: Građevna statika I. - 1st ed. - Split: Sveučilište u Splitu, Fak. građevinarstva, arh. i geodezije, 2011.
Lozančić S., Kalman Šipoš T: Course materials

1.11. Recommended reading (as on submission of the study programme proposal)

V. Simović: Gradevna statika I, Gradevinski institut, 1988.
A. Ghali, A.M. Neville and T.G. Brown: Structural analysis, Spon press, 2017.
A.M. Gilbert, C.-M. Uang, J. T. Lanning, K. M. Leet: Fundamentals of Structural Analysis, McGraw-Hill, 2018.

1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences

Assessment of programmes, revision tests, homework assignments, quizzes, seminars, computer exercises

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| 2. 1. Teaching activity | 2. 2. Student activity | 2. 3. Learning outcome | 2. 4 Assessment method |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1,2,3,4,5 | Recording class attendance |
| Seminar paper | Individual assignments | 2,3,4,5 | Assessment of the programme |
| Continuous assessment | Taking revision tests, doing homework assignments, taking quizzes, writing seminars | 1,2,3,4,5 | Assessment of revision tests, homework assignments, quizzes and seminars |
| Final examination | Answering written and oral questions | 1,2,3,4,5 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Aleksandar Jurić | |
| Course title | Mechanics II | |
| Study programme | University undergraduate Study | |
| Course status | core | |
| Year/Semester | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Number of hours (L+E) | 30+30 |

| **1. 1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| Master the basic definitions, units and methods of solving exercises in kinematics and dynamics and thus acquire theoretical and practical knowledge about the behaviour and procedures of calculating kinematic and dynamic tasks with one degree of freedom. Recognize a statically determinate task, sketch it if necessary and apply the appropriate method to solve it. Prepare well for the upcoming core courses. | | |
| *1. 2. Course enrolment requirements* | | |
| Good knowledge of vector calculus, differential and integral calculus, trigonometry and elements of physics. Know and apply equilibrium conditions of points and bodies. | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. Define and explain the concept of position, distance travelled, speed and acceleration for rectilinear and curvilinear motion as well as differential and integral connections.<br>2. Define and calculate total kinematic quantities as well as components in complex point motion, graphically and using vectors.<br>3. Define, explain and apply kinematic quantities and connections in circular and coplanar body motion and draw velocity and acceleration plans.<br>4. For complex motion of a kinematic pair or chain, define and calculate kinematic quantities graphically and using vectors.<br>5. Define and calculate kinematic and dynamic quantities by one of the calculation methods for point dynamics and explain dynamic quantities in the dynamics of material point systems.<br>6. Define and calculate kinematic and dynamic quantities by one of the calculation methods for body dynamics.<br>7. Define and calculate velocities in direct and oblique centric collisions using calculation and the experimental model. | | |
| *1. 4. Course content (syllabus)* | | |
| Basic kinematic definitions and units, (ad.1.). Kinematics of a point, (ad. 1. and 2.). Kinematics of a rigid body and kinematics of simple construction systems with one degree of freedom, (ad. 3. and 4.). Dynamics (kinetics) of a material point, (ad 5.). Dynamics of the system of material points, (ad 5.). Rigid body dynamics, (ad 6.). Collision theory, (ad 7.). | | |
| *1. 5. Type of instruction* | X lectures<br>☐ seminars and workshops<br>X exercises<br>☐ distance learning<br>☐ field work | x individual assignments<br>☐ multimedia and e-learning<br>x lab work<br>x tutorials<br>☐ other<br>_____ |
| *1. 6. Comments* | | |
| *1. 7. Student requirements* | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Regular class attendance, submitting a neat and accurate independent programme, taking the exam. | | | | | | | |
| *1. 8. Student performance evaluation* | | | | | | | |
| Class attendance | 2.0 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (1.5) | Oral exam | (1.0) | Essay | | Research | |
| Project | | Continuous assessment | 2.5 | Report | | Practical work | |
| Portfolio | | | | | | | |
| *1. 9. Assessment of student work during classes and at the final exam* | | | | | | | |
| During exercises, students write two revision tests. The student can get the final grade based on revision test results according to the total number of points (%), or partially, i.e. satisfy the prerequisite for taking the oral exam. The highest number of points (%) per revision test is 50, i.e. a total of 100 points. The following grading scales apply to the total number of points (%) earned on revision tests: 50-54.9% – required for taking the oral exam, 55-62.9% – sufficient (2), 63-69.9% – good (3), 70-84.9% – very good (4), 85-100% – excellent (5). The student can take the final exam as a written and oral exam. 50% is the requirement for the passing grade at the written exam, and the grading scheme for the written exam is the same as for the revision tests. Provided that the grade of the oral exam is positive, the final grade is the average grade of the written and oral exam. | | | | | | | |
| *1. 10. Required reading (as on submission of the study programme proposal)* | | | | | | | |
| Mehanika I – Statika, A. Jurić, Građevinski fakultet Osijek, 2006. – university textbook. | | | | | | | |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* | | | | | | | |
| Grafomehanika – primjena u statici i kinematici, A. Jurić, Đ. Matošević, J. Zovkić, GF Osijek, 2007.<br>Mehanika II - M. Kožul, A. Džolan, Sveučilište u Mostaru, Mostar 2017,<br>Statics and Dynamics – A. Ruina and R. Pratap**,** Oxford University Press, 2002.<br>Dynamics - F. P. Beer, E.R. Johnston, Jr., McGraw-Hill Publishing Company, New York, 1988.;<br>Dynamics - J. L. Meriam, John Wiley & Sons, Inc., New York, 1975.; | | | | | | | |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* | | | | | | | |
| Continuous assessment of knowledge during lectures and exercises. | | | | | | | |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance | 1 – 7 | Recording class attendance |
| Seminar paper | Individual assignments | 1 – 7 | Evaluation of the semester assignment |
| Final examination | Answering oral and written questions | 1 – 7 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Mirjana Bošnjak-Klečina | |
| Course title | Strength of Materials I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 6.0 |
| | Contact hours (L+E+S) | 45+30 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Acquisition of theoretical knowledge about the behaviour of an elastic deformable body due to the action of an external load. Acquisition of theoretical knowledge about the mechanical properties of materials, calculation of stresses and strains of the structure and its elements. Practical application of theoretical knowledge in the procedures of calculating the strength and stiffness of the structure and its elements.

*1.2. Course enrolment requirements*

Students must have attended the courses Mathematics 1, Mathematics 2, Mechanics 1 and met the requirements for getting the lecturer's signature

*1.3. Expected learning outcomes*

1. Connect the notion of stress and stress components with the notion of strain and strain components in elastic behaviour of materials
2. Connect differential equilibrium equations and transformation equations in stress and strain analysis
3. Analyze displacements, deformations and stresses using a theory that describes the linear-elastic behaviour of materials
4. Calculate the corresponding stresses and deformations of structural elements for basic load cases (longitudinal force, transverse force, torsional moment, pure bending, bending forces)
5. Calculate the dimensions of the given girder for basic load cases using the conditions of allowable stress and allowable deformations
6. Calculate the stresses and strains of thin-walled vessels
7. Calculate the stresses of simpler joints

*1.4. Course content (syllabus)*

General assumptions and basic elements of the calculation. Stress analysis. Differential equilibrium equations and transformation equations. Strain analysis. Concepts of displacement and strain. Continuity conditions. Relationship between stresses and strains. Hooke's law. Material elasticity constant. Axial beam loading. Stress concentration. Statically indeterminate beam systems. Stress and strain of thin-walled vessels. Shear (cutting force). Geometric characteristics of flat beam cross sections. Torsion of flat beams. Torsion of beams with non-circular cross-section. Bending of beams. Bending of composite beams and beams of variable stiffness. Shear centre. Deformation of a flat beam during bending. Work with laboratory equipment (where appropriate).

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐<br>other_____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Regular class attendance, revision tests, exam (continuous assessment during the semester or written and oral exam at the end of the semester).

*1.8. Student performance[5] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | (2.0) | Oral exam | (1.5) | Essay | | Research | |
| Project | | Continuous assessment | 3.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

During the semester – active approach – using revision tests

Three written revision tests (theory + exercises) during the semester. Each revision test is scored with 100 points (100 points theory, 100 points practical tasks). If the student achieves at least 75 points at each revision test, he/she is exempted from the written and oral part of the exam. If the student achieves at least 60 to 74 points, he/she is exempted from the written part of the exam, i.e. he/she should take only the oral part of the exam. Students who earn less than 60 points per revision test should take the exam at the end of the semester.

At the end of the semester – written and oral exam

The final examination at the end of the semester consists of a written and an oral part. The written part of the exam is scored with 100 points (four tasks, 25 points each), the oral part of the exam is scored with 100 points. In order for a student to take the oral part of the exam, he/she must get at least 50 points for the written part, which means having at least two correctly solved tasks.

The final grade is the average of the revision test grades (written and oral), or the final exam (written and oral), provided that both are positive.

*1.10. Required reading (as on submission of the study programme proposal)*

Šimić, V.: Otpornost materijala I, Školska knjiga, Zagreb, 2002.

*1.11. Recommended reading (as on submission of the study programme proposal)*

Timothy A. Philpot, Jeffery S. Thomas: Mechanics of Materials: An Integrated Learning System, 5th ed. ISBN: 978-1-119-60301-6. Wiley, 2019.
Brnić, J., Turkalj, G.: Nauka o čvrstoći I, Teh. fakultet Sveučilišta u Rijeci, Rijeka, 2004.
Alfirević, I.: Nauka o čvrstoći I Tehnička knjiga i Golden marketing, 1994.

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Conditions set by the study programme of the University undergraduate Study of Civil Engineering and conditions set by the quality assurance system of the Faculty.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1-7 | Recording class attendance |
| Class participation | Answering questions, solving independent tasks | 1-7 | Recording active participation |
| Knowledge testing | Answering written and oral questions | 1-7 | Assessment of answers |

[5] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marija Šperac | |
| Course title | Hydrology I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 15+15+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Acquisition of theoretical and practical knowledge in the field of hydrology, which includes water and water movement in nature and processes in the atmosphere.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Distinguish methods for determining the average height of precipitation in a basin.
2. Determine the morphological characteristics of a watershed.
3. Construct a complex runoff hydrograph.
4. Analyze the flow curve.

*1. 4. Course content (syllabus)*

Definition of hydrology, classification and tasks. Water and its natural properties. Water distribution and its circulation in nature, hydrological cycle and water balance. Precipitation: formation, classification, measurement, data processing, intensity. Meteorology. Watershed, surface runoff, runoff factors. Hydrometry: water depth, water level, water speed, water flow. Methods and processing of hydrometric quantities, level charts and hydrograms, flow curve, duration and frequency curves.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance, minimum of 70% of lectures and exercises.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | 1.0 | Oral exam | 1.0 | Essay | | Research | |
| Project | | Continuous assessment | (2)* | Report | | Practical work | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| a) Grading and evaluation of student work during classes:<br>- class attendance, class participation, work during exercises, revision test<br>a) Grading and evaluation of student work at the final exam:<br>- written exam: 60% pass<br>- written/oral/public/in a group |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| 1. Authorized lectures and exercise materials posted on the course website<br>2. Žugaj, R.: Hidrologija, Rudarsko-geološko-naftni fakultet Zagreb, 2000. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| 1. Žugaj, R.: Hidrologija za agroekologe, Agronomski fakultet Zagreb, 2009. |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Results of the revision test, class attendance, degree of active participation of students in classes |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 4 | Recording class attendance |
| Exercises | Class attendance | 1, 2, 3, 4 | Recording class attendance |
| Revision tests, exam | Answering written and oral questions | 1, 2, 3, 4 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Ivana Miličević | |
| Course title | Construction Materials | |
| Study programme | University undergraduate Study | |
| Course status | core | |
| Year | 2nd year/3rd semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+30 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Introduce students to the basic knowledge about the properties of construction materials. Teach them to master the basic skills of handling laboratory equipment for the testing of construction materials. Teach students the ways of determining the properties of construction materials as well as the interpretation of properties. Specific competencies are developed doing individual tasks in laboratory exercises.

*1.2. Course enrolment requirements*

Students must have passed the course in Materials Science.

*1.3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. describe the technology of production of various construction materials
2. test the properties of different construction materials
3. compare the properties of different construction materials
4. apply the results of construction material analysis
5. choose the type of construction material according to its purpose in construction
6. explain the mechanisms of degradation of construction materials
7. identify methods to protect construction materials according to the mechanism of degradation

*1.4. Course content (syllabus)*

Classification of materials. Cement. Aggregate. Water for concrete preparation. Concrete additives. Fresh and hardened concrete. Wood. Metals. Ceramic construction material. Binders and mortars. Glass. Polymers. Stone. Heat, water and soundproofing. Durability of materials.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | - | |

*1.7. Student requirements*

- class attendance of lectures (75%)
- class attendance of exercises (75%)
- completed and submitted laboratory forms
- submission of an accurate semester assignment

*1.8. Student performance[6] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | 0.25 | Seminar paper | 0.25 | Experimental work | 0.5 |
| Written exam | 1.0 | Oral exam | 1.0 | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

*Revision tests:*

- *2 revision tests = 100 points (50 points for practical tasks + 50 points for the theoretical part)*
- *the theoretical part of one revision test is maximum 25 points*
- *the practical tasks on one revision test are maximum 25 points*
- *to be exempted from the exam, it is necessary to collect a minimum of 15 points on practical tasks in each of the two revision tests*
- *to be exempted from the exam, it is necessary to collect a minimum of 15 points on the theoretical part in each of the two revision tests*

*Taking the exam:*

- *based on revision tests (passed both revision tests, theory + practical tasks)*
- *written and oral exam. Students can take the oral exam on condition that they have passed the written exam.*

*Grading scheme: (1st revision test+ 2nd revision test) or written exam:*

- *60-69 points = sufficient (2)*
- *70-79 points = good (3)*
- *80-89 points = very good (4)*
- *90-100 points = excellent (5)*

*1.10. Required reading (as on submission of the study programme proposal)*


Bjegović, D., Štirmer, N., Teorija i tehnologija betona, Građevinski fakultet Sveučilišta u Zagrebu, Zagreb, 2015.
Netinger, I.; Vračević, M.; Bačkalić, Z., Opeka – od sirovine do gotovog proizvoda, Sveučilište J. J. Strossmayera u Osijeku, Građevinski fakultet Osijek, 2014.
Netinger, I.; Miličević, I., Zbirka riješenih zadataka iz Gradiva, Građevinski fakultet Osijek, Osijek, 2014.
Mikoč, M., Građevni materijali, Građevinski fakultet Sveučilišta u Osijeku, Osijek, 2006.
Krstulović, P., Svojstva i tehnologija betona, Građevinski fakultet Sveučilišta u Splitu, Split, 2000.
Ukrainczyk, V., Poznavanje gradiva, Alkor, Zagreb, 2001.
Ukrainczyk, V., Beton, Alkor, Zagreb, 1994.


*1.11. Recommended reading (as on submission of the study programme proposal)*


Illston, J. M.; Domone, P. L. J.: Construction Materials: Their Nature and their Behaviour, 4th Edition. New York: Spon Press, 2010.
Muravljov, M., Građevinski materijali, Građevinska knjiga, 2007.
Muravljov, M. Građevinski materijali: zbirka rešenih ispitnih zadataka, Građevinska knjiga, 1998.
Đureković, A.; Cement, cementni kompozit i dodaci za beton, Školska knjiga, Zagreb, 1996.
Ashby, Michael F.; Joneas David R, H.; Engineering Materials 1, Butterworth-Heinemann, Oxford - Boston - Johannesburg - Melbourne - New Delhi - Singapore, 1996.
Ghosh, N.; Cement and Concrete Science Technology Vol – 1, Part – I, New Delhi, 1991.
Beslać, J.; Materijali u arhitekturi i građevinarstvu, Školska knjiga, Zagreb, 1989.


*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The learning outcomes will be achieved through:

- submitted and accepted laboratory exercise forms,
- submitted and accepted seminar/semester assignment,
- passing both revision tests or written and oral exams.

[6] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| 2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1,2,3,4,5,6,7 | Recording class attendance |
| | Class participation | 4,5,7 | Records of students volunteering to solve set tasks |
| Exercises | Class attendance | 1,2,3,4,5,6,7 | Recording class attendance |
| | Class participation | 2,3,4,5 | Records of students volunteering to solve set tasks |
| | Experimental work | 2 | Review of completed testing forms |
| | Seminar paper | 4,5,7 | Review of prepared seminar papers |
| Knowledge assessment | Written and oral exam/revision tests | 1,2,3,4,5,6,7 | Checking the alignment of achieved results with the pre-established scoring system |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Mirjana Bošnjak-Klečina | |
| Course title | Strength of Materials II | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30+30 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Acquisition of theoretical knowledge for understanding stresses and strains in the field of structural theory. Acquisition of practical knowledge necessary for understanding and solving minor technical problems related to dimensioning, checking the strength and rigidity of elements of engineering structures.

*1.2. Course enrolment requirements*

Students must have attended and obtained the signature for the course Strength of materials I

*1.3. Expected learning outcomes*

1. calculate simpler statically indeterminate systems
2. identify complex states of stress and strain in structural elements
2. calculate complex states of stress and girder deformation in structural elements
4. explain the principle of minimum potential energy of a deformation
5. analyze the problem of stability loss (buckling) of flat beams
6. calculate simpler statically indeterminate structures using the theory of plasticity

*1.4. Course content (syllabus)*

Introduction. Oblique bending. Statically indeterminate systems. Complex stress states/in general, cross-section core and core application. Equivalent stress according to strength theories. Comparison and application of strength theories. Energy methods in the theory of elasticity/potential energy of deformation, principle of minimum potential energy of deformation. Buckling and elastic stability loss/beam buckling in the elastic area, Euler's critical load, application limits, beam buckling in the plastic area, energy method. Calculating structures according to the theory of plasticity/model of ideal elastoplastic material, condition of plasticity, torsion, bending. Theory of curved beams. Work with laboratory equipment (where appropriate).

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐<br>other_____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Regular class attendance, revision tests, exam (continuous assessment during the semester or written and oral exam at the end of the semester).

*1.8. Student performance[7] evaluation*

[7] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | (2.0) | Oral exam | (1.0) | Essay | | Research | |
| Project | | Continuous assessment | 3.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

During the semester – active approach – using revision tests
Two written revision tests (theory + exercises) during the semester. Each revision test is scored with 100 points (100 points theory, 100 points practical tasks). If the student achieves at least 75 points at each revision test, he/she is exempted from the written and oral part of the exam. If the student achieves at least 60 to 74 points, he/she is exempted from the written part of the exam, i.e. he/she should take only the oral part of the exam. Students who earn less than 60 points per revision test should take the exam at the end of the semester.

At the end of the semester – written and oral exam
Students who have passed the exam in the Resistance of Materials I can take the exam.

The final examination at the end of the semester consists of a written and an oral part. The written part of the exam is scored with 100 points (four tasks, 25 points each), the oral part of the exam is scored with 100 points. In order for a student to take the oral part of the exam, he/she must get at least 50 points for the written part, which means having at least two correctly solved tasks.

The final grade is the average of the revision test grades (written and oral), or the final exam (written and oral), provided that both are positive.

*1.10. Required reading (as on submission of the study programme proposal)*

Šimić, V.: Otpornost materijala II, Školska knjiga, Zagreb, 2006.

*1.11. Recommended reading (as on submission of the study programme proposal)*

Timothy A. Philpot, Jeffery S. Thomas: Mechanics of Materials: An Integrated Learning System, 5th ed. ISBN: 978-1-119-60301-6. Wiley, 2019.
Brnić, J., Turkalj, G.: Nauka o čvrstoći II, Teh. fakultet Sveučilišta u Rijeci, Rijeka, 2006
Alfirević, I.: Nauka o čvrstoći II, Tehnička knjiga i Golden marketing, 1999

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Conditions set by the study programme of the University undergraduate Study of Civil Engineering and conditions set by the quality assurance system of the Faculty.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1-6 | Recording class attendance |
| Class participation | Answering questions, solving independent tasks | 1-6 | Recording active participation |
| Knowledge testing | Answering written and oral questions | 1-6 | Assessment of answers |

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Silva Lozančić | |
| Course title | Building Statics II | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+25+5 |

| 1. **COURSE DESCRIPTION** | | |
|---|---|---|
| 1.1. Course objectives | | |
| Acquiring knowledge about energy and variation principles, methods of calculation of statically indeterminate systems, and the properties of statically indeterminate systems and their diagrams | | |
| 1.2. *Course enrolment requirements* | | |
| Mastery of course content of the following courses: Mathematics 1, Mathematics 2, Mechanics 1 and Building Statics 1. Knowledge of trigonometry, differential and integral calculus, matrix calculus, basic principles of mechanics and physics, calculation of internal forces. | | |
| 1.3. Expected learning outcomes | | |
| 1. Apply basic energy principles to determine static shifts and other responses of the system.<br>2. Analyze the basic properties of statically indeterminate systems, the influence of changes in properties on the size of the diagram of internal forces and shifts.<br>3. Apply the principle of superposition to determine the diagram of internal forces on a statically indeterminate system.<br>4. Apply analytical and numerical procedures for the calculation of internal forces of statically indeterminate systems. | | |
| 1.4. Course content (syllabus) | | |
| Statically indeterminate structures. Analyses, basic assumptions and methods. Energy theorems and variational principles. Force method. Choice of basic system. Compatibility equations. Flexibility matrix of beams and systems. Determination of yield matrix elements. Displacement method. Choice of calculation system. Equilibrium equations and work on virtual displacements. Determination of stiffness matrix and external action matrix elements. Influence lines of statically indeterminate systems. | | |
| 1.5. Type of instruction | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☒ tutorials<br>☐ other<br>_____ |
| 1.6. Comments | | |
| 1.7. Student requirements | | |
| Class attendance; developing programmes, homework assignments, quizzes | | |
| 1.8. Student performance evaluation | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
| Written exam | 0.5 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

1.9. Assessment of student work during classes and at the final exam

Grading schemes for revision tests and written exams:

| | |
|---|---|
| 0–54 | insufficient (1) |
| 55–65 | sufficient (2) |
| 66–76 | good (3) |
| 77–87 | very good (4) |
| 88–100 | excellent (5) |

1.10. Required reading (as on submission of the study programme proposal)

M. Anđelić: Građevna statika II, Građevinski fakultet Sveučilišta u Zagrebu,2005
K. Fresl: Građevna statika 2, Lectures, Sveučilište u Zagrebu 2017
S. Lozančić, T. Kalman, M. Grubišić: Course materials

1.11. Recommended reading (as on submission of the study programme proposal)

A. Mihanović, B. Trogrlić, V. Akmadžić: Građevna statika II, Sveučilište u Splitu, 2014.
A. Ghali, A.M. Neville and T.G. Brown: Structural analysis, Spon press, 2017.
C. Natatajan, P. Revathi: Matrix Methods of Structural Analysis - Theory and Problems, PHI Learning, 2014

1.12. *Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Evaluation of programmes, assignments, quizzes, revision tests, seminars, computer exercises

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| 2. 1. Teaching activity | 2. 2. STUDENT ACTIVITY | 2. 3. Learning outcome | 2. 4 Assessment method |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1,2,3,4 | Recording class attendance |
| Seminar paper | Individual assignments | 3.4 | Assessment of the programme |
| Continuous assessment | Taking revision tests, assignments, quizzes | 1,2,3,4 | Assessment of revision tests, homework assignments, quizzes and seminars |
| Final examination | Answering written and oral questions | 1,2,3,4 | Assessment of answers |

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Krunoslav Minažek | |
| Course title | Soil Mechanics | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 6 |
| | Contact hours (L+E+S) | 45+30+0 |

1. **COURSE DESCRIPTION**

*1. 1. Course objectives*

To introduce students to soil as a building material and building environment, to present the specific features of soil as a material and the specifics of stress-strain analyses, to introduce students to the influence of water in soil, explain effects of time on the processes of deformation (consolidation) and water flow, and provide the basis for the analysis of soil properties important for the construction of soil structures and the analysis and implementation of geotechnical structures (dams, embankments, transportation infrastructure, supporting structures, building foundations, excavations).

*1. 2. Course enrolment requirements*

-

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Identify soil types and explain the differences between them, apply soil classification;
2. Explain and analyze the mechanical and physical properties of soil and the experiments used to determine them;
3. Apply numerical analysis of water seepage through embankments and dams;
4. Calculate soil subsidence over time and soil bearing capacity of shallow foundations;
5. Apply computational analysis of slope stability,
6. Explain and calculate ground pressures on supporting structures,
7. Explain the principles of soil compaction and control of compacted soil properties
8. Define basic concepts in rock mechanics

*1. 4. Course content (syllabus)*

- Basic soil properties, soil classification and identification,
- Occurrence and water flow in soil,
- Stresses in soil,
- Soil deformability, soil subsidence, consolidation,
- Soil strength,
- Critical states in soil mechanics,
- Slope stability,
- Load-bearing capacity of soil under shallow foundations,
- Ground pressures on supporting structures,
- Soil compaction theory
- Principles of rock mechanics

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work |
|---|---|---|

| | | |
|---|---|---|
| | ☐ distance learning<br>☐ field work | ☐ tutorials<br>☐ other<br>_____ |

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance. Continuous work on the development of independent tasks (programmes), timely submission of accurate programmes.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | 1 | Experimental work | |
| Written exam | (1.5) | Oral exam | (1) | Essay | | Research | |
| Project | | Continuous assessment | 2.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

There are two written and one oral revision test. Individual assignments (programmes) are submitted at the specified time during the semester, inaccuracies and delay in submission affect the assessment of the programme. Students who do not pass the exam through revision tests take a written and oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Authorized lectures and exercise materials posted on the course website
2. Mulabdić M.: Ispitivanje tla u geotehničkom laboratoriju, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski i arhitektonski fakultet Osijek, Osijek, 2018.
3. Roje-Bonnaci T.: Mehanika tla, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2017.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Smith, I.: Elements of Soil Mechanics, 9th edition, John Wiley & Sons, UK, 2014.,
2. Miščević, P.; Štambuk Cvitanović, N.; Vlastelica, G.: Dimenzioniranje gravitacijskih potpornih zidova, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2020.,
3. EC 7 Standards: HRN EN 1997-1: 2012 / A1: 2014 and HRN EN 1997-1: 2012 / NA: 2016 Eurocode 7 - Geotechnical design - Part 1: General rules and rules and national appendix, HRN EN 1997-2: 2012 Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing (EN 1997-2:2007+AC:2010),
4. Bond A., Harris A.: Decoding Eurocode 7, Taylor & Francis, UK, 2008.,
5. Miščević, P.: Inženjerska mehanika stijena, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2015.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance, evaluation of programmes and revision tests, assessment of written and oral exams.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1-8 | Recording class attendance |
| Exercises | Class attendance | 1-8 | Recording class attendance |
| Individual assignments | Creating independent tasks (programmes) | 3,4,6 | Assessment of individual assignments (programmes) |
| Lab work | Lab exercises attendance, making reports | 2 | Report review |
| Revision tests, exam | Answering written and oral questions | 1-8 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Lidija Tadić | |
| Course title | Fluid Mechanics | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 6.0 |
| | Contact hours (L+E+S) | 30+45+0 |

**1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introduction to the basic principles of fluid mechanics as a foundation for solving hydrotechnical problems.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Classify currents according to different criteria.
2. Determine the magnitude and position of hydrostatic force pressure on plane and curved areas.
3. Dimension the pressure line for a real fluid.
4. Dimension the cross section of an open channel in conditions of uniform steady flow.
5. Describe the leakage and overflow of liquids.
6. Describe groundwater flow.
7. Describe the characteristics of physical modelling.

*1. 4. Course content (syllabus)*

1. Basic physical properties of liquids.
2. Hydrostatics. Properties of hydrostatic pressure. Basic differential equation of hydrostatics. Total hydrostatic force on plane and curved areas. Archimedes' principle.
3. Hydrokinematics. Fluid flow and deformations. The notion of velocity field. Trajectory formula. Flow types. Principle of mass conservation. Equation of continuity.
4. Hydrodynamics. Surface and gravity forces. Principle of impulse conservation. Bernoulli's equation for ideal fluids. Bernoulli's equation for real fluids. Hydrodynamic resistances. Surface resistance. Reynolds number. Boundary layer. Flow regimes. Nikuradse's experiments. Pipe surface resistance. Shape head losses. Steady uniform flow in open channels. Chezy's equation. Specific energy. Froude number. The problem of transition from one flow regime to another. Hydraulic jump. Non-uniform steady flow in prismatic and non-prismatic channels. Leakage through small gaps. Leakage through large gaps. Overflow. Application of Darcy flow equation. Physical modelling.

| *1. 5. Type of instruction* | | |
|---|---|---|
| | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other<br>_____ |

*1. 6. Comments*

*1. 7. Student requirements*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| *1. 8. Student performance evaluation* | | | | | | | |
| Class attendance | 2.5 | Class participation | 0.5 | Seminar paper | | Experimental work | 0.5 |
| Written exam | 1.5 | Oral exam | 1.0 | Essay | | Research | |
| Project | | Continuous assessment | (2.5)* | Report | | Practical work | |
| Portfolio | | | | | | | |
| *1. 9. Assessment of student work during classes and at the final exam* | | | | | | | |
| a) Grading and evaluation of student work during classes:<br>- passed 3 revision tests (300 points) and points earned in laboratory exercises (20 points) and homework assignments (10 points)<br>a) Grading and evaluation of student work at the final exam:<br>- will be conducted based on the results of the written and oral exam | | | | | | | |
| *1. 10. Required reading (as on submission of the study programme proposal)* | | | | | | | |
| 1. Jović, V. (2010): Hidromehanika, FGAG Sveučilišta u Splitu<br>2. Tadić, L. et al. (2021): Zbirka zadataka iz hidromehanike, available at www.gfos.hr<br>3. Vuković, Ž. (1996): Osnove hidrotehnike I/1, Građevinski fakultet Sveučilišta u Zagrebu | | | | | | | |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* | | | | | | | |
| 1. Pečornik, M. (1995): Zbirka zadataka iz mehanike fluida, Sveučilište u Rijeci<br>2. Fox, R. W.; McDonald, A. T. (2002): Introduction to Fluid Mechanics<br>3. Jović, V. (2013): Analysis and modelling of non-steady flow and channel networks | | | | | | | |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* | | | | | | | |
| Monitoring class attendance. Constant interaction with students in laboratory exercises. Taking the exam through revision tests, written and final oral exam. Analysis of revision test, written and oral exam pass rates. | | | | | | | |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1-7 | Recording class attendance |
| Exercises | Class attendance, laboratory exercises | 1-7 | Recording class attendance, submitted report on laboratory exercises |
| Revision tests, exam | Answering written and oral questions | 1-7 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Damir Markulak, Full Prof. Damir Varevac | |
| Course title | Introduction to Structural Engineering | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 4 |
| | Contact hours (L+E+S) | 30+20+10 |

**1. COURSE DESCRIPTION**

*1.1. Course objectives*

Understanding the role and general structural behaviour of the basic elements of structures and the principle of assembling a stable structure in space. Distinguishing between different types of structures depending on the building material, geometric determinants, method of load acceptance and transfer and other relevant parameters. Acquiring basic theoretical knowledge about the methods of calculation of building structures and the concept of reliability of structures according to modern construction standards. Training to conduct a load analysis for typical actions on buildings.

*1.2. Course enrolment requirements*

None

*1.3. Expected learning outcomes*

1. Describe and comment on the basic properties and role of basic structural elements in real constructions
2. Classify structures in terms of relevant parameters that affect their properties and behaviour
3. Demonstrate different ways of ensuring the spatial stabilization of a structure and create a disposition solution for simpler structures
4. Describe and comment on the purpose, advantages and disadvantages of different methods of design calculations
5. Interpret the basics of the concept of reliability according to structural design standards (Eurocodes)
6. Make a load analysis for simpler structures in building design (analyse the impact of live and constant load, usage and snow and wind loads)

*1.4. Course content (syllabus)*

Introduction to building structures. Basic elements of structures - beams, pillars, panels, walls, arches. Division of structures according to different criteria (type of material, geometric characteristics, construction concept, etc.). Basic characteristics of structures and their elements - strength, stiffness and ductility. Global and local stability. Structural robustness. Elements of structure disposition. Standards for structural design – Eurocodes. Introduction to structural design methods. Method of limit states. Basics of building structure reliability. Partial coefficient method. Actions on structures. Typical actions on buildings – self weight and constant load, usage, snow loading and wind action. Calculations. Combined actions.

| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and network<br>☒ laboratory<br>☒ tutorials<br>☐ other _____ |
|---|---|---|
| *1.6. Comments* | | |

*1.7. Student requirements*

Regular class attendance and preparation of a seminar paper.

*1.8. Student performance[8] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
| Written exam | 1.0 | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | (1.0) | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY* | ECTS | LEARNING OUTCOME** | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 2.0 | 1,2,4,5 | Lectures and exercises | Recording class attendance | 0 | 0 |
| Preparation of a seminar paper | 1.0 | 1,2,3,4,5,6 | Supervised seminar paper and team work | Reviewing and grading the seminar | 21 | 35 |
| Continuous assessment | 1.0 | 1,2,3,4,5,6 | Revision tests | Reviewing and grading the revision tests | 39 | 65 |
| Taking a written exam | 1.0 | 1,2,3,4,5,6 | Written exam | Reviewing and grading the written exam | 60 | 100 |

*1.10. Required reading (as on submission of the study programme proposal)*

1. Markulak, D., Zovkić, J., Kraus, I.: Građevinske konstrukcije u zgradarstvu, Građevinski i arhitektonski fakultet Osijek, 2021.

*1.11. Recommended reading (as on submission of the study programme proposal)*

1. Gulvanessian, H., Formichu, P., Calgaro, J.A.: Designer's guide to Eurocode 1, Actions on Buildings: EN1991-1-1 and 1-3 to 1-7, ICE publishing, 2009.
2. Construction standards HRN EN 1991 (HRN EN 1991-1-1, HRN EN 1991-1-3, HRN EN 1991-1-4)

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Students' work is monitored through recording class attendance, class participation, assessment of effort and accuracy of the seminar paper and continuous knowledge assessment (revision tests) or the written exam.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1,2,4,5 | Recording class attendance |
| Seminar paper | Preparation of a seminar paper | 1,2,3,4,5,6 | Reviewing and grading of the seminar paper |
| Revision tests | Continuous assessment | 1,2,3,4,5,6 | Reviewing and grading of revision tests |
| Written exam | Answering written questions | 1,2,3,4,5,6 | Assessment of answers |

[8] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Lidija Tadić | |
| Course title | Environmental Protection | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 20+0+10 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introduction to all components of the environment, pressures on the environment, and especially to the impacts of construction projects on the environment. The emphasis is on raising awareness of the importance of the environment and environmental protection, rather than on the acquisition of formal knowledge.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Define basic terms and impacts on the environment.
2. Recognize the importance of all components of the environment and their vulnerability.
3. Recognize the role of man and his/her interventions and activities in the environment (especially construction interventions).
4. Define the possibilities of protection of individual components of the environment.

*1. 4. Course content (syllabus)*

Environment and its components. Air, water, soil, biota. Application of the concept of sustainable development. Influence of construction on environmental components. Environmental protection strategy. Environmental impact assessments. State of the environment in Croatia and Europe.

| *1. 5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance. Mandatory preparation and presentation of a seminar paper.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | 0.5 | Seminar paper | 0.5 | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| Grading and evaluation of student work during classes:<br>- class attendance, class participation, seminar paper<br>- no exam<br>- final grade is the seminar paper grade |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Briški, F. (2016): Zaštita okoliša, FKIT, Sveučilišta u Zagrebu<br>Herceg, N. (2013): Okoliš i održivi razvoj, Synopsis, Zagreb<br>Izvješća o stanju okoliša u Republici Hrvatskoj, available at http://www.haop.hr/hr/tematska-podrucja/integrirane-i-opce-teme/opce-teme/dokumenti |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Sperling, D.; Cannon, J. S. (2007): Driving Climate Change, Elsevier |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Monitoring class attendance and constant communication with students. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 4 | Class attendance records, submitted seminar paper |

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Dina Stober | |
| Course title | Urban Planning and Design | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | elective | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 15+30 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

The aim of the course is to introduce students to the basic concepts and instruments of urban planning and design. The legislative framework is used to clarify the meaning and role of the land use plan, density, spatial indicators and the relationship between the type of construction and spatial indicators. The aim of the course is to acquire knowledge and apply methods for creating a complete spatial solution for a given area.

*1. 2. Course enrolment requirements*

None

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. compare the content and instruments of different levels of physical and urban planning documents
2. list and interpret urban quality indicators in urban planning
3. identify possible key issues and advantages of residential areas with the help of examples
4. apply the principles of organization of residential areas
5. critically interpret the principles of organization of residential areas using examples

*1. 4. Course content (syllabus)*

Basic principles of urban planning. Types of physical plans. Local physical planning documents. Parts of the local physical plan. Stages in the development of the physical plan. Legal regulations in the field of physical planning in the Republic of Croatia. Physical Planning Act. Quantitative indicators in urban planning. Typology of buildings. Production of a detailed development plan through teamwork. Organization of a residential neighbourhood of a given purpose using different typologies of residential construction. Defining land use and urban rules for a given residential area.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance, project development in team work, submission and public presentation of results.

*1. 8. Student performance evaluation*

| Class attendance | 1.5 | Class participation | | Seminar paper | | Experimental work | |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | 0.5 | Oral exam | | Essay | | Research | |
| Project | 1 | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Class attendance records, class participation records, evaluation of project results and project presentation.
It is necessary to complete each of the five design tasks by the deadline. Programmes are assessed as follows:
– there is no awareness or process of organizing the residential area, not participating in the discussion and argumentation, the plan does not meet the technical requirements or adequately express a clear idea – 55%
– the awareness of and the process of organizing the residential area are correct, but the result is not a highly creative and well-argumented work, participation in discussion and argumentation is not considerable, the plan meets the technical requirements but vaguely expresses the idea - 66%
– the awareness of and the process of organizing the residential area are correct, but the result is a partly creative and argumented work, participation in discussion and argumentation is satisfactory, the plan meets the technical requirements but partly expresses the idea – 78%
– there is full awareness of and the process of organizing the residential area, the result is a creative and argumented work, participation in discussion and argumentation is well-articulated, the plan meets the technical requirements and clearly expresses the idea - 90%
– there is full awareness of and the process of organizing the residential area, the result of which is a highly creative and well-argumented work, participation in discussion and argumentation is well-articulated, supported by examples, the plan meets the technical requirements and clearly expresses the idea – 100%
0 - 55% insufficient (1)
56 - 66% sufficient (2)
67 - 78% good (3)
79 - 90% very good (4)
91 - 100% excellent (5)

*1. 10. Required reading (as on submission of the study programme proposal)*

Prinz D.: Urbanističko planiranje, Tehnička knjiga, Zagreb, 2006.
Pegan, S: Urbanizam - Uvod u detaljno urbanističko planiranje, Zagreb: Sveučilište u Zagrebu, Arhitektonski fakultet, 2007.
Vizije gradova i prostora, Hrvatski zavod za prostorni razvoj, Udruga hrvatskih urbanista, Zagreb, 2017. https://mgipu.gov.hr/UserDocsImages/Zavod/Publikacije/Vizije_gradova_web.pdf

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Gerrit Schwalbach Basics Urban Analysis, Birkhauser, Base, Boston, Berlin, 2009.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Quality Assurance Office of the Faculty of Civil Engineering and Architecture Osijek.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures – presentation, group discussion | Listening to presentations, studying and using literature, participating in discussions | 1,2,3,5 | recording class attendance monitoring the ability to reason and interpret |
| Exercises – auditory and constructive exercises, individual and group discussion | Study and use of literature, application of knowledge and skills, project development, participation in the discussion | 4.5 | recording class attendance monitoring the ability to infer and provide oral and graphical interpretation |

| | | | |
|---|---|---|---|
| Field instruction – analysis of practical examples | Participation in the discussion | 3.5 | recording class attendance monitoring the ability to reason and interpret |
| Final examination | Study and use of literature, written presentation of knowledge | 1,2,3,5 | assessment of the written exam according to the given grading criteria |
| Final presentation of the project | Study and use of literature, oral presentation of the project | 4.5 | project assessment and oral and graphic presentation of the project according to the given assessment criteria |

| **General information** | | |
|---|---|---|
| Lecturer | | |
| Course title | Field Instruction | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 1.0 |
| | Contact hours (L+E+S) | 0+15+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Developing direct perceptual cognitive insight into various aspects of construction projects. Lectures are conducted in situ during guided tours according to the field instruction plan. Possible connection between different courses. Recognizing techniques, technology and organization of various work processes at construction site.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Connect theory with examples from practice.
2. Create a holistic perception of a construction project.
3. Interpret the specific processes of the observed construction project in space and time.

*1. 4. Course content (syllabus)*

Preparation and site visit to selected current construction projects. Introduction and interpretation of specific processes of the selected project.

| *1. 5. Type of instruction* | ☐ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Attending field instruction and active participation during construction site visits. Students are required to adhere to safety precautions.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 0.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

| |
|---|
| None. |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Jurjević, D.: *Sigurnost na radu za studente*, svezak 15, Biblioteka Zaštita na radu, Rijeka, 2018., available at http://www.riteh.uniri.hr/media/filer_public/53/e6/53e6944f-70ba-4854-bda3-6ae7d71b56fa/sigurnost-na-radu-za-studente-2018.pdf |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Exercises – presentation, group discussion | Active participation in group discussion | | Class attendance records, assessment of the ability to reason and connect knowledge |

| **General information** | | |
|---|---|---|
| Lecturer | Lidija Kraljević, M.Ed. | |
| Course title | English Language III | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Number of hours (L+E) | 15+15 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Acquiring additional knowledge by developing comprehension, writing and translation skills. Expanding construction terminology and knowledge of morphological and syntactic features of field-specific texts. Expanding general vocabulary.

*1. 2. Course enrolment requirements*

Basic knowledge of grammar and general vocabulary, and having passed the course English Language 2

*1. 3. Expected learning outcomes*

1. Use different linguistic, grammatical and syntactic structures in field-specific technical English.
2. Use field-specific vocabulary taught during the course in speech and writing.
3. Translate more complex field-specific texts from English into Croatian and from Croatian into English.
4. Analyse more complex field-specific texts in translation from English into Croatian and from Croatian into English.

*1. 4. Course content (syllabus)*

Introduction (2); Transportation system (4); Environmental/sanitary engineering (2); Statics (2); Wood design & construction (2) Preliminary exam (2); Concrete Design & Construction I (4); Loads in structural design (2); Earthquake effects on structures (2); Geological survey (2); Mechanical properties of materials (2); Revision (2); Preliminary exam (2)

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

| |
|---|
| Grading scheme for preliminary exams:<br>10% regular class attendance, submitted translations, completed exercises<br>35% 1st preliminary exam<br>35% 2nd preliminary exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade)<br><br>Grading scheme for exams:<br>10% regular class attendance, submitted translations, completed exercises<br>70% written exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade) |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Kraljević L: Structures in Time & Space I, Faculty of Civil Engineering and Architecture Osijek, J. J. Strossmayer University of Osijek, 2002. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Kralj-Štih, A.: English in Civil Engineering, Croatian University Edition, 2004.<br>Internet sources |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Keeping records of class attendance and student activities<br>Written exercises (translations, abstracts, vocabulary and grammar exercises)<br>Oral expression (reading, oral communication) |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance<br><br>Translation and interpreting from and into a foreign language, vocabulary exercises<br>Discussions, debates, speaking exercises, pair/group work, presentations<br>Translation of field-specific texts from and into a foreign language, writing abstracts of field-specific texts, short presentations/retelling of field-specific texts<br>Silent and loud reading (reading comprehension), retelling or rewriting of texts, articles and documentaries | 1, 2, 3, 4 | Class attendance records.<br><br>Formative assessment during the teaching process. |
| Final summative knowledge testing | Taking the exam | 1, 2, 3, 4 | Grading exams according to grading criteria |

| **General information** | | |
|---|---|---|
| Lecturer | Anamarija Štefić, M.Ed. | |
| Course title | German Language III | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | elective | |
| Year/Semester | 2nd year/4th semester | |
| ECTS value and type of instruction | ECTS | 2.00 |
| | Contact hours (L+E+S) | 15 + 15 + 0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

- expanding field-specific vocabulary
- mastering language and skills for training and learning and for communication in the professional field
- encouraging independent reading of professional literature and documentation in German
- expanding technical knowledge primarily at the receptive level (written and oral reception) depending on the desired language level

*1. 2. Course enrolment requirements*

Students must have attended courses German Language I and German Language II

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. express their own opinion on topics related to the professional field
2. translate a more complex professional text from German into Croatian and vice versa
3. use grammatical structures and aspects in written exercises and oral communication
4. use field-specific vocabulary in independent and spontaneous speech and writing
5. express hypotheses based on field-specific texts and summarize the information

*1. 4. Course content (syllabus)*

- Brückenbau: Geschichte, Balkenbrücken, Bogenbrücken, Hängebrücken, Schrägseilbrücken, Fachwerkbrücken, Spannbandbrücken, bewegliche Brücken
- Wasserversorgung
- Wasserkraftwerk
- Riesen-Staudämme verändern die Welt
- Flughafen
- Tragverhalten beim Hochhäusern
- Windenergieanlage

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

- class attendance (minimum 70%)
- doing exercises and translations in class
- occasional individual assignments (not obligatory but for earning additional points)

| *1. 8. Student performance evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

During the semester, there are two (2) preliminary exams, and the average grade on preliminary exams is taken as the final grade. If the student does not pass (gets a negative grade) or is not satisfied with the grade on the preliminary exam he/she can/must take the final exam. Only students who want to get an excellent grade or those who want a higher grade take the oral exam.
Students can collect 45 points on each preliminary exam and 10 points by completing additional individual assignments
The final grade is the sum of all points earned during the semester based on the following grading scale:
sufficient (2): 44-57
good (3): 58-71
very good (4): 72-85
excellent (5): 86-100

*1. 10. Required reading (as on submission of the study programme proposal)*

- Štefić, Anamarija (2015.) Deutsch im Bauwesen, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski fakultet Osijek, Osijek
- Various texts from the Internet

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Kralj Štih, Alemka (2005). Deutsch im Bauingenieurwesen, Hrvatska sveučilišna naklada, Zagreb
- Ritoša, M. – V. Sekula (1989.) Njemački za građevinare, Škola za strane jezike, Zagreb
- Tecilazić, Franci (1986.) Deutsch für Studenten der Architektur, Arhitektonski fakultet Sveučilišta u Zagrebu, Zagreb

Journals from the Faculty library:

- Bautechnik, Ernst & Sohn, Berlin
- Bauingenieur, Springer Verlag, Berlin
- Bauen mit Holz, editor: Klaus Fritzen, Berlin
- Beton und Stahlbeton, editor: Konrad Bergmeister et al., Berlin

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Keeping records of class attendance and student activities
Written exercises (translations, abstracts, vocabulary and grammar exercises)
Oral expression (reading, oral communication)

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| | Written exercises (translations, abstracts, vocabulary and grammar exercises) | 1, 2, 3, 4, 5 | Formative assessment during the teaching process |
| | Oral communication | 1, 3, 4, 5 | Formative assessment during the teaching process |
| | Individual assignments | 1, 2, 3, 4, 5 | Formative assessment during the teaching process |
| Final summative knowledge testing | Answering written and oral questions | 1, 2, 3, 4, 5, 6 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Juro Zovkić | |
| Course title | Introduction to Timber Structures | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+25+5 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to wood as a building material, the acquisition of basic knowledge about the properties, capabilities, conditions and methods of using wood in construction and the methodology of calculating simpler and typical timber structures loaded in the plane and space according to the standard HRN EN-1995. This knowledge will become the foundation for further education and enable students to acquire limited competencies in the field of timber structures and structural engineering in general.

*1. 2. Course enrolment requirements*

None.
Recommendation: a) Having passed the courses Mathematics I and II, Mechanics I, Strength of Materials I, Building Statics I
b) Having attended the courses Mechanics II, Strength of Materials II

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. List the basic types of wood and strength of solid and glued laminated timber used in construction.
2. Explain the properties of wood.
3. Sketch and distinguish between simple and typical static systems of timber structures.
4. Make calculations in accordance with the HRN EN-1995 standard for simple and standard timber structures loaded in plane and space, i.e. planar and spatial rod elements.
5. Check the evidence of strength and stability of timber structure elements loaded in plane and space.

*1. 4. Course content (syllabus)*

Introduction, historical development of timber structures, recent tendencies. Wood as a building material - wood biology, technologies of wood element production, technical properties, wood rheology, wood protection of timber structures. Types of timber structures, modern timber structures, glued laminated wood. Basics of timber structures – graphic representation of timber structures, constants of wood material, HRN EN-1995 standard. Joints and fasteners in timber structures – overview, basics of joint construction, stability of joints, fasteners, overview of fasteners, dimensioning of fasteners. Stability of timber structures – basic evidence of stability, loads and actions, evidence of stability of elements of timber structures, elements of spatial stability.

| *1. 5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☒ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Conditions for obtaining the lecturer's signature: Regular class attendance (less than 30% of absences) and submitting an accurate semester assignment by the end of the semester. Students receive a semester assignment after the fourth exercise.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | 1.5 | Oral exam | 1.0 | Essay | | Research | |
| Project | | Continuous assessment | (2.5) | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

First option (taking revision tests): Student work on the course is evaluated during classes. Students can take two revision tests during classes (continuous assessment). The student can achieve 100 points for the course (the activities listed below are assessed).
Example:
Continuous knowledge assessment: the total number of points that a student can achieve is 100 points

1. Class attendance (max. 3 absences from classes): 5 points
2. Class participation (in lectures and exercises): 10 points
3. Written and oral exam: 80 points
   1. Revision test (practical tasks+theory): 40 (23+17) points (pass rate for the revision test is minimum 20 points, of which 8 for the theoretical part and 12 for the practical part)
   2. Revision test (practical tasks+theory): 40 (23+17) points (pass rate for the revision test is minimum 20 points, of which 8 for the theoretical part and 12 for the practical part)
4. Seminar paper (semester assignment): 5 points

Final grade (it is necessary to register for the exam):

- sufficient (2) …… 51-60 points
- good (3) …….. 61-75 points
- very good (4) ……76-90 points
- excellent (5) ……..91-100 points

Second option (taking the final exam): After passing the written exam, the student can take the final oral exam.
The written exam lasts 120 minutes. It is allowed to use all available literature (but not solved examples). After passing the written exam, the student can take the final oral exam. If a student does not pass the oral exam, he/she must retake the written exam. The following should be brought to the written exam: a double sheet of paper, a few clean sheets papers, a calculator, a pen and an eraser.
N.B.: The student cannot take the exam (or get a grade) until he/she receives lecturer's signature confirming that the student has met all the requirements to take the exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

Bjelanović, A., Rajčić, V.: Drvene konstrukcije prema europskim normama, Hrvatska sveučilišna naklada, Zagreb, 2005. (2nd edition 2007.)
Markulak, D., Zovkić, J., Kraus, I.: Građevinske konstrukcije u zgradarstvu, Građevinski i arhitektonski fakultet Osijek, 2021.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

HRN EN 1995-1-1 standard
Žagar, Z: Drvene konstrukcije I-IV, Udžbenici Sveučilišta u Zagrebu, Zagreb, 1999.
Colling, F.: Hlozbau (Grundlagen und Bemessung nach EC5), Springer Vieweg, 2019. (6th edition)
Colling, F.: Hlozbau – Beispiele (Musterlösungen und Bemessungstabellen nach EC5), Springer Vieweg, 2019. (6th edition)
Becker, K., Rautenstrauch, K., Ingenieurholzbau nach Eurocode 5 (Konstruktion, Berechnung, Ausführung), Ernst&Sohn, 2012.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance. Constant interaction with students during lectures and laboratory exercises. Taking the exam through revision tests, making a semester assignment during the semester, written exam, final oral exam. Analysis of revision test, written and oral exam pass rates.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1,2,3,4,5 | Class attendance records. Class participation |

| | | | |
|---|---|---|---|
| Supervised seminar paper and team work | Preparation of a seminar paper | 1,3,4,5 | Reviewing and grading the seminar paper |
| Written exam | Taking a written exam | 1,3,4,5 | Reviewing and grading the written exam |
| Revision tests | Continuous assessment | 1,2,3,4,5 | Reviewing and grading revision tests |
| Oral exam | Oral exam | 1,2,3,4,5 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Damir Markulak | |
| Course title | Introduction to Steel Structures | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+20+10 |

**1. COURSE DESCRIPTION**

*1.1. Course objectives*

Understanding the advantages and disadvantages of steel as a construction material and knowledge of basic methods of testing the mechanical properties of steel. Acquisition of basic theoretical and practical knowledge and skills in the design of steel structures, with special emphasis on the concept of calculation of simple beam structural elements and the type of joints between structural elements.

*1.2. Course enrolment requirements*

None

1.3. Expected learning outcomes

1. Interpret the properties of steel, and the advantages and disadvantages of its application in building structures
2. Choose the basic material for the steel structure
3. Calculate tensile, compression and bending resistance of cross-sections.
4. Calculate the resistance of the elements to buckling and lateral torsional buckling
5. Compare the properties and behaviour of bolted and welded connections
6. Categorize and explain different methods of protection of steel from corrosion and fire

*1.4. Course content (syllabus)*

Steel as a building material. Structural steel – types, production and properties. Steel products. Strain analysis. Heat treatment. Selection of basic material. Classification of cross-sections. Structural analysis of steel structures. Calculation of tensile, compression and bending resistance of cross-sections of structural elements. Interactions at the level of cross-sections. Buckling and lateral-torsional bending of structural elements. Calculation of limit state design. Connections in steel structures. Bolted and welded connections. Protection from corrosion and fire. Basics of steel structure design.

| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☒ tutorials<br>☐ other<br>_____ |
|---|---|---|
| *1.6. Comments* | | |

*1.7. Student requirements*

Regular class attendance and preparation of a seminar paper.

*1.8. Student performance[9] evaluation*

| Class attendance | 2.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | 1.5 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | (1.5) | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY* | ECTS | LEARNING OUTCOME** | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 2.0 | 1,3,4,5,6 | Lectures and exercises | Class attendance records | 0 | 0 |
| Preparation of a seminar paper | 1.0 | 2,3,4,5,6 | Supervised seminar paper and team work | Reviewing and grading the seminar paper | 10 | 20 |
| Taking a written exam | 1.5 | 1,2,3,4,5,6 | Written exam | Reviewing and grading the written exam | 60 | 100 |
| Continuous assessment | 1.5 | 1,2,3,4,5,6 | Revision tests | Reviewing and grading the revision tests | 48 | 80 |
| Oral exam | 0.5 | 1,3,4,5,6 | Oral exam | Assessment of answers | 60 | 100 |

*1.10. Required reading (as on submission of the study programme proposal)*

1. Markulak, D.: Proračun čeličnih konstrukcija prema EN 1993-1-1, Građevinski fakultet Osijek, 2008
2. Markulak. D. Me(n)talne konstrukcije, Građevinski i arhitektonski fakultet Osijek, 2018.
3. Markulak, D., Zovkić, J., Kraus, I.: Građevinske konstrukcije u zgradarstvu, Građevinski i arhitektonski fakultet Osijek, 2021.

*1.11. Recommended reading (as on submission of the study programme proposal)*

1. Skejić, D., Džeba, I.: Čelične konstrukcije, priručnik, Građevinski fakultet Zagreb, 2015.
2. Markulak, D.: Posebna poglavlja čeličnih konstrukcija, Građevinski fakultet Osijek, 2010.
3. B. Androić, D. Dujmović, I. Džeba: Čelične konstrukcije 1, IA Projektiranje, Zagreb, 2009.
4. Da Silva, L. S.; Simoes, R.; Geravsio, H.: Design of steel structures, ECCS Eurocode design manuals, 2010
5. HRN EN 1993-1-1, HRN EN 1993-1-5, HRN EN 1998-1-1 standards

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Student work is monitored through recording class attendance, class participation, assessment of effort and accuracy of the seminar paper, and continuous knowledge assessment (revision tests) or the written exam and oral exam.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1,3,4,5,6 | Recording class attendance |
| Seminar paper | Preparation of a seminar paper | 2,3,4,5,6 | Reviewing and grading the seminar paper |
| Written exam | Taking a written exam | 1,2,3,4,5,6 | Reviewing and grading the written exam |
| Revision tests | Continuous assessment | 1,2,3,4,5,6 | Reviewing and grading of revision tests |
| Oral exam | Answering oral questions | 1,3,4,5,6 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marija Šperac | |
| Course title | Water Supply and Sewage Systems I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/semester | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30+30+0 |

**1. COURSE DESCRIPTION**

*1.1. Course objectives*

Acquisition of theoretical knowledge on water supply and sewage management. Acquisition of practical knowledge in the design and hydraulic dimensioning of individual parts of water supply and sewage systems

*1.2. Course enrolment requirements*

None

*1.3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. calculate the dimensions of the water tanks
2. define relevant parameters and hydraulically dimension the water supply and sewage network
3. calculate the dimensions of sewage network facilities
4. define the works required for the construction of water supply and sewage

*1.4. Course content (syllabus)*

Water supply. Water consumption. Water supply systems. Water interventions: underground and surface. Drinking water conditioning plants and procedures. Pumping stations – role, power calculation and selection of pumping units. Pressure reduction stations. Hydraulic calculation of water supply networks. Materials for the construction of the water supply network. Water tanks – role, dimensioning and equipment. Construction, commissioning and maintenance of water supply facilities. Waste water disposal. Types of waste water, basic characteristics and their impact on the environment and human health. Waste water disposal systems, basic schemes of sewage systems. Relevant quantities of waste water. Basics of sewage design. Limitation of sewage system parameters. Types of sewer collectors, materials, types, shapes and basic characteristics. Buildings in the sewer system. Sewage pumping stations. Rain overflow. Retention basins. Basic wastewater treatment procedures. Effluent disposal, basic principles and conditions.

| | | |
|---|---|---|
| *1.5. Type of instruction* | [X] lectures<br>[ ] seminars and workshops<br>[X] exercises<br>[ ] distance learning<br>[ ] field work | [ ] individual assignments<br>[ ] multimedia and e-learning<br>[X] lab work<br>[ ] tutorials<br>[ ] other<br>_____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Minimum class attendance 70% of lectures and exercises

*1.8. Student performance[10] evaluation*

[10] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | 1 | Seminar paper | | Experimental work | |
| Written exam | (1.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 2.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

**a) Grading and evaluation of student work during classes**
– class attendance, class participation, work during exercises, revision test

**a) Grading and evaluation of student work at the final exam**
– written/oral/public/in a group

*1.10. Required reading (as on submission of the study programme proposal)*

Gulić, I.: Opskrba vodom, Hrvatski savez građevinskih inženjera Zagreb, 2000.
Margeta, J.: Kanalizacija naselja – Građevinsko arhitektonski fakultet Split, 1998
Internal course materials on the course website

*1.11. Recommended reading (as on submission of the study programme proposal)*

J. Margeta: Vodopskrba naselja, planiranje, projektiranje, upravljanje, obrada vode, Građevinsko arhitektonski fakultet Split, 2010.
D. Ljubisavljević, B. Babić, A. Đukić, B. Jovanović: Komunalna hidrotehnika primeri iz teorije i prakse, Građevinski fakultet Beograd, 2010.

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Revision results, course attendance and the degree of active class participation

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1-4 | Recording class attendance |
| Exercises | Class attendance | 1-4 | Recording class attendance |
| Revision tests, exam | Answering written and oral questions | 1-4 | Assessment of answers |

| **General information** | | |
|---|---|---|
| Lecturer | Full Prof. Sanja Dimter | |
| Course title | Roads | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+45+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to the method of calculating and determining the main technical elements of the road, solving road drainage and the basics of road construction.

*1. 2. Course enrolment requirements*

-

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. explain the basic principles of road traffic and the basic driving dynamics,
2. define and describe the elements of the cross section of the road,
3. define and calculate the horizontal elements of the road,
4. define and calculate the vertical elements of the road,
5. to design a road outside the settlement in simple conditions at the level of the preliminary design.

*1. 4. Course content (syllabus)*

Introduction, classification and road regulations. Basics of vehicle motion. Defining and describing the elements of the cross section of the road, Horizontal alignment. Vertical alignment. Spatial alignment. Road drainage: ditches, gutters, culverts, drains. Road construction materials. Lower structure: earthwork and walls. Carriageway construction.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance (min 70%).
Independent and continuous work on the programme during exercises.
Accurate programme submitted on time.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | 1.5 | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

The final examination consists of the written and the oral exam, the questions on the written part of the exam are designed according to the course literature and lectures. The maximum number of points on the written exam is 100.
Written exam grading scheme:

| Points | grade |
|---|---|
| up to 55 | insufficient |
| 55-65 | sufficient |
| 65-75 | good |
| 75-85 | very good |
| 85 and more | excellent |

There are two revision tests during the semester and the student can pass the exam if he/she earns at least 60 points at each revision test. The maximum number of points on the revision test is 100. Revision tests are graded using the grading scheme for written exams.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Željko Korlaet, Vesna Dragčević: "Projektiranje i građenje cesta", Građevinski fakultet Sveučilišta u Zagrebu, 2018.
2. Pravilnik o osnovnim uvjetima kojima javne ceste izvan naselja i njihovi elementi moraju udovoljavati sa stajališta sigurnosti prometa, Official Gazette110/2001.
3. Vesna Dragčević, Željko Korlaet: "Osnove projektiranja cesta", Građevinski fakultet Sveučilišta u Zagrebu, 2003.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Vesna Dragčević, Tatjana Rukavina: "Donji ustroj prometnica" Građevinski fakultet Sveučilišta u Zagrebu, 2006.
2. Wolfgang Kuhn: „Fundamentals of road design (Advances in Transport) "1st Edition; WIT Press / Computational Mechanics; 1st edition (February 18, 2013)

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The course evaluation is done on the basis of the following criteria:
- results of the exam pass rate analysis (for revision tests and the exam)
- results of class attendance analysis
- results of student survey analysis

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1 - 5 | Recording class attendance |
| Independent work | Making a semester assignment | 1 - 5 | Evaluating the semester assignment |
| Final examination | Answering written and oral questions | 1 - 5 | Assessing answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Krunoslav Minažek, M.S.C.E. | |
| Course title | Geotechnical Engineering | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+30+0 |

**1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introduce students to geotechnical engineering through learning about types and methods of soil research, analysis of shallow and deep foundations, supporting structures for backfill and buried structures, landslide remediation, soil improvement methods and adoption of Eurocode 7 for geotechnical works.

*1. 2. Course enrolment requirements*

- having attended the course in Soil Mechanics

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:
1. List and explain in situ soil testing procedures,
2. Carry out the analysis of stresses and strains in shallow and pile foundations and calculate the bearing capacity of soil and foundations,
3. Explain and calculate ground pressures on supporting structures and dimension supporting structures
4. Distinguish and explain the technologies of soil interventions (foundations, construction pits, structures on backfilled soil),
5. List and explain the procedures for soil improvement and landslide remediation,
6. Explain the principles of using geosynthetics in soil,
7. Present and explain the basic roles of materials in landfills,
8. Explain and apply the procedures of observation of geotechnical works, apply filter rules for soil and drainage.

*1. 4. Course content (syllabus)*

- Overview of geotechnical facilities and works,
- Geotechnical investigations,
- Shallow foundations,
- Construction pits, protection of excavations (embedded walls),
- Retaining walls, drainage channels, ground anchors,
- Pile foundation, deep foundations,
- Soil improvement
- Structures on backfilled soil,
- Landslide remediation,
- Reinforced soil, geosynthetics
- Geotechnical aspects of landfills,
- Measurements and observations of geotechnical works.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance. Continuous work on the development of individual assignments (programmes), timely submission of accurate programmes.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | | Seminar paper | 1 | Experimental work | |
| Written exam | (1) | Oral exam | (1) | Essay | | Research | |
| Project | | Continuous assessment | 2 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

There are two written and one oral revision test. Individual assignments (programmes) are submitted at the specified time during the semester, inaccuracies and delay in submission affect the assessment of the programme. Students who do not pass the exam through revision tests take a written and an oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Authorized lectures and exercise materials posted on the course website,
2. Mulabdić, M.: Ispitivanje tla u geotehničkom laboratoriju, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski i arhitektonski fakultet Osijek, Osijek, 2018.,
3. Das, B. M., Sobhan, K.: Principles of Geotechnical Engineering, 9th edition, Cengage Learning, Boston, USA, 2017
4. Miščević, P., Štambuk Cvitanović, N., Vlastelica, G.: Dimenzioniranje gravitacijskih potpornih zidova, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2020.,
5. Mulabdić, M., Bošnjaković, M.: Pojmovnik geosintetika, Osijek: Građevinski fakultet Osijek, 2011.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. EC 7 Standards: HRN EN 1997-1: 2012 / A1: 2014 and HRN EN 1997-1: 2012 / NA: 2016 Eurocode 7 - Geotechnical design - Part 1: General rules and rules and national appendix, HRN EN 1997-2: 2012 Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing (EN 1997-2:2007+AC:2010),
2. Bond A., Harris A.: Decoding Eurocode 7, Taylor & Francis, UK, 2008.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance, evaluation of programmes and revision tests, assessment of written and oral exams.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1-8 | Recording class attendance |
| Exercises | Class attendance | 1-8 | Recording class attendance |
| Individual assignments | Creating independent tasks (programmes) | 1,2,3 | Assessment of individual assignments (programmes) |
| Revision tests, exam | Answering written and oral questions | 1-8 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Hrvoje Krstić | |
| Course title | Building Technology I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/5th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+15+15 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to building technology. Describing the manner and order of performing works on the construction site. Get acquainted with the methods and manner of using materials, equipment and machinery on the construction site.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

1. Identify technological process.
2. Describe the sequence of works.
3. Describe the method of production of building materials.
4. Explain the role of construction machinery with regard to its purpose.
5. Describe groups of works in construction.
6. Calculate the effects of individual machines.
7. Select the optimal combination of machines and equipment for a simple example case.

*1. 4. Course content (syllabus)*

Introduction to building technology. Definition and purpose of technology. Safety measures at the construction site. Production and processing of building materials. Plants for the production of masonry products. Concrete mixing plants. Production of stone aggregates. Aggregate crushing, cleaning and separation plants. Preparatory works on the construction site. Earthwork and earthwork equipment. Technology of carpentry, reinforcement and concrete works. Concreting in special conditions. Technology of masonry work – masonry and plastering. Insulation works – waterproofing, thermal insulation and sound insulation. Vertical and horizontal transport on the construction site. Prefabrication of concrete structures. Basic assembly systems. Connections and joining of precast to monolithic structures. Technology dry construction method. Partition walls with metal substructures, suspended ceilings, cladding of walls and ceilings with plasterboard.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

*Regular class attendance.*

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | 0.5 | Seminar paper | | Experimental work | |
| Written exam | (1.50) | Oral exam | (1.00) | Essay | | Research | |
| Project | | Continuous assessment | 2.50 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

*Class attendance, class participation and revision tests during classes are scored according to the data in Table 1.*

*Table 1 Evaluation of student work during classes*

| Activity | STUDENT ACTIVITY | Points | Point range | Share in the final grade |
|---|---|---|---|---|
| Class attendance | 91% and more | 5 | 0-5 | 10% |
| | 70% - 90% | 2 | | |
| | Less than 70% | 0 | | |
| Class participation | Frequent participation, discussion | 5 | 0-5 | 10% |
| | Occasional participation, questions | 2 | | |
| | No active participation in classes | 0 | | |
| Revision tests | Revision test 1 | 20 | 0-40 | 80% |
| | Revision test 2 | 20 | | |
| Total number of points | | 50 | 0-50 | 0-100% |

*Assessment of student work during classes and at the final exam is done according to the grading scheme in Table 2.*

*Table 2 Grading and evaluation of student work on the final exam*

| % | Grade |
|---|---|
| 0-59 | Insufficient (1) |
| 60-69 | Sufficient (2) |
| 70-79 | Good (3) |
| 80-89 | Very good (4) |
| 90-100 | Excellent (5) |

*Students are entitled to get a signature if they collect a sufficient number of points by attending lectures, class activities and taking revision tests. The minimum number of points required to exercise the right to get a signature is 30% of the total number of points (which is 15 points) with mandatory class attendance. Absence from classes is tolerated up to 70% of the total number of hours.*

*Students who earn a sufficient number of points by attending lectures, participating in classes and passing revision tests are evaluated on the basis of the number of points expressed as a percentage according to the grading scheme in Table 2.*

*1. 10. Required reading (as on submission of the study programme proposal)*

Lončarić, R., Organizacija izvedbe građevinskih projekata, Zagreb, 1995.
Bučar, G., Tesarski, armirački i betonski radovi, Građevinski fakultet Sveučilišta Josipa Jurja Strossmayera, 1997.
Ćirović, G., Tehnologija građenja, Beograd, Visoka građevinsko-geodetska škola, 2007.
Hadžić, R. H., Tehnologija izvođenja oplata, skela i lansirnih konstruktivnih sistema, Sarajevo, Građevinski fakultet, 2008.
Arizanović, D., Tehnologija građevinskih radova, Univerzitet u Beogradu, Beograd, 1997. 1
Linarić, Z., Leksikon strojeva i opreme za proizvodnju građevinskih materijala, Zagreb: Business Media Croatia, 2007
Slunjski, E., Građevinski strojevi, Zagreb, 1995.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Daniels (2003.) Advanced building systems, Birkhauser, Basel
David M. Gann (2000.) Building innovation, Thomas Telford Publishing, London
Le Cuyer (1999.) Steel and beyond, Birkhauser, Basel
Weber, Steiger, Hugues (2004.) Timber construction, Birkhauser, Basel

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Conditions set by the study programme of the University undergraduate Study of Civil Engineering and conditions set by the quality assurance system of the Faculty.

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 5 | Class attendance/Class participation/Oral exam |
| Exercises | Active participation in exercises | 4, 6, 7 | Class attendance/Class participation/Written exam |

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Ivan Kraus | |
| Course title | Introduction to Concrete Structures | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+30+0 |

| 1. COURSE DESCRIPTION | | |
|---|---|---|
| *1.1. Course objectives* | | |
| Introducing the basic properties of reinforced concrete. Understanding the advantages and disadvantages of reinforced concrete as a construction material. Acquiring basic theoretical and practical knowledge and skills in the design of reinforced concrete structures, with an emphasis on the structural analysis of simple bar and flat structural elements. | | |
| *1.2. Course enrolment requirements* | | |
| None | | |
| *1.3. Expected learning outcomes* | | |
| 1. Interpret the properties of reinforced concrete, and the advantages and disadvantages of using reinforced concrete for building structures<br>2. Explain the interrelationships between concrete and reinforcement<br>3. Calculate the required amount of reinforcement for the element loaded with transversal forces and bending moment<br>4. Calculate the required amount of reinforcement for the element loaded with longitudinal forces<br>5. Make reinforcement plans of simple reinforced concrete beams and flat construction elements | | |
| *1.4. Course content (syllabus)* | | |
| Introduction to reinforced concrete structures. Advantages and disadvantages of reinforced concrete structures. Strength of concrete. Deformations of concrete under short-term, long-term and cyclic load. Types of steel for reinforcement. Mechanical properties of steel for reinforcement. Bond-slip behaviour of steel-concrete, anchorage and continuation of reinforcement. The role of concrete and reinforcement and their joint participation in load-bearing capacity. Specificities of reinforced concrete structures. Calculation of the protective layer. Minimum and maximum reinforcement area. Calculation of reinforcement of elements loaded with longitudinal forces. Singly and doubly reinforced rectangular and T cross-section loaded by bending. Calculation of transverse reinforcement. Details and basic rules of reinforcement of simple beam and flat construction elements. | | |
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | | |
| *1.7. Student requirements* | | |
| Regular class attendance (minimum 70%) and submitting a semester assignment by the end of the current semester. | | |

*1.8. Student performance[11] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | 0.1 | Seminar paper | 0.5 | Continuous assessment | 2.4 |
| Written exam* | (3.0) | | | | | | |

** If the student is not exempted from the written exam on the basis of writing a seminar paper and continuous knowledge assessment*

*1.9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY | ECTS | LEARNING OUTCOME | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 2.0 | 1, 2, 3, 4, 5 | Lectures, exercises and lab work | Class attendance records | 0 | 0 |
| Class participation | 0.1 | 1, 2, 3, 4, 5 | Conversation and discussion | Questions while working on a new topic | 0 | 5 |
| Seminar paper | 0.5 | 3, 4, 5 | Solving tasks | Reviewing and grading the seminar paper | 9 | 15 |
| Continuous assessment | 2.4 | 1, 2, 3, 4, 5 | Revision tests | Review of knowledge assessment | 48 | 80 |
| Written exam* | 3.0 | 1, 2, 3, 4, 5 | Written exam | Review of knowledge assessment | 60 | 100 |

** If the student is not exempted from the written exam on the basis of writing a seminar paper and continuous knowledge assessment*

*1.10. Required reading (as on submission of the study programme proposal)*


Sorić, Z., Kišiček, T. (2014). Betonske konstrukcije 1. Sveučilište u Zagrebu, Zagreb
Sorić, Z., Kišiček, T. (2018). Betonske konstrukcije 2. Sveučilište u Zagrebu, Zagreb
Markulak, D., Zovkić, J., Kraus, I. (2021). Građevinske konstrukcije u zgradarstvu, Građevinski i arhitektonski fakultet Osijek, Osijek
Konstantinidis, A. (2010). Earthquake resistant buildings from reinforced concrete. Alfa Grafico, Athens


*1.11. Recommended reading (as on submission of the study programme proposal)*


Bhatt, P., MacGinley, T.J., Choo, B.S. (2014). Reinforced Concrete Design to Eurocodes: Design Theory and Examples, 4th Edition. CRC Press
Calavera, J. (2011). Manual for Detailing Reinforced Concrete Structures to EC2. Taylor & Francis
Beeby, A.W., Narayanan, R.S. (2005). Designers' guide to EN 1992-1-1 and EN 1992-1-2: Eurocode 2: Design of concrete structures: general rules and rules for buildings and structural fire design. Thomas Telford, London
Tomičić, I. (1996). Betonske konstrukcije, 3. izmijenjeno i dopunjeno izdanje. Društvo hrvatskih građevinskih inženjera, Zagreb
Tomičić, I. (1996). Betonske konstrukcije - selected chapters, 2. izmijenjeno izdanje harmonized with EC2 and EC8. Grafomerkantile, Zagreb
HRN EN 1992 standards
HRN EN 1998 standards


*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Students' work is monitored through tracking class attendance, class participation, accuracy of seminar paper and continuous knowledge assessment (revision tests) or the written exam. The results of the activities are evaluated using a scoring system and grades based on the criteria.

[11] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| **General information** | | |
|---|---|---|
| Lecturer | Full Prof. Zlata Dolaček-Alduk | |
| Course title | Construction Management I | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 30+45+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Acquiring knowledge about construction project planning, organization of work processes in the construction phase, building site layout and participants in the construction process. Acquiring knowledge and applying procedures for documenting the construction process through the preparation of the bill of quantities, cost calculation, cost breakdown and organisation of building site layout.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Interpret basic concepts in construction management and the organization of participants in the construction process.
2. Calculate the required amount of resources for the construction project.
3. Calculate the unit and total cost of construction works.
4. Make a cost breakdown.
5. Dimension the elements of the construction site.
6. Develop the construction site layout.

*1. 4. Course content (syllabus)*

*Lectures*

Organization theory and influence on the development of construction organization. Properties and specificities of construction that affect organization. Principles of construction organization and management. Documenting the organization of construction. Elements and methods of work in the organization of construction. Organization and mobilization on construction sites (temporary structures and buildings at construction site, fence, storages, plants and workshops, internal transport, construction site roads, electricity and water supply on the construction site, fences on the construction site, spatial arrangement of the construction site, occupational safety measures). Cost calculation of building costs (cost breakdown; costs of labour, material, machinery and equipment, structure of indirect building site costs and company management, determination of factors for calculation of indirect costs). Organization of project participants (participants in the construction process, relations of participants, organizational structures, documentation of the construction process, required on-site documentation). Building site safety. Current trends in construction and construction organization.

*Exercises*

Preparation of bill of quantities. Preparation of material takeoff (in connection with the course in Roads) Making a cost calculation. Making a cost breakdown. Develop the construction site layout.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance, preparation of the semester assignment in a team, participation in group and individual discussions.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.5 | Class participation | | Seminar paper | 1.5 | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Prerequisite for taking the exam: regular class attendance and timely submission of the semester assignment, the possibility of exemption from the written part of the exam on the basis of revision tests (the condition for taking the second revision test is earning 2/3 points on the first revision test).
Point distribution (student can earn a total of 180 points):
- 2 revision tests - 2 x 40 points = 80 points
- semester assignment - 100 points
- additional points - maximum 10 points

Grading scheme:
- 140 – 150 points - sufficient (2)
- 151 – 160 points - good (3)
- 161 – 170 points - very good (4)
- 171 – 180 points - excellent (5)

*1. 10. Required reading (as on submission of the study programme proposal)*

Radujković, M. et al.: *Organizacija građenja*, Sveučilište u Zagrebu, Građevinski fakultet, Zagreb, 2015.
Vukomanović, M.; Kolarić, S.; Radujković, M.: *Priručnik organizacije građenja*, Sveučilište u Zagrebu, Građevinski fakultet, Zagreb, 2018.
Bučar, G.: *Normativi i cijene u graditeljstvu*, ICG d.o.o. Omišalj i Građevinski fakultet u Rijeci, Rijeka, 2003.
Normativi i standardi rada u građevinarstvu - Visokogradnja, Građevinska knjiga, Beograd, 1996.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Klepac, J.: *Organizacija građenja*, Građevinski institut Zagreb, Zagreb, 1989.
Klepac, J.: *Organizacija građenja: uređenje gradilišta,* Fakultet građevinskih znanosti, Zagreb, 1982.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lecture – presentation, analysis of practical examples, group discussion | Class attendance, active participation in group discussions | 1, 2, 3, 4, 5, 6 | Class attendance records, assessment of the ability to reason |
| Exercises – auditory exercises, individual and group discussion, submission of the semester assignment | Attending exercises, active participation in group or individual discussions, preparation of the semester assignment in a team, preparation for the revision test | 1, 2, 3, 4, 5, 6 | Class attendance records, assessment of the ability to make conclusions, evaluation of the semester assignment according to the criteria, evaluation of continuous knowledge assessment |

| | | | |
|---|---|---|---|
| Field instruction | Attending field instruction classes, analysis of examples from practice, active participation in group discussions | 5, 6 | Class attendance records, assessment of the ability to conclude and interpret basic concepts of the organization of construction |
| Knowledge testing | Study and use of literature, presentation of knowledge | 1, 2, 3, 4, 5, 6 | Evaluation of knowledge according to assessment criteria |

| General information | | |
|---|---|---|
| Lecturer | | |
| Course title | Student Internship | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 4.0 |
| | Contact hours (L+E+S) | 15+90+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Gaining experience and insight into the activities of companies and institutions that perform activities in the field of construction. In this course, students acquire generic knowledge and achieve generic learning outcomes (business responsibility, communication skills and teamwork) and specific knowledge and specific learning outcomes related to the work of the company where internship is organized (design, implementation, administrative procedures).

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Use professional language in communication.
2. Identify the stages of project implementation.
3. Identify the organizational structure, participants in the construction project and the structure of the work environment.
4. Critically evaluate the knowledge acquired in completed courses and apply it in solving specific tasks.
5. Design a conceptual solution to the problem of a defined project task.
6. Apply occupational safety rules.

*1. 4. Course content (syllabus)*

*Lectures*

Introduction to the organization, functioning, system of work and main activity of a company, institution or organization in which internship will be performed. Health and safety at work. Information security practice and awareness. Instructions for handling equipment. Communication and teamwork.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>other: student internship☒ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

During the internship: attendance and keeping the internship diary, confirmation from the employer as proof of a successfully completed internship.

After the internship: preparation of a written report (internship diary) in which the activities and tasks performed during the internship are presented and described, and preparation of the final presentation.

| *1. 8. Student performance evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 0.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | 3.5 | | | | | | |

| *1. 9. Assessment of student work during classes and at the final exam* |
|---|
| Student assessment is carried out by employers (internship mentors) on the basis of defined criteria.<br>The internship supervisor evaluates the report and the final presentation.<br>Share of individual evaluation criteria: 30% presentation; 60% report; 10% literacy and documentation. |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Jurjević, D.: Sigurnost na radu za studente, svezak 15, Biblioteka Zaštita na radu, Rijeka, 2018., available at http://www.riteh.uniri.hr/media/filer_public/53/e6/53e6944f-70ba-4854-bda3-6ae7d71b56fa/sigurnost-na-radu-za-studente-2018.pdf |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Summary - Green jobs and occupational safety and health: Foresight on new and emerging risks associated with new technologies by 2020, available online: https://osha.europa.eu/en/publications/summary-green-jobs-and-occupational-safety-and-health-foresight-new-and-emerging-risks/view |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lecture – presentation, group discussion, referring students to independent study of regulations in the field of occupational safety | Monitoring of presentations, use of literature, participation in group discussions | 2, 3, 6 | Recording class attendance |
| Exercises – individual and group discussion, submission of the portfolio | Attending internship, keeping an internship diary, creating a portfolio, final presentation | 1, 2, 3, 4, 5, 6 | Confirmation and assessment of employers on completed internship, evaluation of the final presentation according to the grading criteria |

| General information | | |
|---|---|---|
| Lecturer | | |
| Course title | Bachelor's Thesis | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 5.0 |
| | Contact hours (L+E+S) | 0+60+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Independent preparation and presentation of a thesis offering a conceptual solution or a solution to a theoretical or practical problem in construction (building structures or systems) of limited complexity.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Define a theoretical or practical problem.
2. Carry out independent research work related to the topic of the bachelor's thesis.
3. Apply the knowledge and competencies acquired during studies.
4. Independently apply scientific methods and techniques of analysis in solving problems.
5. Independently solve a theoretical or practical problem.
6. Present and interpret the results of research in the bachelor's thesis.

*1. 4. Course content (syllabus)*

The topic of the bachelor's thesis is selected from engineering courses studied at the Faculty and determined by the Faculty Council. The student, in cooperation with the mentor, conducts research related to the topic of the thesis (maximum 3 months from the date of setting the topic for the thesis). The thesis is prepared in written form.

| *1. 5. Type of instruction* | ☐ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☒ tutorials<br>☐ other<br>_____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Consultations with the course teacher, independent research work and preparation of the bachelor's thesis.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | 3.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Project | | Continuous assessment | | Report | | Practical work | 2.0 |
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| The evaluation committee, which consists of a mentor and two teachers who work in related fields, evaluates the bachelor's thesis. Standing committees for the evaluation of the bachelor's thesis in relevant fields are appointed by the Faculty Council. |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Oraić Tolić, D.: *Akademsko pismo*, Naklada Ljevak d.o.o., Zagreb, 2011.<br>Jakobović, Z.: *Pisanje i uređivanje stručnih i znanstvenih publikacija*, Kiklos – Krug knjige d.o.o., Zagreb, 2013.<br>Silobrčić, V.: *Kako sastaviti, objaviti i ocijeniti znanstveno djelo*, Medicinska naklada Zagreb, Zagreb, 1998. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Mentoring – preparation of the task and the content of the bachelor's thesis | Consultations with a mentor, research and use of literature, independent research work, implementation of the practical part of the work, preparation of the bachelor's thesis | 1, 2, 3, 4, 5, 6 | Evaluation and assessment of the bachelor's thesis |

**COURSES IN THE LOAD-BEARING STRUCTURES (LBS) MODULE**

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marijana Hadzima-Nyarko | |
| Course title | Introduction to Masonry Structures | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (LBS MODULE) | |
| Year/semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 4 |
| | Contact hours (L+E+S) | 30+15+0 |

| 1. COURSE DESCRIPTION | | |
|---|---|---|
| *1.1. Course objectives* | | |
| Acquiring theoretical knowledge about masonry structures and the basics of wall dimensioning.<br>Acquiring practical knowledge of the design of masonry structure elements. | | |
| *1.2. Course enrolment requirements* | | |
| None. | | |
| *1.3. Expected learning outcomes* | | |
| 1. Describe the types and properties of wall elements, mortar and masonry.<br>2. Describe the experimental testing of wall elements and mortar.<br>3. Explain the procedure of experimental determination and calculate the mechanical and deformation properties of unreinforced masonry.<br>4. Check the load-bearing capacity of the vertically loaded wall.<br>5. Explain and apply construction rules for the design of masonry structures. | | |
| *1.4. Course content (syllabus)* | | |
| Partial safety coefficients for materials. Wall elements. Mortar. Testing of wall elements and mortar. Types of masonry. Explain the procedure of experimental determination and calculation of mechanical and deformation properties of unreinforced masonry. Vertically loaded unreinforced masonry. Structural details of masonry. | | |
| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other |
| *1.6. Comments* | | |
| *1.7. Student requirements* | | |
| Student obligations (SIGNATURE REQUIREMENTS)<br>1. Attendance of exercises: Exercises are mandatory and the absence must be justified.<br>2. Attendance of lectures: Absence of up to 30% per semester is tolerated.<br>3. Positively evaluated programme that is developed during exercises. | | |
| *1.8. Student performance[12] evaluation* | | |

| Class attendance | 2.0 | Class participation | | Seminar paper | 0.5 | Experimental work | |
|---|---|---|---|---|---|---|---|

[12] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | 0.5 | Oral exam | 1.0 | Essay | | Research | |
| Project | | Continuous assessment | (2.0) | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

TWO (2) revision tests are scheduled during the semester.
The revision tests will be held after the corresponding course units have been covered, and the exact date is stated in the curriculum implementation plan. Revision tests are taken in writing. Each revision test is 45 points (25 for the theory and 20 for practical tasks).
The total number of points that a student can earn by taking the revision tests and developing the programme is 100.
To be exempt from the exam students must meet the following criteria:
- on each of the revision tests: get 11 or more points for the theoretical part and 9 or more points for the practical tasks.
- the minimum number of points for the programme is 5.

If a student passes both revision tests, he/she may be exempted from taking the exam and receive a final grade according to the following grading scheme:
- sufficient (2)..... 61 - 70
- good (3)..... 71 - 80
- very good (4)..... 81 - 90
- excellent (5)..... 91 - 100

*1.10. Required reading (as on submission of the study programme proposal)*

Sorić, Zorislav: Zidane konstrukcije, udžbenici Sveučilišta u Zagrebu, Zagreb, 2016.
Hadzima-Nyarko, Marijana; Ademović, Naida; Jeleč, Mario: Konstrukcijska pojačanja zidanih zgrada – metode i primjeri. Osijek: Građevinski i arhitektonski fakultet Osijek Sveučilišta Josipa Jurja Strossmayera u Osijeku, 2020.

*1.11. Recommended reading (as on submission of the study programme proposal)*

Jure Radić et al. (2007.) – Zidane konstrukcije – priručnik, udžbenici sveučilišta u Zagrebu, Zagreb

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The quality monitoring process in order to ensure the acquisition of defined learning outcomes is carried out through:
1. Validation of learning outcomes through regular student feedback on whether certain learning outcomes have been achieved and whether all outcomes have been covered (analysis of student survey on teachers, class attendance and participation as well as analysis of individual/group seminar papers)
2. Verification of the study according to learning outcomes is done by aligning learning outcomes, teaching methods and assessment at the level of study programmes. It also includes an assessment of how the given learning outcomes affect student workload.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Seminar paper | Preparation of a seminar paper | 3, 4, 5 | Reviewing and grading the seminar paper |
| Revision tests | Continuous assessment | 1, 2, 3, 4, 5 | Reviewing and grading of revision tests |
| Written exam | Completing written assignments | 1, 3, 4 | Reviewing and grading the written exam |
| Oral exam | Answering oral questions | 1, 2, 3, 4, 5 | Reviewing and grading the oral exam |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Jurko Zovkić | |
| Course title | Project Workshop | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core elective (LBS MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 0+0+30 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Synthesis and application of knowledge acquired in construction courses on the example of a simpler building (family house, urban villa, simple farm building or warehouse, etc.) Teaching is carried out in the form of a project workshop where there is a continuous interaction between students and teachers and students acquire practical knowledge and skills in designing and structural analysis of simpler buildings, which are an important basis for further education in construction.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Make a layout for load-bearing structures
2. Make a structural analysis of the actions on a structure
3. Select the appropriate structural analysis method
4. Make a structural analysis of load-bearing elements of a structure
5. Analyse the calculation/dimensioning results in the context of safety of the structure

*1. 4. Course content (syllabus)*

Content and parts of construction projects. Selection of architectural bases for the structural analysis of the construction of a simpler building – a family house, urban villa, a simple farm building or warehouse, etc. Defining the construction concept of a building – vertical and horizontal. Making a layout for the load-bearing structure. Analysis of the effect on the structure according to the applicable regulations. Determination of the centre of mass and centre of rigidity under earthquake load. Dimensioning of selected load-bearing elements of the structure – foundations, walls, beams, columns, slabs, etc. of different materials (concrete, steel, timber, masonry). Analysis of the obtained calculation results from the aspect of their impact on the safety of the structure, i.e. building. Production of graphic appendixes at the level of the main construction project.

| *1. 5. Type of instruction* | ☐ lectures<br>☒ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☒ tutorials<br>☐ other |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Conditions for obtaining the signature:

| |
|---|
| Regular class attendance (at least 70%) and completed and submitted practical assignment – project until the end of the current semester. |

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | 1.0 | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Student work on a practical assignment – the project will be evaluated and assessed during the semester. The project is divided into several stages and review and assessment are done on completion of every stage of project development. The parts of the project that are evaluated and assessed are: layout of the load-bearing structure; load analysis; earthquake forces; dimensioning of selected load-bearing elements of the structure; analysis and interpretation of the obtained results. The condition for submitting the project is that the specified stages of the project have been completed correctly, and the overall grade is formed by calculating the average grade of all individual stages of the project.

N.B.: If the student does not submit a positively evaluated practical assignment – project by the end of the current semester, or the deadline, it is considered that the student has not met the conditions for obtaining the signature verifying course completion.

*1. 10. Required reading (as on submission of the study programme proposal)*

Markulak, D., Zovkić, J., Kraus, I.: Građevinske konstrukcije u zgradarstvu, Građevinski i arhitektonski fakultet Osijek, 2021.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

HRN EN construction standards - Eurocodes

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Regular monitoring of class attendance, project development and class participation in general. The course is designed as a project workshop where students and teachers interact most of the time on the development of a practical assignment – a project, and thus students are continuously monitored and directed to take the appropriate approach to solving problems.

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Exercises | Attending exercises | 1, 2, 3, 4, 5 | Recording class attendance<br>Class participation |
| Practical work with mentoring (possible work in teams) | Making a semester assignment | 1, 2, 3, 4, 5 | Reviewing and grading the practical assignment |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Ivana Miličević | |
| Course title | Concrete Technology | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (LBS MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 4 |
| | Contact hours (L+E+S) | 30+15+0 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Acquiring knowledge necessary for proper selection of concrete composition components, appropriate preparation, installation and compaction to ensure the properties of fresh and hardened concrete in use for the required purpose. Acquiring knowledge about the properties and methods of testing fresh and hardened concrete, traditional and modern technologies of concrete production and execution of concrete works. Introduction to the basic properties of special types of concrete. Acquiring knowledge of mechanical, chemical, biological and electrochemical effects on concrete and protection methods. Acquiring knowledge about the directions of research in the field of concrete technology in the future.

*1.2. Course enrolment requirements*

Having passed the courses in Materials Science and Building Materials at the university undergraduate study.

*1.3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. design the concrete mix with the required properties and make the mix at the concrete plant
2. demonstrate testing the properties of concrete in fresh and hardened state
3. assess the influence of components and preparation technology on the properties of concrete
4. evaluate the results of testing the properties of concrete
5. explain the mechanisms of degradation of concrete and reinforced concrete buildings and identify ways to protect concrete with regard to the mechanisms of degradation.

*1.4. Course content (syllabus)*

History of concrete technology development. Components of concrete composition (aggregate, cement, additives, water for concrete preparation) and testing of their properties in accordance with standards. Concrete mix design for required properties in use. Fresh concrete – properties and their significance. Structure of hardened concrete, strength and stress state, dimensional stability. Influence of humidity and temperature on concrete. Preliminary and control tests of concrete. Quality control of embedded concrete. Concrete production technology, transport, installation, compaction and curing of concrete. Special concretes, new types and technologies. Mechanical, chemical, biological and electrochemical effects on concrete and protection methods.

| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other |
|---|---|---|
| *1.6. Comments* | --- | |

*1.7. Student requirements*

- class attendance minimum 75%, auditory and laboratory exercises 100%
- making a seminar paper
- 2 revision tests

*1.8. Student performance[13] evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2.0 | Class participation | | Seminar paper | 0.5 | Experimental work | 0.5 |
| Written exam | 0.5 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | (1.0) | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

| STUDENT ACTIVITY | ECTS | LEARNING OUTCOME | TEACHING METHOD | ASSESSMENT METHOD | POINTS | |
|---|---|---|---|---|---|---|
| | | | | | min | max |
| Class attendance | 2.0 | 1, 2, 3, 4, 5 | Lectures | Recording class attendance | 0 | 0 |
| Preparation of testing reports | 0.5 | 1, 2, 4 | Experimental work | Evaluating active participation and reviewing testing reports | 0 | 0 |
| Making a seminar paper | 0.5 | 1, 2, 3, 4, 5 | Seminar | Reviewing and grading the seminar | 12 | 20 |
| Answering oral questions | 0.5 | 1, 2, 3, 4, 5 | Oral exam | Assessment of answers | 24 | 40 |
| Completing written assignments | 0.5 | 1, 3, 4 | Written exam | Assessment of answers | 24 | 40 |
| Continuous assessment | 1.0 | 1, 2, 3, 4, 5 | Revision tests | Reviewing and grading of revision tests | 48 | 80 |

*Assessment and evaluation of student work during the semester:*

| | *1st revision test* | *2nd revision test* | *Seminar* |
|---|---|---|---|
| *Maximum number of points* | *40* | *40* | *20* |
| *Minimum number of points required for taking the exam* | *24* | *24* | *12* |

*Grading at the end of the semester, if the student did not pass the revision tests:*

| | *Written exam* | *Oral exam* | *Seminar* |
|---|---|---|---|
| *Maximum number of points* | *40* | *40* | *20* |
| *Minimum number of points required for taking the exam* | *24* | *24* | *12* |

*Grading scheme:*

| *Number of points* | *Grade* |
|---|---|
| *60-69* | *Sufficient* |
| *70-79* | *Good* |
| *80-89* | *Very good* |
| *90-100* | *Excellent* |

*1.10. Required reading (as on submission of the study programme proposal)*

1. Bjegović, D., Štirmer, N., Teorija i tehnologija betona, Sveučilište u Zagrebu, 2015.
2. A. M. Neville, J.J. Brooks, Concrete Technology, Pearson Education Canada; 2nd edition, March 25, 2019
3. M. S Shetty, A.K. Jain, Concrete Technology Theory and Practice, S. Chand Publishing, 2017.

*1.11. Recommended reading (as on submission of the study programme proposal)*

1. Zongjin Li, Advanced Concrete Technology, Wiley, February 2011.
2. Ukrainczyk, V.: Beton – struktura, svojstva, tehnologija, Alcor, Zagreb, 1994.
3. Krstulović, P.: Svojstva i tehnologija betona, ISBN 953-6116-20-0 (Građevinski fakultet Sveučilišta u Splitu).

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

[13] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

The learning outcomes will be achieved through:

- submitted and accepted laboratory exercise forms,
- submitted and accepted seminar,
- passed written and oral exam or both revision tests.

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Experimental work | Preparation of testing reports | 1, 2, 4 | Evaluating active participation and reviewing testing reports |
| Seminar | Making a seminar | 1, 2, 3, 4, 5 | Reviewing and grading the seminar |
| Oral exam | Answering oral questions | 1, 2, 3, 4, 5 | Assessment of answers |
| Written exam | Completing written assignments | 1, 3, 4 | Assessment of answers |
| Revision tests | Continuous assessment | 1,2,3,4,5 | Reviewing and grading the revision tests |

**COURSES OF THE MODULE CONSTRUCTION MANAGEMENT AND TECHNOLOGY**

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Ivana Šandrk Nukić | |
| Course title | Engineering Economics | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (CMT MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 5 |
| | Contact hours (L+E+S) | 30+0+30 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Understanding the importance of economic and legal aspects of construction business with an emphasis on cost and revenue management and understanding their impact on business decisions.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. use the acquired knowledge of various legal possibilities of registration and termination of companies and trades
2. explain the laws of supply and demand in the market
3. discuss the concept of the cycle of reproduction
4. analyse direct and indirect costs
5. calculate the cost price and the selling price
6. connect capacity and deadlock
7. distinguish financial categories: assets, capital, liabilities, income, expenses and profit
8. interpret basic macroeconomic indicators

*1. 4. Course content (syllabus)*

Review of the relevant legal framework for construction operations, with the emphasis on the National Classification of Economic Activities, the Companies Act and the Crafts Act (available legal forms of business, establishment, changes in registration and liquidation). Basic economic concepts – economics with division into microeconomics and macroeconomics, model approach in economics, supply and demand in the market, market balance and structure. Means of work, objects of work and work in the process of reproduction. Business assets, depreciation and maintenance. Allocation of costs, primarily according to the possibility of allocation to cost bearers, according to the totality and according to the degree of capacity utilization. Capacity, deadlock profitability and economies of scale. Calculation, factor, cost price and selling price. Analysis of basic financial statements of a company (balance sheet and income statement) and performance indicators. Financial literacy – skills and knowledge for making personal financial decisions and managing one's own budget. Tax system with the emphasis on VAT, corporate tax and income tax. Bankruptcy. Introduction to management – basics of planning, organizing, controlling, human resource management and leadership. Introduction to marketing – the needs and desires of potential customers and their satisfaction through the marketing strategy and 4 Ps. Basic macroeconomic indicators – inflation, unemployment rate, GDP.

| *1. 5. Type of instruction* | | |
|---|---|---|
| | ☒ lectures | ☒ individual assignments |
| | ☒ seminars and workshops | ☐ multimedia and e-learning |
| | ☐ practical classes | ☐ lab work |
| | ☐ distance learning | ☐ tutorials |
| | ☒ field work | ☐ other _____ |

*1. 6. Comments None*

*1. 7. Student requirements*

Student obligations are also the conditions for getting the lecturer's signature:

- class attendance of lectures: absence of up to 25% per semester is tolerated
- class attendance of exercises: absence of up to 25% per semester is tolerated
- positively graded and publicly presented seminar paper

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 2 | Class participation | 0.5 | Seminar paper | 1 | Experimental work | |
| Written exam | (1.3)* | Oral exam | (0.2)* | Essay | | Research | |
| Project | | Continuous assessment | 1.5 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

1. Revision tests
Three (3) revision tests are scheduled during the semester. The revision tests will be held after the corresponding course units have been covered, and the exact date will be determined at the beginning of the semester. Revision tests are taken in writing. The revision test may consist of a theoretical part and calculations. Students answer multiple choice questions, complete written statements or write the answers to question on their own. For multiple choice questions, it is possible that more than one answer is correct. The points earned on all revision tests together make the maximum of 66% of the final grade.

2. Class participation is scored and its share in the final grade is up to 12%
3. The seminar is scored and its share in the final grade is up to 22%
4. Necessary conditions for the exemption from the exam and getting the final grade are:
   - getting a minimum of 50 out of 100 points for revision tests, seminars and class participation together

If the student meets the necessary requirements he/she can be exempted from taking the exam and get the final grade. In this case, the final grade is calculated according to the grading scheme specified for the exam, see below. If the student is not satisfied with the proposed grade, and has met the necessary conditions for exemption from the exam, he/she can take the oral exam only in the first exam term in order to improve the existing grade. Alternatively, he/she can take the written exam at any time, which will override the points earned during the semester.

5. Exam
The exam is taken by all students who did not qualify for exemption from the exam at the end of the semester and have met the conditions for getting the lecturer's signature. The exam is written. The oral exam is organized only for those students who are between grades, those who want to get a higher grade and those who have proven difficulties with expressing themselves in writing. The final grade is made only on the basis of the exam result, according to the following grading scheme:
sufficient (2) .....50% - 64%
good (3) ..... 65% - 79%
very good (4) .....80% - 89%
excellent (5) .....90% - 100%

In the case of an oral exam, the grade depends on the teacher's assessment of the student's knowledge.

*1. 10. Required reading (as on submission of the study programme proposal)*

- Lectures – course materials on the GRAFOS website
- www.zakon.hr

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Katavić Mariza: Osnove ekonomike za graditelje
- Grubišić Dragana: Poslovna ekonomija
- Čulo Ksenija: Ekonomika investicijskih projekata
- Medanić Barbara: Management u građevinarstvu
- Blank Leland, Tarquin Anthony: Engineering economics

| |
|---|
| https://www.hzu.edu.in/engineering/engineering%20economy.pdf<br>- Panneerselvam R.: Engineering Economics<br>https://www.academia.edu/35775332/Engineering_Economics_by_Panneer_Selvam_pdf |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| The quality monitoring process in order to ensure the acquisition of defined learning outcomes is carried out through:<br>1. Validation of learning outcomes from regular student feedback on whether certain learning outcomes have been achieved and whether all outcomes have been covered (analysis of student survey on teachers, class attendance and participation, and the analysis of individual and group work or seminar papers<br>2. The verification of the study according to learning outcomes is done by aligning learning outcomes, teaching methods and assessment at the level of study programmes. It also includes an assessment of how the given learning outcomes affect student workload. |

* if the student is not exempted from the exam on the basis of taking revision tests. If the student has passed all revision tests, the credit value of the exam is equal to revision tests as continuous knowledge assessment

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1,2,3,4,5,6,7,8 | Continuous knowledge assessment/exam |
| Seminars and workshops | - preparation of a seminar paper<br>- presentation of the seminar paper<br>- workshop activities | 1,2,3,4,5,6,7,8 | Seminar paper/class attendance/class participation/ |
| Distance learning | Class attendance | 1,2,3,4,5,6,7,8 | Class attendance |
| Field Instruction | Class attendance | 1,2,3 | Class attendance |
| Individual assignments | Completing of assigned tasks | 4,5,6,7 | Seminar paper |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Zlata Dolaček-Alduk | |
| Course title | Construction Business in the Digital Environment | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (CMT MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 15+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Gaining knowledge and experience in the implementation of construction processes in the digital environment. Introducing students to the procedures of digital business in construction – electronic delivery and download of construction documents, e-conference, e-Permit, e-construction site diary, e-signature). Introducing students to the work and exchange of information in a virtual environment.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Use e-services in the construction business.
2. Exchange information in a virtual environment.
3. Organize a virtual team.

*1. 4. Course content (syllabus)*

*Lectures*

Digital transformation, digital capacity building, degree of economic and social digitalization, digitalization in construction, digital infrastructure development (e-project documentation, e-procurement, e-processes, e-invoice). Digital applications and digital platforms in construction. Integration of new technologies into internal business processes of construction companies.

*Exercises*

Introduction to the work and use of digital databases and platforms.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance, mandatory preparation and presentation of a seminar paper.

*1. 8. Student performance evaluation*

| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Prerequisite for taking the exam: regular class attendance and timely submission of the seminar paper, the possibility of exemption from the written part of the exam on the basis of revision tests.
Assessment and share of individual assessment criteria: 60% seminar paper; 30% presentation; 10% literacy and documentation.
Grading scheme:
- 90 - 100% excellent (5)
- 80 - 89.9% very good (4)
- 70 - 79.9% good (3)
- 60 - 69.9% sufficient (2)

*1. 10. Required reading (as on submission of the study programme proposal)*

Building Act
Physical Planning Act
Ordinance on the manner of conducting professional construction supervision, form, conditions and manner of keeping the construction site diary and on the content of the final report of the supervising engineer

*1. 11. Recommended reading (as on submission of the study programme proposal)*

World Business Council for Sustainable Development: Digitalization of the built environment: Towards a more sustainable construction sector, 2021, available at https://www.wbcsd.org/contentwbc/download/11292/166447/1
Jurčević, M.; Pavlović, M.; Šolman, H.: Opće smjernice za BIM pristup u graditeljstvu, Hrvatska komora inženjera građevinarstva, Zagreb, 2017.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures – presentation, group discussion | Monitoring of presentations, use of literature, participation in group discussions | 1, 2 | Class attendance records, evaluation of active participation in the discussion |
| Exercises – individual and group discussion, seminar paper | Study of literature, application of knowledge in the preparation of a seminar paper, participation in the discussion | 1, 2, 3 | Class attendance records, evaluation of active participation in the discussion, seminar paper assessment |
| Knowledge testing | Study and use of literature, presentation of knowledge | 1, 2, 3 | Evaluation of student work according to assessment criteria |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Ivana Šandrk Nukić | |
| Course title | Professional Ethics, Sociology of Work and Organizational Psychology | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | elective (CMT MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 15+15+0 |

| **1. 1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| Awareness that in addition to the knowledge of the construction profession, in the workplace it is important to know how to deal with various moral issues, function as an individual and as a member of the working group and know the basics of organizational psychology. | | |
| *1. 2. Course enrolment requirements* | | |
| None. | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. shape their behaviour and attitudes towards socially acceptable norms<br>2. apply the principles of professional ethics<br>3. identify the role of organizational psychology in the organization of work<br>4. use different methods to increase work performance<br>5. analyse your own emotional intelligence<br>6. explain organizational culture | | |
| *1. 4. Course content (syllabus)* | | |
| The concept and scope of engineering ethics. Code of Ethics as a mandatory instrument for ensuring ethical decision-making and behaviour in organizations. Ethical dilemmas and ethical responsibility (prejudice, corruption, mobbing, etc.). Moral framework – virtues in engineering and motives of engineers. Profit and professional challenges vs. safety and risk reduction – safety at work. Socially responsible behaviour of civil engineers. Construction and environmental ethics: sustainable development. Computer ethics and the Internet (plagiarism, illegal software, etc.). Developing critical thinking. Self-perception, self-esteem, self-justification. Group processes in teamwork (group structure, team roles, conflict and cooperation). Attitudes and changes in attitudes and behaviour – conformism. Emotional intelligence. The notion of society and social structure. Contemporary social trends as a challenge in construction: demographic change, migration (aging and outflow of workers). Social inequalities (stratification of society): generation gap, gender and religious inequalities. Organizational culture in the background of ethical and sociological issues and actions. Basic performance factors. Career development. Fatigue and stress. Motivation to work. | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |

*1. 6. Comments: None*

*1. 7. Student requirements*

Student obligations are also the conditions for getting the lecturer's signature:

- attendance of lectures: absence of up to 25% is tolerated
- attendance of exercises: absence of up to 25% is tolerated

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | 0.5 | Seminar paper | | Experimental work | |
| Written exam | 0,8* | Oral exam | 0,2* | Essay | 0.5 | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

1. Revision tests

Two (2) revision tests are scheduled during the semester. The revision tests will be held after the corresponding course units have been covered, and the exact date will be determined at the beginning of the semester. Revision tests are taken in writing. Students answer multiple choice questions, complete written statements or write the answers to question on their own. For multiple choice questions, it is possible that more than one answer is correct. The points earned on all revision tests together make the maximum of 50% of the final grade.

2. Class participation

During the semester, various teaching activities are carried out with students, such as group assignments in class, case studies and individual essays on relevant topics. All activities are scored and included in the final grade. Their share in the final grade is 50%.

3. Necessary conditions for the exemption from the exam and getting the final grade are:

- fulfilling the student obligations listed above
- getting a minimum of 50 out of 100 points for revision tests and class participation

If the student meets the necessary requirements he/she can be exempted from taking the exam and get the final grade. In that case, the final grade is calculated as the sum of points for class participation and points earned in revision tests (the total of 100 points), with the following grading scheme:

sufficient (2) .....50 - 64 points
good (3) ..... 65 - 79 points
very good (4) .....80 - 89 points
excellent (5) .....90 - 100 points

4. Exam

The exam is taken by all students who did not qualify for exemption from the exam at the end of the semester and have met the conditions for getting the lecturer's signature. The exam is written. The oral exam is organized only for those students who are between grades, those who want to get a higher grade and those who have proven difficulties with expressing themselves in writing. The final grade is made only on the basis of the exam result, according to the following grading scheme:

sufficient (2) .....50% - 64%
good (3) ..... 65% - 79%
very good (4) .....80% - 89%
excellent (5) .....90% - 100%

In the case of an oral exam, the grade depends on the teacher's assessment of the student's knowledge.

*1. 10. Required reading (as on submission of the study programme proposal)*

- Robbins, S., Judge, T.: Organizacijsko ponašanje
- course materials on the GRAFOS website

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Arnold, J.; Silvester, J; Patterson, F.; Robertson, I.; Cooper, C. & Burnes, B. (2005). Work Psychology (4th ed.) Prentice-Hall http://library.wbi.ac.id/repository/280.pdf
- Aronson, E., Wilson, T., Akert, R.: Socijalna psihologija

| |
|---|
| - Poslovna etika, korporacijska društvena odgovornost i održivost; Urednici: Jalšenjak, B., Krkač, K.<br>- Martin, M., Schinzinger, R.: Etika u inženjerstvu<br>- Jex, S. M. & Britt, T. W. (2008). Organizational psychology: A scientist- practitioner approach. New Jersey: John Wiley and Sons |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| The quality monitoring process in order to ensure the acquisition of defined learning outcomes is carried out through:<br>1. Validation of learning outcomes from regular student feedback on whether certain learning outcomes have been achieved and whether all outcomes have been covered (analysis of student survey on the work of teachers, class attendance and participation, and the analysis of individual and group work or seminar papers)<br>2. The verification of the study according to learning outcomes is done by aligning learning outcomes, teaching methods and assessment at the level of study programmes. It also includes an assessment of how the given learning outcomes affect student workload. |

*if the student is not exempted from the exam on the basis of taking revision tests. If the student has passed all revision tests, the credit value of the exam is equal to revision tests as continuous knowledge assessment

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1,2,3,4,5,6 | Continuous knowledge assessment/exam |
| Seminars and workshops | - Preparation of the seminar paper<br>- presentation of the seminar paper<br>- workshop activities | 1,2,3,4,5,6 | Class attendance/class participation |
| Exercises | Active participation in exercises | 1,2,3,4,5,6 | Class attendance/class participation |
| Distance learning | Class attendance | 1,2,3,4,5,6 | Class attendance |
| Individual assignments | Completing assigned tasks | 3,4,6 | Essay |

| General information | | |
|---|---|---|
| Lecturer | Full Prof. Zlata Dolaček-Alduk | |
| Course title | Procedures and Methods for Building Condition Assessment | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (CMT MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 15+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Gaining knowledge and experience in assessing the existing (derived/current) condition of buildings that are carried out with the aim of making design (engineering) bases that serve for further elaboration during the rehabilitation, reconstruction, adaptation, extension or conversion of buildings.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. Apply different procedures for assessing the existing condition of buildings.
2. Independently use measuring instruments when surveying the existing condition of buildings.
3. Process recording results.
4. Create a digital model of a surveyed building or a complex architectural structure.
5. Apply a snapshot of the existing condition of the building for a given purpose (e.g. making material takeoffs, visualizations).

*1. 4. Course content (syllabus)*

*Lectures*

Existing state records (definition, term, categories, legislative framework), making a record of the existing condition, surveying equipment, procedure of classical surveying of the existing condition and methods of digital processing of recording results, procedure of digital recording of the existing condition and processing of recording results (laser scanning, tachymetric surveying, photogrammetric surveying).

*Exercises*

Operation of measuring instruments (rangefinder, level indicator, handheld laser 3D scanner, thermal cameras, armature detection device, drone), measurement of the existing condition of the selected building and selected details (recording of complex architectural structures) and making a digital model of the surveyed building, application of specialized tools (e.g. Curamess, Maxmess) as computer support for surveying the existing condition of buildings, application of occupational safety rules at work (in case the work is performed in abandoned/damaged buildings).

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Class attendance, mandatory preparation and presentation of a seminar paper.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Prerequisite for taking the exam: regular class attendance and timely submission of the seminar paper, the possibility of exemption from the written part of the exam on the basis of revision tests.
Assessment and share of individual assessment criteria: 60% seminar paper; 30% presentation; 10% literacy and documentation.
Grading scheme:
- 90 - 100% excellent (5)
- 80 - 89.9% very good (4)
- 70 - 79.9% good (3)
- 60 - 69.9% sufficient (2)

*1. 10. Required reading (as on submission of the study programme proposal)*

Arbutina, D.: *Suvremene metode izrade zatečenog stanja – Primjena specijalnih računalnih alata*, Zagreb, 2012.
Dolaček-Alduk, Z.; Lončar-Vicković, S.; Stober, D.: *Projektna nastava u obrazovanju građevinskih inženjera*, Građevinski fakultet Osijek, Osijek, 2011.
ISO 13822:2010 Bases for design of structures - Assessment of existing structures

*1. 11. Recommended reading (as on submission of the study programme proposal)*

Law on the Treatment of Illegally Constructed Buildings (OG 90/11)

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Anonymous quantitative standardized student survey on the course and work of teachers conducted by the Office for Quality Development and Assurance in Higher Education of the Faculty of Civil Engineering and Architecture Osijek.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4. Assessment method* |
|---|---|---|---|
| Lectures – presentation, group discussion, referring students to independent study of literature | Class attendance, use of literature, participation in group discussions | 1, 2, 3, 4, 5 | Class attendance records, assessment of the ability to reason |
| Exercises – individual and group discussion, demonstration of surveying procedures and processing of results | Class attendance, study of literature, application of knowledge in the preparation of a seminar paper, participation in the discussion | 2, 3, 4, 5 | Class attendance records, evaluation of active participation in the discussion, seminar paper assessment |
| Field Instruction | Active participation in the discussion, analysis of practical examples, application of surveying procedures | 3, 4, 5 | Class attendance records, assessment of the ability to interpret surveying and recording procedures |
| Knowledge testing | Study and use of literature, presentation of knowledge | 1, 2, 3, 4, 5 | Evaluation of student work according to assessment criteria |

**COURSES IN THE HYDRAULIC ENGINEERING MODULE (HE)**

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marija Šperac | |
| Course title | Introduction to Hydraulic Engineering | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (HE MODULE) | |
| Year | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 15+20+10 |

| **1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1.1. Course objectives* | | |
| Acquiring knowledge about the needs and methods of water management and applying knowledge of hydrology and fluid mechanics in solving certain hydrotechnical problems. | | |
| *1.2. Course enrolment requirements* | | |
| None | | |
| *1.3. Expected learning outcomes* | | |
| 1. Explain the importance and principles of water management<br>2. Distinguish and discuss the basic elements of water management<br>3. Conduct a statistical analysis of hydrological data<br>4. Construct characteristic curves in hydrology<br>5. Apply certain physical laws in solving specific problems<br>6. Describe the possibilities and potential of using numerical modelling and machine learning in hydraulic engineering | | |
| *1.4. Course content (syllabus)* | | |
| Development, importance, tasks and goals of hydraulic engineering<br>Water management<br>Application of hydrology and fluid mechanics<br>Computer tools<br>Protection against the harmful effects of water<br>Water protection<br>Use of water and watercourses<br>Water management and administration | | |
| *1.5. Type of instruction* | ☒ lectures<br>☒ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | | |
| *1.7. Student requirements* | | |
| Regular attendance of lectures (minimum 70%) and exercises (exercises are mandatory and any absence should be justified), completed and successfully submitted assignments by the end of the current semester. | | |

| *1.8. Student performance[14] evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | | Oral exam | (1.0) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

By passing the revision test
It is possible to take a revision test during the semester. The revision test includes the content covered during lectures. Students are obliged to submit assignments (seminar papers) during the semester. The assignment refers to a problem task that is done in auditory and construction exercises.

Conditions for the exemption from the exam:
- passed revision test
- regular class attendance
- graded submitted assignments.

By passing the exam
Prerequisites for taking the exam are graded homework assignments and regular class attendance. The examination is oral.

*1.10. Required reading (as on submission of the study programme proposal)*

Authorised course materials
Vuković, Ž.: Osnove hidrotenike I
Vuković, Ž.: Osnove hidrotenike II

*1.11. Recommended reading (as on submission of the study programme proposal)*

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

By assessing homework assignments, revision tests and exam results.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2.1. Teaching activity* | *2.2. Student activity* | *2.3. Learning outcome* | *2.4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1-6 | Recording class attendance |
| Seminar paper | Preparation of a seminar paper | 3, 4, 5 | Assessment of active class participation and review and assessment of seminar papers |
| Continuous knowledge assessment (revision test) | Answering oral and written questions | 1-6 | Assessment of answers |
| Final examination | Answering oral questions | 1-6 | Assessment of answers |

[14] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Tamara Brleković | |
| Course title | Water Protection | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (HE MODULE ) | |
| Year/semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 30+15+0 |

**1. COURSE DESCRIPTION**

*1.1. Course objectives*

Acquiring theoretical and practical knowledge about the importance and principles of water protection and construction and non-construction measures to reduce the negative impact on water bodies.

*1.2. Course enrolment requirements*

None

*1.3. Expected learning outcomes*

1. Explain the principles of water protection
2. Distinguish and understand the sources and types of pollution
3. Assess the burden of pollution on the water body
4. Propose and choose a solution to reduce the negative impact on the water body
5. Calculate construction measures to reduce pollution burdens

*1.4. Course content (syllabus)*

Basic ecological principles
Significance and role of water protection in water resources management
Properties and quality of water
Sources and types of pollution
Surface and groundwater pollution
Rainwater pollution and pollution burden assessment
Estimation of wastewater pollution loads from point sources of pollution
Construction and non-construction water protection measures
Wastewater discharge

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Regular class attendance of lectures (minimum 70%) and exercises, as well as completed and successfully submitted programmes.

| *1.8. Student performance[15] evaluation* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | 0.5 | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

By passing the revision test
It is possible to take revision tests during the semester. It is the student's responsibility to submit the programme assignments during the semester. The programme refers to a problem task that is done in auditory and construction exercises.
Conditions for the exemption from the exam:

- passed revision tests
- regular class attendance
- graded submitted programme tasks

By passing the exam
Prerequisites for taking the exam are graded programme tasks and regular class attendance. The exam is taken in writing and orally.

*1.10. Required reading (as on submission of the study programme proposal)*

Authorised course materials for lectures and exercises
Tedeschi, S.: Zaštita voda, Zagreb, 1997.
Margeta, J.: Oborinske i otpadne vode: teret onečišćenja, mjere zaštite, Split, 2007.

*1.11. Recommended reading (as on submission of the study programme proposal)*

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

By assessing homework assignments, revision tests and exam results.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2.1. Teaching activity* | *2.2. Student activity* | *2.3. Learning outcome* | *2.4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1-5 | Recording class attendance |
| Project | Completing a semester assignment | 3, 4, 5 | Reviewing and grading project tasks |
| Continuous knowledge assessment (revision test) | Answering oral and written questions | 1-5 | Assessment of answers |
| Final examination | Answering oral and written questions | 1-5 | Assessment of answers |

[15] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| General information | | |
|---|---|---|
| Lecturer | Assist. Prof. Tamara Brleković | |
| Course title | Hydraulic Engineering Practicum | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (HE MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 0+30+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Application of measurement methods that are theoretically covered in other courses and introduction to the methods of processing and interpretation of measurement results.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:
1. Conduct simpler hydrological measurements in the field and laboratory.
2. Apply theoretical knowledge acquired in courses at the undergraduate level.
3. Process and interpret measurement results.

*1. 4. Course content (syllabus)*

Flow velocity measurements in the field and in the laboratory. Flow rate measurements in the field and in the laboratory. Determination of flow curve using measurement results. Sampling and analysis of water quality in the field. Flow of water through the soil (application of Darcy's law). Measuring suspended sediment. Water balancing.

| *1. 5. Type of instruction* | ☐ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Attendance of field and laboratory exercises is mandatory, as is the submission of the measurement results.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | 0.5 | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | | Report | 0.5 | Practical work | |
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| a) Grading and evaluation of student work during classes<br>– class attendance, class participation, preparation of the measurement report. There is no final exam. |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| 1. Žugaj, R. (2015): Hidrologija, Sveučilište u Zagrebu<br>2. Vuković, Ž. (1996): Osnove hidrotehnike I/1, Sveučilište u Zagrebu |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| 1. WMO (2008): Guide to Hydrological Practices, Volume I, Hydrology – From Measurement to Hydrological Information, http://www.whycos.org/chy/guide/168_Vol_I_en.pdf |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Monitoring class attendance and constant interaction with students in exercises. |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Exercises | Class attendance | 1, 2, 3 | Class attendance records, submitted measurement report |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marija Šperac, Assoc. Prof. Krunoslav Minažek | |
| Course title | Waste Management | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (HE MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 30+15+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to waste management by learning about the context of generation, collection, incineration and use of energy, mechanical and biological treatment, recovery or disposal of various types of non-hazardous and hazardous waste, with the emphasis on municipal waste. Introducing students to the possibilities of waste recovery and utilization of waste materials in construction. Training students for the implementation of basic construction calculations and analysis of municipal waste landfills. Acquiring basic knowledge of transportation of pollution underground through soil and water pollution.

*1. 2. Course enrolment requirements*

None.

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:
1. Identify the places of origin and distinguish the types of non-hazardous/hazardous waste and the methods of their collection.
2. Identify and use the basic legislation and terminology related to waste management.
3. Critically evaluate approaches to waste management: incineration, mechanical and biological treatment, recovery, disposal.
4. Evaluate the possibility of using waste materials in various construction projects.
5. Identify the types and elements of landfills, design and implement basic (geostatic) calculations for dimensioning landfills and assessing their stability/safety, identify the basic characteristics of transport of pollution underground through soil and water pollution.

*1. 4. Course content (syllabus)*

A) General part
   a. General terms related to waste, legislation related to waste management – EU, HR
   b. Generation, types, properties and quantities of waste
   c. Waste collection and transport
   d. Waste management methods – mechanical and biological treatment, recovery, incineration – energy effects of incineration and waste incineration technologies, waste disposal
   e. Waste management system, waste management centres
B) Waste recovery and possibilities of using waste materials in construction
   a. Types of waste that can be used in construction, areas of application
   b. Waste treatment for construction applications
   c. Waste applications in various construction projects/interventions: insulation, construction elements, embankments, transportation infrastructure
C) Waste disposal/landfills – basic features
   a. Types of landfills
      i. Landfills for non-hazardous (municipal) waste, bioreactor landfills
      ii. Basic characteristics of hazardous waste landfills (medical biological waste, radioactive waste, asbestos and other hazardous materials)

b. Municipal waste landfills
   i. Elements and characteristics of municipal waste landfills, calculation (estimation) of the amount of waste
   ii. Site selection, documentation – studies (feasibility, environmental impact), projects
   iii. Landfill as a civil engineering structure – elements of a landfill
   iv. Structure of landfills; foundation and cover sealing system, leachate drainage, degassing
   v. Environmental protection from leachate, transport of pollution underground
c. Landfill construction project
   i. Exploration works in the soil, geotechnical bases
   ii. Materials used in the construction of landfills
   iii. Physical and mechanical properties of waste and other materials in landfills
   iv. Stability analyses; global stability, landfill body stability, cover system stability
   v. Landfill subsidence analyses
   vi. Basics of drainage system dimensioning
   vii. Basics of degassing system dimensioning
   viii. Landfill construction

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance and preparation of a seminar paper.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
| Written exam | 0.5 | Oral exam | 0.5 | Essay | | Research | |
| Project | | Continuous assessment | (1)* | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Revision tests, seminar paper, written and oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Authorized lectures and exercise materials posted on the course website
2. Clinton P. Richardson: Municipal landfill design calculations an entry level manual of practice, Richardson Environmental Solutions & Design, LCC u Lemitar, New Mexico, 2009. (open library)
3. Tchobanoglous, G.; Kreith, F.: Handbook of solid waste management, McGraw-Hill, Inc., New York, 2002.
4. Mulabdić, M.; Bošnjaković, M.: Pojmovnik geosintetika, Osijek, Građevinski fakultet Osijek, 2011.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Environmental Protection Agency, Landfill manuals – Landfill site design, Johnstown Castle Estate, Co. Wexford, Ireland, 2000.
2. Milanović, Z.: Otpad nije smeće, Gospodarstvo i okoliš, Zagreb, 2002.
3. Dimter, S.; Rukavina, T.; Barisic, I.: Alternative, environmentally acceptable materials in road construction. In Handbook of Research on Advancements in Environmental Engineering; Gaurina-Medimurec, N., Ed.; IGI Global: Hershey, PA, USA, 2014; pp. 557–583.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance, grading of the seminar paper, revision tests, written and oral exams.

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Exercises | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| Field Instruction | Attendance | According to the available terrain type – outcome 1, 3, 4, 5 | Recording class attendance |
| Seminar paper | Preparation of a seminar paper | 5 | Grading of the seminar paper |
| Revision tests, exam | Answering written and oral questions | 1, 2, 3, 4, 5 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Marija Šperac | |
| Course title | Building Installations | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (HE MODULE) | |
| Year/semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3.0 |
| | Contact hours (L+E+S) | 20+15+10 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Introduction to water supply and sewage, installations, functional aspects of fireproofing installation, placement in buildings, dimensioning, required space, and their integration into modern building solutions and technologies. Introduction to the basics of domestic hot water system, gas fitting, heating, cooling, ventilation, air conditioning, as well as electrical wiring of buildings.

*1.2. Course enrolment requirements*

**None**

*1.3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. independently design entire water supply and sewage installations of multi-residential and simpler commercial buildings
2. perform hydraulic dimensioning of entire water supply and sewage installations of multi-residential and commercial buildings
3. supervise water supply and sewage installation work
4. describe the basics of electrical wiring and mechanical installations of domestic hot water systems, heating, ventilation and air conditioning

*1.4. Course content (syllabus)*

Plumbing: cold water pipes, basic diagrams of domestic home water supply system, main parts of home water supply system, symbols used in design plans, elements of diagrams. Water-based fire protection systems: type, representation, diagram, elements. Hot water consumption, types of preparation, devices, representation of installations and devices in diagrams. Technical regulations for water supply installations, design and dimensioning of hot and cold water pipes: according to flow amount, flow velocity, uniform friction loss method, segmented loss method. Representation in dimensional drawings and diagrams. Sewage pipes: wastewater, sanitary objects and devices, pipes and tools. Main parts of home sewage system: horizontal and vertical drainpipes, storm sewer, connection to public sewer. Construction of home sewer. Dimensioning and design of sewer pipes, representation in dimensional drawings and diagrams. Gas fittings: types of gas for use in buildings, main parts of home fittings, installation of pipes, design of home gas fittings.
Central heating: thermal bridges, planar temperature, calculation of heat loss for residential buildings. Central heating fittings inside buildings, description of elements, diagrams, location inside structures. Types and systems of central heating. Solar energy. Electrical wiring: types of electrical wiring in buildings, basic diagrams, materials, installation. Lightning conductors. Representation in dimensional drawings and diagrams. Ventilation: basics of ventilation, primary, secondary, basic diagrams, devices. Air conditioning: basics of air conditioning, standalone and central devices, device fitting. Air humidifiers.

| *1.5. Type of instruction* | | |
|---|---|---|
| | [X] lectures | [ ] individual assignments |
| | [X] seminars and workshops | [ ] multimedia and e-learning |
| | [X] exercises | [ ] lab work |
| | [ ] distance learning | [ ] tutorials |
| | [X] field work | [ ] other _____ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *1.6. Comments* | | | | | | | |
| *1.7. Student requirements* | | | | | | | |
| Regular class attendance (70%), programme development, seminar paper | | | | | | | |
| *1.8. Student performance[16] evaluation* | | | | | | | |
| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (1.0) | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |
| *1.9. Assessment of student work during classes and at the final exam* | | | | | | | |
| Revision tests (two revision tests) or a written exam; programme | | | | | | | |
| *1.10. Required reading (as on submission of the study programme proposal)* | | | | | | | |
| M. Radonić: Vodovod i kanalizacija u zgradama, Croatiaknjiga Zagreb, 2003.<br>B. Tušar: Kućna kanalizacija, Građevinski Fakultet, Zagreb, 2001.<br>Internal course materials on the course website | | | | | | | |
| *1.11. Recommended reading (as on submission of the study programme proposal)* | | | | | | | |
| Blagojević, Biljana: Vodovod i kanalizacija, Tehnička knjiga Beograd, 2002.<br>Boris Labudović: Osnove tehnike instalacija vode i plina, Zagreb, 2000.<br>Boris Labudović: Priručnik za grijanje, Zagreb, 2005.<br>Boris Labudović: Priručnik za ventilaciju i klimatizaciju, Zagreb, 2003.<br>Čargonja: Instalacije vodovoda i kanalizacije, Zagreb 1990.<br>M. Šivak: Centralno grijanje, ventilacija, klimatizacija, Nakladnička djelatnost M. Šivak, Zagreb, 1998.<br>V. Rodeš: Električne instalacije (1. i 2. dio), Elektrostrojarska škola Varaždin, 2007. | | | | | | | |
| *1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* | | | | | | | |
| Programme, seminars, revision test results, class attendance | | | | | | | |

| **2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT** | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures | Class attendance | 1-4 | Class attendance records |
| Exercises | Class attendance<br>Project development | 1,2 | Class attendance records<br>Project assessment |
| Seminar paper | Preparation of a seminar paper | 4 | Grading of the seminar paper |
| Revision tests, exam | Answering written and oral questions | 1-4 | Assessment of answers |

[16] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

**LIST OF COURSES IN THE TRANSPORTATION INFRASTRUCTURE (TI) MODULE**

| **General information** | | |
|---|---|---|
| Lecturer | Full Prof. Sanja Dimter | |
| Course title | Road Infrastructure | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (TI MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 15+15+0 |

| **1. 1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| To introduce students to basic traffic indicators, types of road junctions, traffic characteristics on junctions, types and design of special purpose traffic areas and traffic equipment. | | |
| *1. 2. Course enrolment requirements* | | |
| - | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. list and explain basic traffic indicators,<br>2. define and describe the type of road junction,<br>3. design a special purpose traffic area,<br>4. choose the appropriate traffic equipment. | | |
| *1. 4. Course content (syllabus)* | | |
| Basic features of vehicle motion. Basic traffic indicators. Running surface geometry./Geometry of vehicle motion./Geometry of road design. Road intersections.<br><br>Traffic and service areas. Traffic at rest. Traffic equipment. Smart roads and autonomous vehicles. | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
| *1. 6. Comments* | | |
| *1. 7. Student requirements* | | |
| Regular class attendance (minimum 70%).<br>Independent and continuous work on the programme during exercises.<br>Accurate programme submitted on time. | | |
| *1. 8. Student performance evaluation* | | |

| Class attendance | 1.0 | Class participation | | Seminar paper | 1.0 | Experimental work | |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

The final examination consists of the written and the oral exam, the questions on the written part of the exam are designed according to the course literature and lectures. The maximum number of points on the written exam is 100.
Written exam grading scheme:

| Points | grade |
|---|---|
| up to 55 | insufficient |
| 55-65 | sufficient |
| 65-75 | good |
| 75-85 | very good |
| 85 and more | excellent |

Revision test during the semester – a student can pass the exam if he/she achieves 60/100 points at the revision test. Revision tests are graded using the grading scheme for written exams.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Željko Korlaet, Vesna Dragčević: "Projektiranje i građenje cesta", Građevinski fakultet Sveučilišta u Zagrebu, 2018.
2. Ivan Legac et al.: "Gradske prometnice", Fakultet prometnih znanosti Sveučilišta u Zagrebu, 2011.
3. Pravilnik o prometnim znakovima, signalizaciji i opremi na cestama, Official Gazette 92/2019.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Opći tehnički uvjeti za radove na cestama, IGH d.d. knjiga VI, 2001.
2. Wolfgang Kuhn: „Fundamentals of road design (Advances in Transport)" 1st Edition; WIT Press / Computational Mechanics; 1st edition (February 18, 2013)

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The course evaluation is done on the basis of the following criteria:
- results of the exam pass rate analysis (for revision tests and the exam)
- results of class attendance analysis
- results of student survey analysis

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1 - 4 | Recording class attendance |
| Independent work | Making a semester assignment | 3 - 4 | Evaluation of the semester assignment |
| Final examination | Answering written and oral questions | 1 - 4 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Krunoslav Minažek | |
| Course title | Laboratory Soil Testing | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Core (TI MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 15+30+0 |

| 1. **COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| Introducing students to the organization of a geotechnical laboratory. To enable students to independently perform laboratory soil tests to determine the basic physical properties and classification of soil and to perform standard laboratory tests of mechanical properties of soil. To enable students to interpret, analyse and evaluate the results of laboratory tests of soil properties. | | |
| *1. 2. Course enrolment requirements* | | |
| Having attended the course in Soil Mechanics | | |
| *1. 3. Expected learning outcomes* | | |
| Upon successful completion of the course, students will be able to:<br>1. Categorize the types of soil samples with regard to the method of obtaining and use in different laboratory experiments,<br>2. Identify and describe the parts and present the organization of a geotechnical laboratory from a technical and administrative perspective,<br>3. Plan, organize and conduct laboratory experiments to determine physical properties and soil classification, interpret, analyse and evaluate test results and classify soil,<br>4. Plan, organize and conduct laboratory experiments to determine mechanical properties and soil classification, interpret, analyse and evaluate test results,<br>5. Create a report on the results of laboratory soil testing, propose elements of the programme of geotechnical investigation, create elements of a geotechnical report. | | |
| *1. 4. Course content (syllabus)* | | |
| 1. Basic concepts in soil mechanics – physical and mechanical properties of soil, basic concepts in metrology,<br>2. Geotechnical exploration works in soil: Types of exploration works in soil (exploratory drilling, basics: in situ, other types of geotechnical exploration works – geophysics), sampling, types, classes and transport of soil samples,<br>3. Organization of a geotechnical laboratory: Organizational structure of a geotechnical laboratory: administration, documentation, calibration of equipment, importance of accreditation, organizational units of a geotechnical laboratory, spatial and technical conditions, storage and preparation of soil samples,<br>4. Laboratory experiments to determine the physical properties of soil – implementation of experiments and interpretation of test results: water content, density, consistency, granulometric composition, other experiments (organic matter, combustible substances, $CaCO_3$ content ...),<br>5. Laboratory experiments to determine mechanical properties and permeability of soil – implementation of experiments and interpretation of test results: One-dimensional consolidation test, determination of soil permeability coefficient, standard tests of shear strength of soil – uniaxial and direct shear, triaxial shear, advanced tests of shear strength of soil – triaxial shear – stress path, other tests of shear strength of soil (rotational shear, vane shear test, simple shear), laboratory experiments for testing the properties of geosynthetics, review of laboratory experiments for testing the properties of rocks,<br>6. Programmes of geotechnical investigation, report on the results of laboratory soil testing, geotechnical report. | | |
| *1. 5. Type of instruction* | ☒ lectures | ☒ individual assignments |

| | | |
|---|---|---|
| | ☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☒ field work | ☐ multimedia and e-learning<br>☒ lab work<br>☐ tutorials<br>☐ other<br>_____ |

*1. 6. Comments*

*1. 7. Student requirements*

Regular class attendance. Continuous work on the development of independent tasks (programmes), timely submission of accurate programmes.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Written and oral revision test. Individual assignments (programmes) are submitted at the specified time during the semester, inaccuracies and delays in submission affect the assessment of the programme. Students who do not pass the exam through revision tests take a written and oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Authorized lectures and exercise materials posted on the course website,
2. Mulabdić, M.: Ispitivanje tla u geotehničkom laboratoriju, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski i arhitektonski fakultet Osijek, Osijek, 2018.
3. Roje-Bonnaci, T.: Mehanika tla, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2017.
4. Germaine A.V.: Geotechnical Laboratory Measurements for Engineers, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. Mulabdić, M., Bošnjaković, M.: Pojmovnik geosintetika, Osijek: Građevinski fakultet Osijek, 2011
2. Miščević, P.: Inženjerska mehanika stijena, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2015.
3. Hunt, R.E.: Geotechnical Investigation Methods: A Field Guide for Geotechnical Engineers, Taylor & Francis Group, Boca Raton, FL, 2007.

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance, evaluation of programmes and revision tests, assessment of written and oral exams.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1-5 | Recording class attendance |
| Exercises | Class attendance | 1-5 | Recording class attendance |
| Individual assignments | Creating independent tasks (programmes) | 3-5 | Assessment of individual assignments (programmes) |
| Lab work | Attending laboratory experiments, preparation of reports | 1-4 | Class attendance records, report review |
| Revision tests, exam | Answering written and oral questions | 1-5 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Miroslav Šimun | |
| Course title | Introduction to Railways | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (TI MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 30+0+0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

The objectives of the course are to acquire basic theoretical and operational knowledge through practical examples of design, construction and maintenance of modern railways.

*1. 2. Course enrolment requirements*

None

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. analyze the basic problems of railway functioning.
2. single out the similarities and differences between classic and welded rails.
3. identify the basic elements of the railway, practical knowledge of the construction and maintenance of railways.
4. apply track structures – types of switches, differences and problems in exploitation.

*1. 4. Course content (syllabus)*

Introduction and general characteristics of railways. History of railways. Track elements. Forces acting on the track (static and dynamic – vertical and horizontal). Elements of the superstructure of power-driven vehicles: 1. Rails, 2. Track fittings (fastening systems and couplings), 5. Sleepers, 6. Blanket layer and protection layer. Special structures in the track (switches). Track design. Track control (geometry, condition of individual elements and track as a whole). Track maintenance works (regular, seasonal, occasional and major works – overhauls). Rail welding (AT-welds and ET-weld). Destressing of long welded rail.

| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☐ practical classes<br>☐ distance learning<br>☒ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
|---|---|---|

*1. 6. Comments:* None

*1. 7. Student requirements*

Class attendance, active class participation and positively graded written and oral exam.

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | 1.0 | Seminar paper | | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

The final examination consists of the written and the oral exam, the questions on the written part of the exam are designed according to the course literature and lectures. The maximum number of points on the written exam is 100. Written exam grading scheme: Points: 0-54 - insufficient; 55-66 - sufficient; 67-78 - good; 79-89 - very good; 90 and more - excellent. There are two revision tests during the semester and the student can pass the exam if he/she earns at least 60 points at each revision test. The maximum number of points on the revision test is 100. Revision tests are graded using the grading scheme for written exams (60-69 points - sufficient, 70-79 - good, 80-89 - very good and 90 points and more - excellent).

*1. 10. Required reading (as on submission of the study programme proposal)*

- Stipetić, A.: Gornji ustroj željezničkoga kolosijeka, Fakultet prometnih znanosti, Zagreb, 2008.
- Guido, P., Pollak, B.: Željeznice - gornji ustroj i specijalne željeznice, Fakultet građevinskih znanosti Sveučilišta u Zagrebu, Zagreb, 1988.
- Mikulić, J., Stipetić, A.: Željezničke pružne građevine, Institut građevinarstva Hrvatske – Zagreb, Zagreb, 1999.
- Coenraad Esveld: Modern Railway Track, MRT Production, second edition, 2001.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Pravilnik o održavanju gornjeg ustroja željezničkih pruga HŽ (Službeni vjesnik, br. 20/91).
- Pravilnik o održavanju donjeg ustroja željezničkih pruga HŽ (Ordinance 315).
- Pravilnik o izgradnji u zaštitnom pojasu željezničke pruge, Zagreb, 1997. (Ordinance 317).

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

- results of the exam pass rate analysis (for revision tests and the exam),
- results of class attendance analysis,
- results of student survey analysis,
- results of the analysis field instruction implementation.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lecture | Class attendance | 1-4 | Class attendance records. |
| Discussion | Class participation | 1-3 | Accuracy of answers to questions |
| Knowledge testing | Written and oral exam | 1-4 | Scoring written and oral answers |

| **General information** | | |
|---|---|---|
| Lecturer | Assoc. Prof. Krunoslav Minažek, Assist. Prof. Igor Sokolić | |
| Course title | Introduction to Geotechnical Design | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective (TI MODULE) | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 3 |
| | Contact hours (L+E+S) | 15+30+0 |

1. **COURSE DESCRIPTION**

*1. 1. Course objectives*

Introducing students to the role and importance of geotechnical design in the design of various buildings, to acquaint students with the principles of geotechnical design, regulations, rules and content of a geotechnical design. Enabling students to develop a programme of geotechnical research works, select budget parameters, design a technical solution, form a design model and basic calculations of typical geotechnical problems; shallow foundation and foundation on piles, supporting structures, protection of construction pits, soil improvements, landslide stabilization.

*1. 2. Course enrolment requirements*

Having completed the course in Soil Mechanics

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:
1. identify interventions and facilities that require the preparation of a geotechnical design, based on the characteristics of the intervention and soil data to conduct a preliminary geotechnical categorization,
2. devise a plan of geotechnical investigation works for typical geotechnical problems,
3. perform analysis and evaluation of the results of geotechnical research works and selection of parameters for the calculation,
4. identify conditions and constraints and define the concept of a technical solution, budget model and perform calculations and dimensioning of typical (simpler) geotechnical problems,
5. evaluate and verify different variants of a technical solution of typical (simpler) geotechnical problems on the basis of given conditions and limitations and performed calculations and analyses
6. define and elaborate technical conditions for the selected technical solution,
7. create elements of geotechnical design for typical geotechnical structures (technical description, calculations, drawings).

*1. 4. Course content (syllabus)*

1. Significance of geotechnical design for buildings and structures, interaction of geotechnical design and construction design,
2. Task and content of geotechnical documentation: reports, projects, regulations
3. Principles of geotechnical design, regulations and rules for design – EC 7 (through specific projects), connection of investigations, design solution, performance and performance control,
4. Geotechnical investigation works, analysis and selection of parameters for calculation, settings of geotechnical models (on specific projects)
5. Calculation methods in geotechnics – on specific projects
6. Conditions for defining a technical solution and presentation of technical solutions for typical geotechnical interventions and interventions related to environmental protection
7. Calculations of typical geotechnical problems; shallow foundation and foundation on piles, supporting structures, protection of construction pits, soil improvements, landslide stabilization.

| | | |
|---|---|---|
| 8. Critical review of the concept of foundation solution using specific projects for selected common geotechnical interventions (selection of exploration works, selection of soil parameters, influence of calculation method, importance of observations and measurements, control of work performance). | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
| *1. 6. Comments* | | |
| *1. 7. Student requirements* | | |
| Regular class attendance, preparation of an individual assignment (programme). | | |
| *1. 8. Student performance evaluation* | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.5 | Class participation | | Seminar paper | 0.5 | Experimental work | |
| Written exam | (0.5) | Oral exam | (0.5) | Essay | | Research | |
| Project | | Continuous assessment | | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

Students have the task of independently solving one of the selected cases of geotechnical problems (programme), the evaluation takes place through the assessment of the individual assignment (programme) and assessment of the written and oral exam.

*1. 10. Required reading (as on submission of the study programme proposal)*

1. Authorized lectures and exercise materials posted on the course website,
2. Mulabdić, M.: Ispitivanje tla u geotehničkom laboratoriju, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski i arhitektonski fakultet Osijek, Osijek, 2018.
3. Roje-Bonnaci, T.: Mehanika tla, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2017.
4. Das, B. M., Sobhan, K.: Principles of Geotechnical Engineering, 9th edition, Cengage Learning, Boston, USA, 2017.
5. Miščević, Prag; Štambuk Cvitanović, N.; Vlastelica, G.: Dimenzioniranje gravitacijskih potpornih zidova, Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, Split, 2020.

*1. 11. Recommended reading (as on submission of the study programme proposal)*

1. EC 7 Standards: HRN EN 1997-1: 2012 / A1: 2014 and HRN EN 1997-1: 2012 / NA: 2016 Eurocode 7 - Geotechnical design - Part 1: General rules and rules and national appendix, HRN EN 1997-2: 2012 Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing (EN 1997-2:2007+AC:2010),
2. Bond, A., Harris, A.: Decoding Eurocode 7, Taylor & Francis, UK, 2008.
3. Tehnički propis za građevinske konstrukcije (Official Gazette 17/17, 75/20)

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Monitoring class attendance, assessment of individual assignments (programmes), assessment of written and oral exams.

2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures | Class attendance | 1-7 | Class attendance records |
| Exercises | Class attendance | 1-7 | Class attendance records |
| Individual assignments | Preparation of the individual assignment (programme) | According to the selected problem type 1-7 | Assessment of the individual assignment (programme) |
| Revision tests, exam | Answering written and oral questions | 1-7 | Assessment of answers |

**GENERAL ELECTIVE COURSES**

| **General information** | | |
|---|---|---|
| Lecturer | Lidija Kraljević, M.Ed. | |
| Course title | English Language IV | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | elective | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Number of hours (L+E) | 15+15 |

| **1. 1. COURSE DESCRIPTION** | | |
|---|---|---|
| *1. 1. Course objectives* | | |
| Expanding and consolidating English language skills by developing comprehension, writing and translation skills.<br>Expansion and upgrading construction terminology in English and knowledge about morphological and syntactic features of field-specific texts. Expending general vocabulary. | | |
| *1. 2. Course enrolment requirements* | | |
| Basic knowledge of grammar and general vocabulary, and having passed the course in English Language 3. | | |
| *1. 3. Expected learning outcomes* | | |
| 1. Translate and interpret field-specific terminology and texts from English into Croatian and from Croatian into English.<br>2. Adopt new field-specific terms at the level of words and collocations and use them field-specific sentences and texts in English.<br>3. Interpret a more complex field-specific text in English.<br>4. Distinguish and identify the basic linguistic rules of the English language in the translation of texts from English into Croatian and from Croatian into English. | | |
| *1.4. Course content (syllabus)* | | |
| Introduction (2); Failure and fracture (2); Deflections (2); Foundations (4); Statically determinate/indeterminate structures (2); Preliminary exam (2); How to Plan a House (2); Job Planning & Management (2); Green architecture (4); Innovative construction technologies (4); Revision (2); Preliminary exam (2); | | |
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☐ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other<br>_____ |
| *1. 6. Comments* | | |
| *1. 7. Student requirements* | | |
| Class attendance | | |
| *1. 8. Student performance evaluation* | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | | Experimental work | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1.0 | Report | | Practical work | |
| Portfolio | | | | | | | |

| |
|---|
| *1. 9. Assessment of student work during classes and at the final exam* |
| Grading scheme for preliminary exams:<br>10% regular class attendance, submitted translations, completed exercises<br>35% 1st preliminary exam<br>35% 2nd preliminary exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade)<br><br>Grading scheme for exams:<br>10% regular class attendance, submitted translations, completed exercises<br>70% written exam<br>20% oral exam (mandatory only for students who want an excellent or a very good grade) |
| *1. 10. Required reading (as on submission of the study programme proposal)* |
| Kraljević L: Structures in Time & Space I, Faculty of Civil Engineering and Architecture Osijek, J. J. Strossmayer University of Osijek, 2002. |
| *1. 11. Recommended reading (as on submission of the study programme proposal)* |
| Kralj-Štih, A.: English in Civil Engineering, Croatian university edition, 2004.<br>Internet sources |
| *1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences* |
| Keeping records of class attendance and student activities<br>Written exercises (translations, abstracts, vocabulary and grammar exercises)<br>Oral expression (reading, oral communication) |

| 2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT | | | |
|---|---|---|---|
| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
| Lectures and exercises | Class attendance<br><br>Translation from and into a foreign language<br>Reading professional texts, articles, watching documentaries about construction in English<br>Translation of field-specific texts from and into a foreign language, writing abstracts of field-specific texts, short presentations/retelling of field-specific texts<br>Vocabulary exercises, retelling exercises, use of synonyms/antonyms, oral or written definition/explanation of terms and expressions | 1, 2, 3, 4 | Class attendance records.<br><br>Formative assessment during the teaching process. |
| Final summative knowledge testing | Taking the exam | 1, 2, 3, 4 | Grading exams according to grading criteria |

| General information | | |
|---|---|---|
| Lecturer | Anamarija Štefić, M.Ed. | |
| Course title | German Language IV | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | elective | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 2.00 |
| | Contact hours (L+E+S) | 15 + 15 + 0 |

**1. 1. COURSE DESCRIPTION**

*1. 1. Course objectives*

- expanding field-specific terminology
- developing a higher level of qualitative use of language in field-specific contexts, developing independence in the use of professional literature of the target language, independent data collection, selection of appropriate information, their classification and encouraging the development of independent learning habits

*1. 2. Course enrolment requirements*

Having attended courses in German Language I and German Language II

*1. 3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:

1. use field-specific vocabulary in independent and spontaneous speech and writing
2. analyze and interpret more complex texts
3. discuss, explain and analyse a text using field-specific terminology
4. prepare an independent presentation on a given topic
5. translate more complex texts from German into Croatian and simpler texts from Croatian into German

*1. 4. Course content (syllabus)*

- Energiewirtschaft und Energiequellen
- Energiewende
- Nachhaltiges Bauen
- Solarhaus
- Erdbebensicheres Bauen
- Grüne Architektur
- Amphibisches Haus

| | | |
|---|---|---|
| *1. 5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☐ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other_____ |

*1. 6. Comments*

*1. 7. Student requirements*

- class attendance (minimum 70%)
- doing exercises and translations in class
- occasional individual assignments (not obligatory but for earning additional points)

*1. 8. Student performance evaluation*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1 | Class participation | | Seminar paper | | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment | 1 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1. 9. Assessment of student work during classes and at the final exam*

During the semester, two (2) preliminary exams are taken and their average is the final grade for the course. One of the preliminary exams can be replaced by preparing and presenting a seminar paper on a given topic. If the student does not pass (gets a negative grade) or is not satisfied with the grade on the preliminary exam he/she can/must take the final exam. Only students who want to get an excellent grade or those who want a higher grade take the oral exam.
Students can collect 45 points on each preliminary exam and 10 points by completing additional individual assignments.
The final grade is the sum of all points earned during the semester based on the following grading scale:
sufficient (2): 44 – 57
good (3): 58 – 71
very good (4): 72 – 85
excellent (5): 86 - 100

*1. 10. Required reading (as on submission of the study programme proposal)*

Various texts from the Internet

*1. 11. Recommended reading (as on submission of the study programme proposal)*

- Štefić, Anamarija (2015.) Deutsch im Bauwesen, Sveučilište Josipa Jurja Strossmayera u Osijeku, Građevinski fakultet Osijek, Osijek
- Kralj Štih, Alemka (2005). Deutsch im Bauingenieurwesen, Hrvatska sveučilišna naklada, Zagreb
- Ritoša, M. – V. Sekula (1989.) Njemački za građevinare, Škola za strane jezike, Zagreb
- Tecilazić, Franci (1986.) Deutsch für Studenten der Architektur, Arhitektonski fakultet Sveučilišta u Zagrebu, Zagreb

Journals from the Faculty library:

- Detail, Institut für Internationale Architektur – Dokumentation
- Bautechnik, Ernst & Sohn, Berlin
- Bauingenieur, Springer Verlag, Berlin
- Bauen mit Holz, editor: Klaus Fritzen, Berlin
- Beton und Stahlbeton, editor: Konrad Bergmeister et al., Berlin

*1. 12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

Keeping records of class attendance and student activities. Written exercises (translations, abstracts, vocabulary and grammar exercises). Oral expression (reading, oral communication)

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance | 1, 2, 3, 4, 5 | Recording class attendance |
| | Written exercises (translations, abstracts, vocabulary and grammar exercises) | 1, 2, 5 | Formative assessment during the teaching process |
| | Oral communication | 1, 2, 3, 4 | Formative assessment during the teaching process |
| Independent work | Individual assignments | 1, 2, 3, 4, 5 | Formative assessment during the teaching process |
| | Preparation of a seminar paper | 1, 2, 3, 4, 5 | Grading of the seminar paper |
| Final summative knowledge testing | Answering written and oral questions | 1, 2, 3, 4, 5 | Assessment of answers |

| General information | | |
|---|---|---|
| Lecturer | Assoc. Prof. Davorin Penava | |
| Course title | Computer Programming in Civil Engineering | |
| Study programme | University undergraduate Study of Civil Engineering | |
| Course status | Elective | |
| Year/Semester | 3rd year/6th semester | |
| ECTS value and type of instruction | ECTS | 2.0 |
| | Contact hours (L+E+S) | 15+15+0 |

## 1. COURSE DESCRIPTION

*1.1. Course objectives*

Introduce students to the basics of computer programming with an emphasis on application in civil engineering. The MATLAB programming language is used.

*1.2. Course enrolment requirements*

**None.**

*1.3. Expected learning outcomes*

Upon successful completion of the course, students will be able to:
1. Describe the purpose of computer programming in civil engineering
2. Distinguish types and methods of working with data in MATLAB
3. Apply drawing aids and graphics
4. Modify and adapt existing computer programs
5. Detect and remove errors from a computer program
6. Design, build and test computer programs
7. Understand and use MATLAB to solve basic problems in civil engineering

*1.4. Course content (syllabus)*

Introduction to computer programming; Basics of work in MATLAB; Arrays and matrices; Branching; Looping; Drawing and graphics; User functions and methods; External files; Numerical methods in MATLAB; Symbolic mathematics; Polynomials, curve fitting and interpolation; Application in civil engineering.

| | | |
|---|---|---|
| *1.5. Type of instruction* | ☒ lectures<br>☐ seminars and workshops<br>☒ practical classes<br>☐ distance learning<br>☐ field work | ☒ individual assignments<br>☒ multimedia and e-learning<br>☐ lab work<br>☐ tutorials<br>☐ other _____ |
| *1.6. Comments* | | |

*1.7. Student requirements*

Class attendance minimum 70%; homework assignments; revision tests, final project; written and oral exam.

*1.8. Student performance[17] evaluation*

[17] **IMPORTANT**: For each of the methods of monitoring student work, the appropriate share in ECTS credits for individual activities should be entered so that the total number of ECTS credits corresponds to the credit value of the course. Blank fields can be used for additional activities.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Class attendance | 1.0 | Class participation | | Seminar paper | 0.3 | Experimental work | |
| Written exam | | Oral exam | | Essay | | Research | |
| Project | | Continuous assessment and/or final exam | 0.7 | Report | | Practical work | |
| Portfolio | | | | | | | |

*1.9. Assessment of student work during classes and at the final exam*

Student work during classes will be evaluated with two compulsory revision tests, including one elective recurring revision test which compensates for insufficient success in one of the compulsory revision tests. The total percentage achieved during classes is determined as the average result of both revision tests, where the highest result for each revision test is 100.0%, and the lowest pass rate is 60.0%. Additionally, student work during classes will be evaluated through the final project, where the highest result in the final project is 100.0% and the lowest pass rate is 60.0%. The total grade is the sum of the average revision test results (which make 70% of the total grade) and the result of the final project (which makes 30% of the final grade).
Student performance is assessed as follows: 85.0-100.0% excellent (5); 70-84.9% very good (4); 60.0-69.9% good (3) and sufficient (2) 50.0-59.9%. If a student scores between 0 and 59.9% during the course, he/she should take a written and oral exam.

*1.10. Required reading (as on submission of the study programme proposal)*

Gilat, A. 2011. MATLAB - An Introduction with Applications, 6 edn, Wiley

*1.11. Recommended reading (as on submission of the study programme proposal)*

Prakash, A. 2014. Introduction to Computing with MATLAB, CEE15 Class Notes. School of Civil Engineering, Purdue University

*1.12. Course evaluation to ensure the acquisition of knowledge, skills, and competences*

The quality monitoring process in order to ensure the acquisition of defined learning outcomes is carried out through:

- Validation of learning outcomes through regular student feedback on whether certain learning outcomes have been achieved and whether all outcomes have been covered (analysis of student survey on teachers, class attendance and participation, and the analysis of individual and group work or seminar papers)
- The verification of the study according to learning outcomes is done by aligning learning outcomes, teaching methods and assessment at the level of study programmes. It also includes an assessment of how the given learning outcomes affect student workload.

**2. ALIGNING LEARNING OUTCOMES, TEACHING METHODS AND ASSESSMENT**

| *2. 1. Teaching activity* | *2. 2. Student activity* | *2. 3. Learning outcome* | *2. 4 Assessment method* |
|---|---|---|---|
| Lectures and exercises | Class attendance (computer work) | 1—7 | Checking class attendance |
| Final project | Independent preparation of the final project (computer work) | 1—7 | Reviewing and grading the final project |
| Continuous assessment | Solving tasks in revision tests during the semester (computer work) | 1—7 | Reviewing and grading of revision tests |
| Final examination | Solving exam tasks (computer work) | 1—7 | Reviewing and grading of the exam |

### 4.3. Structure of the study, study progression, conditions for enrolment in the next semester

#### 4.3.1 Structure and organization of the study

The education cycle at the University undergraduate Study of Civil Engineering lasts 3 years, i.e. 6 semesters. During the study, the student earns 180 ECTS credits (30 ECTS credits per semester). The structure of the study consists of the following groups of courses:

- core courses
- general elective courses
- core courses of the module
- elective courses of the module
- elective courses from the List of University elective courses.

Instruction is carried out in the form of lectures, auditory and construction exercises. Students acquire general and field-specific theoretical knowledge, develop field-specific, critical thinking and teamwork skills, and are encouraged to work independently.

Over the years, in student surveys and interviews they expressed their desire to connect teaching content with practice and the need for a better acquisition of field-specific skills. The result is the introduction of two new courses that will increase field-specific skills and professional knowledge, namely Field Instruction in the fourth semester and Student Internship in the sixth semester. As a result, we are innovating and changing the scope and content of some courses where possible (so as not to disrupt the required share of general, basic and field-specific knowledge). New courses intended for the acquisition of information technology skills have been introduced.

The sixth semester is designed to introduce students, through modules, to specializations taught in the university graduate study of Civil Engineering. It consists of core courses of the module that are the same for all students: Load-Bearing Structures, Construction Management and Technology, Hydraulic Engineering and Transportation Infrastructure, and elective courses.

The student is obliged to attend classes and fulfil other teaching obligations (take revision tests, develop programmes, etc.). The condition for obtaining the lecturer's signature is meeting all student obligations. Prerequisites for enrolling in each course are defined in the detailed course description.

Any additional ECTS credits (over the required 180) are recorded in the Diploma Supplement.

**Table 8** Basic structure of the study by semesters

| 1st semester | | 2nd semester | |
|---|---|---|---|
| Core courses | 30 ECTS | Core courses | 30 ECTS |
| Elective courses | 0 ECTS | Elective courses | 0 ECTS |
| TOTAL 30 ECTS | | TOTAL 30 ECTS | |

| 3rd semester | | 4th semester | |
|---|---|---|---|
| Core courses | 30 ECTS | Core courses | 26 ECTS |
| Elective courses | 0 ECTS | Elective courses | 4 ECTS |
| TOTAL 30 ECTS | | TOTAL 30 ECTS | |

| 5th semester | | 6th semester | |
|---|---|---|---|
| Core courses | 30 ECTS | Core courses | 19 ECTS |
| Elective courses | 0 ECTS | Core courses of the module: | |
| | | **LOAD-BEARING STRUCTURES** | 6 ECTS |
| | | **CONSTRUCTION MANAGEMENT AND TECHNOLOGY** | 8 ECTS |
| | | **HYDRAULIC ENGINEERING** | 6 ECTS |
| | | **TRANSPORTATION INFRASTRUCTURE** | 6 ECTS |
| | | Elective courses of the module: | |
| | | **LOAD-BEARING STRUCTURES** | 5 ECTS |
| | | **CONSTRUCTION MANAGEMENT AND TECHNOLOGY** | 3 ECTS |
| | | **HYDRAULIC ENGINEERING** | 5 ECTS |
| | | **TRANSPORTATION INFRASTRUCTURE** | 5 ECTS |
| TOTAL 30 ECTS | | TOTAL 30 ECTS | |

### 4.3.2 Study progression

At the beginning of the academic year, the student enrols in all courses of that year (core and selected elective courses). The student is obliged to attend classes and fulfil other obligations (take revision tests, develop programmes, etc.) in accordance with the detailed course description. The condition for obtaining the lecturer's signature as confirmation of completion of the course, is having attended at least 70% of classes and fulfilling other student obligations (revision tests, programmes, etc.). The beginning and the end of each academic year is determined by the Senate Decision on the academic calendar.

### 4.3.3 Conditions for enrolment of in a higher year of study

The conditions for enrolment in a higher year of study are determined by the University Ordinance on Studies and Studying and the Senate Decision on the conditions for enrolment in a higher year of study, and are related to:

a) Fulfilling obligations defined in the study programme.
   Fulfilling of obligations defined in the study programme is verified by the course lecturer that the course has been completed (lecturer's signature). The obligations are defined for each course in the detailed course description.
   The general condition for getting the lecturer's signature is 70% class attendance.
b) The minimum number ECTS credits earned in the current academic year
   The minimum number ECTS credits earned required for enrolment in a higher year of study is prescribed by the University Senate Decision before the beginning of each academic year.

The beginning and the end of each academic year is determined by the Senate Decision on the academic calendar.

### 4.4. Courses students can choose from other study programmes

During the study, the student can choose two elective courses taught by other members of the University which are on the List of University Elective Courses. The list of university elective courses is adopted by the University Senate before the beginning of each academic year.

### 4.5. Courses that can be taught in a foreign language

**Course title**

Structural Geometry
Basics of Construction Informatics I
Introduction to Building
Materials Science
Basics of Construction Informatics I
Basics of Construction Informatics II
Energy in Building Design
Hydrology I
Construction Materials
Fluid Mechanics
Introduction to Structural Engineering
Environmental Protection
Introduction to Steel Structures
Water Supply and Sewage Systems I
Introduction to Concrete Structures
Introduction to Masonry Structures
Engineering Economics
Introduction to hydraulic engineering
Water Protection
Road Infrastructure
Laboratory Soil Testing
Hydraulic Engineering Practicum
Waste Management
Building Installations
Computer Programming in Civil Engineering

### 4.6. Completion of the study

The university undergraduate study of Civil Engineering is completed by passing all the exams and writing the bachelor's thesis. By completing the thesis, the student must prove that he/she is able to apply the knowledge acquired during the studies and show that he/she can successfully solve professional tasks at the level of the academic title he/she obtains.
The mentor of the bachelor's thesis can be a teacher in the scientific-teaching title starting from assistant professor appointed in the field relevant for the thesis topic.
The GRAFOS Ordinance on bachelor's and master's theses regulates the issues of bachelor's thesis, rights and obligations of students, mentors, co-mentors, examination committees and the Committee for final and diploma exams, and other issues related to the bachelor's thesis.

### 4.7. Conditions under which students who have interrupted their study of lost the right to study in one study programme can continue their studies

The UNIOS Ordinance on studies and studying defines the conditions under which students who have interrupted their study or lost the right to study in one study programme may continue their studies.
The following conditions are currently in effect:
A person who has lost the status of a full-time student may be allowed to complete the study and pay the tuition fee. The deadline for completion of studies is six years from the first year of enrolment.
A student who has interrupted a full-time study may continue his/her studies provided that the study programme has not changed significantly from the one originally enrolled. The tuition for continuing studies is covered by the student. The deadline for completion of studies is six years from the first year of enrolment.
A student who has lost the status of a full-time student at another higher education institution may continue his/her studies by transferring to this study programme if it is a related study, with the possibility of taking differential exams. The tuition for continuing studies is covered by the student. The deadline for completion of studies is six years from the first year of enrolment.
The decision on the approval of the continuation of studies is made by the professional council or the authorized body of the institution delivering the study in accordance with the study programme. The Decision lists the recognized exams with grades and ECTS credits earned during the studies, as well as differential and additional exams in accordance with the study programme of the institution at which the student continues his/her studies.

## 4. CONDITIONS FOR DELIVERING THE STUDY PROGRAMME

### 5.1. Location of delivering the study programme

Classes at the Faculty of Civil Engineering and Architecture Osijek are held on the premises used by the Faculty, Ulica Vladimira Preloga 3, Osijek, within the University Campus of the Josip Juraj Strossmayer University of Osijek. The total area of the building is 9,660.00 $m^2$. Part of the classes will be organized as field instruction.

### 5.2. Documents on the ownership, right of use documents, or other valid legal basis

The contract on the use and maintenance of the building on the University Campus between the Josip Juraj Strossmayer University of Osijek and the Faculty of Civil Engineering and Architecture Osijek is provided in Appendix 7.

### 5.3. Proof of available space for performing higher education activities

The building of the Faculty of Civil Engineering and Architecture Osijek was built with funds from the Ministry of Science and the Josip Juraj Strossmayer University of Osijek. It was opened in 2016 and is one of the most modern higher education buildings in Europe. It has six floors (Po + Su + Pr + 3) with a total area of 10,600 m2. It consists of several functional units, i.e. six departments (70 offices and four laboratories) as well as teaching spaces (lecture rooms, drawing rooms and practicums), administration (dean's office, accounting and student administration office with accompanying rooms), faculty library, students' and community spaces (halls, stands, open classroom, cafeteria, hallways), but also auxiliary and utility/maintenance rooms. The building has oblong shape and is organised in four groups of spaces: two groups of teacher offices, a central corridor with a central communications area and shared areas, and the teaching and drawing rooms with their own corridor. This arrangement allows for flexible use, linking or separating the rooms as necessary. On the two floors below ground level there are laboratories and depictions of archaeological sites, with the building maintenance rooms; on the ground floor there are tiered lecture rooms, the library, student administration office and the faculty hall; on the first floor there is the

administrative section (with the Dean's Office, administrative and exhibition rooms); on the second floor there are lecture rooms, teacher offices, an open classroom, green spaces and student areas, and on the third floor there are offices, the cafeteria and accommodation for visiting professors. At full capacity the building can hold 1,348 students and 179 staff. The design of the building is conditioned by the layout of the rooms and the three open spaces, and especially the choice of the supporting structure of high reinforced concrete bearers. These features affect its appearance and volume, as do the high walls interpolated according to the demands of the rooms and the distribution of forces within them. The overall impression is defined by constructional and spatial logic. The design and construction elements create an external and internal impression that indicates the purpose of the building – the training of highly educated civil engineering and architecture specialists. The floor plans of the building are given in Appendix 8.

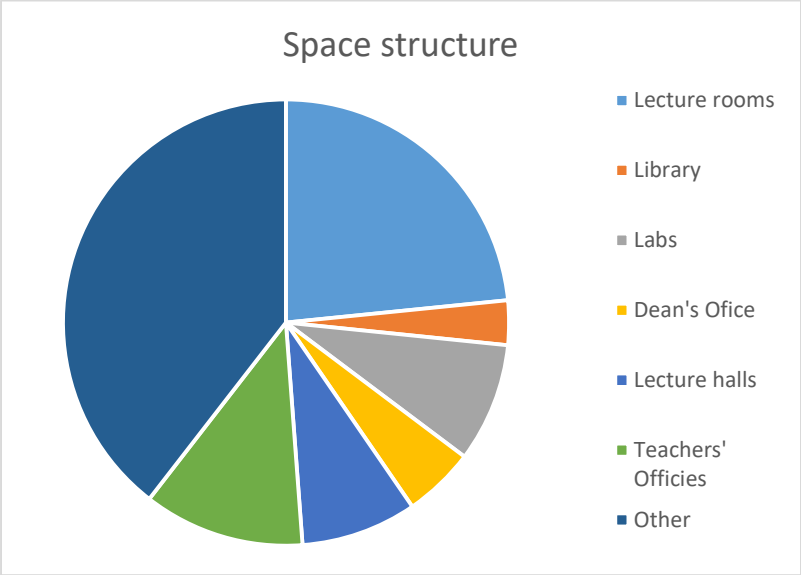


**Figure 5** Space structure

### 5.4. Proof of available own equipment

**Table 9** Space and equipment

| **1. SPACE AND EQUIPMENT** | | | | | |
|---|---|---|---|---|---|
| ***1.1. HEI buildings*** | | | | | |
| *Building address* | *Building location* | *Year of construction* | *Year of extension or reconstruction* | *Total area in m²* | |
| Ulica Vladimira Preloga 3 | Osijek | 2016 | - | 9660.00 | |
| | | | | | |
| ***1.2. Lecture rooms*** | | | | | |
| *Building address* | *Number of the lecture room* | *Area in m²* | *Number of seats for students* | *Number of hours of use per week* | *Equipment rating* (from 1 to 5)* |
| Ulica Vladimira Preloga 3 | 1 | 180.00 | 144 | 50 | 5 |
| | 2 | 262.30 | 255 | 50 | 5 |
| | 3 | 127.80 | 102 | 50 | 5 |
| | 4 | 126.50 | 102 | 50 | 5 |
| | 5 | 87.20 | 40 | 50 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| | 6 | 87.20 | 40 | 50 | 5 |
| | 7 | 87.20 | 40 | 50 | 5 |
| | 8 | 87.20 | 40 | 50 | 5 |
| | 9 | 87.20 | 40 | 50 | 5 |
| | 10 | 101.80 | 40 | 50 | 5 |
| | 11 | 150.00 | 36 | 50 | 5 |
| | 12 | 76.60 | 36 | 50 | 5 |
| | 13 | 76.60 | 36 | 50 | 5 |
| | 14 | 76.60 | 36 | 50 | 5 |
| | 15 | 76.60 | 36 | 50 | 5 |
| | 16 | 87.40 | 36 | 50 | 5 |
| | **TOTAL** | **1983.30** | **1059** | | |

** the equipment of the lecture room refers to the quality of furniture, technical and other equipment*

***1.3. Laboratories/practicums used in teaching***

| *Building address* | *Internal designation of the laboratory/practicum* | *Area (in m²)* | *Number of seats for students* | *Number of hours of use per week* | *Equipment rating* (from 1 to 5)* |
|---|---|---|---|---|---|
| Ulica Vladimira Preloga 3 | Materials Testing Laboratory | 249.00 | 30 | 20 | 5 |
| | Laboratory for Hydraulic Engineering | 104.50 | 20 | 20 | 5 |
| | Computer lab | 89.90 | 42 | 40 | 5 |
| | Computer lab | 103.30 | 40 | 40 | 4 |
| | Computer lab | 76.60 | 36 | 40 | 3 |
| | **TOTAL** | **623.30** | **168** | | |

***1.4. Teaching bases (work sites) for practical classes***

| *Building address* | *Name of teaching base* | *Number of students working at a particular teaching base* | *Number of teaching hours (per week) held in each teaching base* |
|---|---|---|---|
| | | | |

***1.5. Computer lab equipment***

*(provide data on computers in computer labs/practicums used in teaching)*

| *Number of newer computers (up to 3 years)* | *Number of computers older than 3 years* | *Functionality assessment (from 1 to 5)* | *Maintenance assessment (from 1 to 5)* | *Assessment of the possibility of use outside of class* |
|---|---|---|---|---|
| | 20 | 4 | 5 | 5<br>8.00-20.00h |

| | | | | |
|---|---|---|---|---|
| 30 | | 4 | 5 | 5<br>8.00-20.00h |
| | 20 | 3 | 3 | - |

***1.6. Teachers' offices***

| *Building address* | *Number of teachers' offices* | *Average area (in m²)* | *Equipment rating (from 1 to 5)* | *Average area in m² per full-time teacher/associate ** |
|---|---|---|---|---|
| Ulica Vladimira Preloga 3 | 60 | 15.50 | 5 | 14.10 |

** or the number of teachers/associates who share the office*

***1.7. Space used only for scientific research and professional work***

| *Building address* | *Internal room or lab designation* | *Area (in m²)* | *Number of hours of use per week* | *Equipment rating (from 1 to 5)* |
|---|---|---|---|---|
| Ulica Vladimira Preloga 3 | Laboratory for geotechnics, geodesy and transportation infrastructure | 145.80 | 60 | 5 |
| | Structural testing laboratory | 292.70 | 60 | 5 |
| | **TOTAL** | **437.70** | | |

***1.8. Capital equipment***
*(provide data on the available capital equipment of this higher education institution costing less than HRK 200,000)*

| *Name of instrument (equipment)* | *Purchase value* | *Age* |
|---|---|---|
| Geosynthetic properties testing machine | 245,001.09 | 19 |
| Air handling units for samples | 204,422.57 | 19 |
| Vibration exciter | 202,141.59 | 18 |
| Building materials testing device | 295,884.17 | 17 |
| Hydrodemonstration channel | 239.903.52 | 17 |
| Autograph 300 kN tensile tester | 370,184.55 | 11 |
| Earthquake shake table | 219,924.00 | 10 |
| Aramis optical measuring system | 607,882.90 | 9 |
| Georadar | 236,840.00 | 9 |
| Multi-purpose concrete testing machine | 228,076.25 | 7 |
| BET device | 325,566.75 | 4 |
| Shimadzu tensile tester 50 kN | 461,125.00 | 2 |
| GDS triaxial shear testing system | 562,250.00 | 2 |
| SEM electron microscope | 703,125.00 | 2 |
| EDS spectrometer | 537,500.00 | 1 |

| | | |
|---|---|---|
| Thermal conductivity of materials | 268,146.00 | 1 |
| Proceq ultrasonic device | 232,053.00 | 1 |
| **TOTAL** | **5,940,026.39** | |

***1.9. Library space and equipment***

*a) provide information on the library space*

| *Total area (in m²)* | *Number of employees* | *Number of seats* | *Number of students using the library* | *Is there a computer database of your books and magazines* |
|---|---|---|---|---|
| 325 | 3 | 40 | 349 | YES |

*b) provide information on the equipment in the library*

| *Number of books* | *Number of textbooks** | *How recently were the books and textbooks published (from 1 to 5)* | *Number of titles of foreign journals* | *Number of titles of national journals* | *Functionality assessment of book and journal catalogues (from 1 to 5)* | *Equipment rating (from 1 to 5)*** | *Assessment of quality and availability of electronic content**** |
|---|---|---|---|---|---|---|---|
| 6034 | 234 | 4 | 84 | 94 | 5 | 5 | 5 |

**The number of textbooks refers to all titles regardless of the number of copies.*
***Possibilities of making copies for teachers and students, purchase of copies from other libraries, catalogues of teachers' works, etc.*
**** Electronic content includes electronic editions of books and journals, databases, but also catalogues of own and external libraries.*

***1.10. Student Office***

| *Total area in m²* | *Number of employees* | *Working hours* |
|---|---|---|
| 46.00 | 5 | 7.30 – 15.30 |

## 5.5. Spatial capacities for teaching

The spatial capacity of the building of the Faculty of Civil Engineering and Architecture Osijek is determined as the ratio of usable space for teaching and the number of enrolled students in all studies and years of study. The total number of students also includes repeat students and students in the status of completion of studies and suspension of student status.

Table 10 Number of enrolled students in all statuses (full-time, part-time, in completion of studies)

| **Study** | **Number of students enrolled in the academic year 2020/21** |
|---|---|
| University undergraduate Study of Civil Engineering | 414 |
| Professional undergraduate Study of Civil Engineering (full-time + part-time) | 240 |
| University undergraduate Study of Architecture and Urban Planning | 150 |
| Professional graduate Study | 53 |
| University graduate Study | 196 |
| Doctoral Study (doctoral) | 34 |
| TOTAL ENROLLED STUDENTS: | 1087 |

As can be seen in Table 9, there is a total of 2253.10 m² of usable space in classrooms, lecture rooms and drawing rooms, which is per student:

$$P = 2253.10/1087 = 2.07\ m^2$$

It is clear that there are adequate spatial capacities for teaching.

### 5.6. Optimal number of students who can enrol

Considering the total available area of classrooms, lecture rooms and drawing rooms, which amounts to 2253.10 $m^2$, and according to the criterion that it is necessary to provide 1.50 $m^2$ of space per student, the optimal number of students is:

$$N = 2253.10/1.50 = 1502\ students$$

At the moment, 1,087 students are enrolled at the Faculty, which means that we have the opportunity to enrol another 415 students to reach full capacity. At the moment, no increase in the admission quota is planned for the proposed university undergraduate study and the new study has the existing admission quota.
At the Faculty of Civil Engineering and Architecture Osijek there are 36 teachers in scientific-teaching titles employed full-time (total FTE 35), 10 teachers in the teaching titles (total FTE 10) and 20 teachers in associate titles of assistants and post-doctoral students, which makes the total FTE = 35 + 10 + 20×0.5 = 55. Considering that a total of 1087 students are enrolled in this academic year, the ratio of the number of students and teachers is 1087/55 = 19.76.

**Table 11** Full-time teachers by title

| **FULL-TIME TEACHERS BY TITLE** | | |
|---|---|---|
| **TITLE** | **NUMBER** | **FTE** |
| Full Professor with Tenure | 3 | 2.5 |
| Full Professor | 6 | 6 |
| Associate Professor | 19 | 18.5 |
| Assistant Professor | 8 | 8 |
| Post-doctoral student | 4 | 2 |
| Assistant | 16 | 8 |
| Senior lecturer | 8 | 8 |
| Lecturer | 2 | 2 |
| **TOTAL** | **66** | **55** |

**Table 12** Total number of teachers and students

| ***Total number of teachers and students – University undergraduate Study of Civil Engineering*** | | | | | | |
|---|---|---|---|---|---|---|
| | | *Year of study program* | | | | |
| | | *1.* | *2.* | *3.* | *4.* | *5.* |
| ***1.*** | **Total number of teachers** | **16** | **25** | **18** | | |
| *1.1.* | Full-time teachers | 16 | 24 | 18 | | |
| *1.2.* | 30% contractual relationship | | | | | |
| *1.3.* | 50% contractual relationship | | 1 | | | |
| ***2.*** | **Total number of full-time students** | 140 | 132 | 142 | | |
| *2.1.* | With the support of the Ministry of Science, Education and Sports | 119 | 63 | 32 | | |
| *2.2.* | Independent student funding | 21 | 69 | 110 | | |
| ***3.*** | **Total number of part-time students** | - | - | - | | |
| ***4.*** | **Total number of students (2+3)** | 140 | 132 | 142 | | |
| ***Table of the total number of teachers and students – University undergraduate Study of Architecture*** | | | | | | |

| | | Year of study program | | | | |
|---|---|---|---|---|---|---|
| | | *1.* | *2.* | *3.* | *4.* | *5.* |
| ***1.*** | **Total number of teachers** | **14** | **12** | **12** | | |
| *1.1.* | Full-time teachers | 14 | 12 | 12 | | |
| *1.2.* | 30% contractual relationship | | | | | |
| *1.3.* | 50% contractual relationship | | | | | |
| ***2.*** | **Total number of full-time students** | 41 | 57 | 52 | | |
| *2.1.* | With the support of the Ministry of Science and Education | 32 | 32 | 25 | | |
| *2.2.* | Independent student funding | 9 | 25 | 27 | | |
| ***3.*** | **Total number of part-time students** | - | - | - | | |
| ***4.*** | **Total number of students (2+3)** | 41 | 57 | 52 | | |

***Total number of teachers and students – University graduate Study of Civil Engineering***

| | | Year of study program | | | | |
|---|---|---|---|---|---|---|
| | | *1.* | *2.* | *3.* | *4.* | *5.* |
| ***1.*** | **Total number of teachers** | **34** | **23** | | | |
| *1.1.* | Full-time teachers | 34 | 22 | | | |
| *1.2.* | 30% contractual relationship | | | | | |
| *1.3.* | 50% contractual relationship | | 1 | | | |
| ***2.*** | **Total number of full-time students** | 94 | 102 | | | |
| *2.1.* | With the support of the Ministry of Science and Education | 92 | 50 | | | |
| *2.2.* | Independent student funding | 2 | 52 | | | |
| ***3.*** | **Total number of part-time students** | - | - | | | |
| ***4.*** | **Total number of students (2+3)** | 94 | 102 | | | |

***Total number of teachers and students – Professional undergraduate Study of Civil Engineering***

| | | Year of study program | | | | |
|---|---|---|---|---|---|---|
| | | *1.* | *2.* | *3.* | *4.* | *5.* |
| ***1.*** | **Total number of teachers** | **14** | **15** | **10** | | |
| *1.1.* | Full-time teachers | 14 | 15 | 10 | | |
| *1.2.* | 30% contractual relationship | | | | | |
| *1.3.* | 50% contractual relationship | | | | | |
| ***2.*** | **Total number of full-time students** | 77 | 27 | 17 | | |
| *2.1.* | With the support of the Ministry of Science and Education | 55 | 14 | 7 | | |
| *2.2.* | Independent student funding | 22 | 13 | 10 | | |
| ***3.*** | **Total number of part-time students** | 34 | 56 | 29 | | |
| ***4.*** | **Total number of students (2+3)** | 111 | 83 | 46 | | |

| *Table of the total number of teachers and students – University undergraduate Study of Civil Engineering*<br>**NEW PROPOSED STUDY PROGRAMME** | | | | | | |
|---|---|---|---|---|---|---|
| | | *Year of study programme* | | | | |
| | | *1.* | *2.* | *3.* | *4.* | *5.* |
| ***1.*** | **Total number of teachers** | **12** | **22** | **22** | | |
| *1.1.* | Full-time teachers | 15 | 21 | 22 | | |
| *1.2.* | 30% contractual relationship | | | | | |
| *1.3.* | 50% contractual relationship | | 1 | | | |
| ***2.*** | **Total number of full-time students** | 140 | 120 | 110 | | |
| *2.1.* | With the support of the Ministry of Science and Education | 120 | 80 | 60 | | |
| *2.2.* | Independent student funding | 20 | 40 | 50 | | |
| ***3.*** | **Total number of part-time students** | - | - | - | | |
| ***4.*** | **Total number of students (2+3)** | 140 | 120 | 110 | | |

### 5.7. List of teachers and associates who will teach the programme

The list of teachers and associates who will participate in the proposed study programme of the University undergraduate study is provided in Table 13 (own employees) and Table 14 (external associates), and the coverage of teaching by own staff is shown in Table 15.

**Table 13** List and workload of teachers employed at the higher education institution who participate in the implementation of the study programme (as for the academic year 2020/2021)

| Title | Name and surname | Course | Semester | Plan | | | Execution | | | Standardized teaching hours | Total workload on the study programme | Total workload at the HEI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | E | S | L | E | S | | | |
| FULL PROFESSORS WITH TENURE | | | | | | | | | | | | |
| | Full Prof. Damir Markulak | Introduction to Steel Structures | 5 | 30 | 0 | 0 | | | | 60 | 100 | 190 (64%) |
| | | Introduction to Structural Engineering | 4 | 20 | 0 | 0 | | | | 40 | | |
| | | Metal Structures 2 | 3 | | | | 30 | 0 | 0 | 60 | 90 | |
| | | Basics of Analysis and Loadings on Structures | 3 | | | | 15 | 0 | 0 | 30 | | |
| FULL PROFESSORS | Full Prof. Lidija Tadić | Fluid Mechanics | 4 | 30 | 0 | 0 | | | | 60 | 105 | 300 (100%) |
| | | Environmental Protection | 4 | 20 | 0 | 10 | | | | 55 | | |
| | | Land Reclamation 1 | 2 | | | | 30 | 0 | 0 | 60 | 195 | |
| | | Hydrotechnical Structures | 1 | | | | 30 | 0 | 0 | 60 | | |
| | | River Regulation | 2 | | | | 30 | 0 | 0 | 60 | | |
| | | Hydrometrics | 3 | | | | 0 | 15 | 0 | 15 | | |
| | Full Prof. Sanja Dimter | Roads | 5 | 30 | 0 | 0 | | | | 60 | 90 | 300 (100%) |
| | | Road Infrastructure | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Roads | 3 | | | | 30 | 0 | 0 | 60 | 210 | |
| | | Substructure of Transportation Infrastructure | 1 | | | | 15 | 0 | 0 | 30 | | |
| | | Carriageway Construction | 2 | | | | 30 | 0 | 0 | 60 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Maintenance and Repair of Transportation Infrastructure | 3 | | | | 30 | 0 | 0 | 60 | | |
| | Full Prof. Zlata Dolaček-Alduk | Construction Management I | 6 | 30 | 0 | 0 | | | | 60 | 120 | 420 (140%) |
| | | Construction Business in the Digital Environment | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Procedures and Methods for Building Condition Assessment | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Construction Management I | 4 | | | | 30 | 0 | 0 | 60 | 300 | |
| | | Lower Organisation of Transportation Infrastructure | 1 | | | | 15 | 0 | 0 | 30 | | |
| | | Project Management | 3 | | | | 45 | 0 | 0 | 90 | | |
| | | Quality Management | 2 | | | | 30 | 30 | 0 | 90 | | |
| | | Integrated Design | 3 | | | | 15 | 0 | 0 | 30 | | |
| | Full Prof. Damir Varevac | Introduction to Structural Engineering | 4 | 10 | 0 | 0 | | | | 20 | 20 | 185 (62%) |
| | | Pre-Stressed Concrete | 3 | | | | 30 | 0 | 0 | 60 | 165 | |
| | | Structural Design | 3 | | | | 15 | 15 | 0 | 45 | | |
| | | Concrete Structures 1 | 1 | | | | 30 | 0 | 0 | 60 | | |
| ASSOCIATE PROFESSORS | Assoc. Prof. Brankica Malić | Structural Geometry | 1 | 15 | 0 | 0 | | | | 30 | 90 | 330 (110 %) |
| | | Geodesy | 1 | 30 | 0 | 0 | | | | 60 | | |
| | | GIS in Hydraulic Engineering | 3 | | | | 30 | 30 | 0 | 90 | 240 | |
| | | GIS and Engineering Geodesy in Transportation Infrastructure | 2 | | | | 30 | 0 | 0 | 60 | | |
| | | Technical Drawing and CAD | 1 | | | | 30 | 0 | 0 | 60 | | |
| | | Architectural and Computer Graphics | 2 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Sanja Lončar-Vicković | Introduction to Building | 1 | 30 | 0 | 0 | | | | 60 | 60 | 352 (118%) |
| | | Basics of Architectural Design | 1 | | | | 30 | 0 | 0 | 60 | 292 | |
| | | Basics of Architectural Design | 2 | | | | 30 | 0 | 0 | 60 | | |
| | | History of Architecture 1 | 3 | | | | 30 | 0 | 0 | 60 | | |
| | | History of Architecture 2 | 4 | | | | 30 | 0 | 0 | 60 | | |
| | | Design studio in Urban planning and Architecture – bachelor's thesis | 6 | | | | 0 | 52 | 0 | 52 | | |
| | Assoc. Prof. Aleksandar Jurić | Mechanics 1 | 2 | 45 | 0 | 0 | | | | 90 | 150 | 210 (70%) |
| | | Mechanics 2 | 3 | 30 | 0 | 0 | | | | 60 | | |
| | | Technical Mechanics 1 | 1 | | | | 15 | 0 | 0 | 30 | 60 | |
| | | Technical Mechanics 2 | 2 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Hrvoje Krstić | Energy in Building Design | 2 | 30 | 0 | 0 | | | | 60 | 180 | 450 (150%) |
| | | Construction Regulations | 2 | 30 | 0 | 0 | | | | 60 | | |
| | | Building Technology I | 5 | 30 | 0 | 0 | | | | 60 | | |
| | | Building Technology | 3 | | | | 30 | 0 | 0 | 60 | 270 | |
| | | Building Maintenance | 4 | | | | 30 | 0 | 0 | 60 | | |
| | | Tenders and Contracts | 3 | | | | 30 | 30 | 0 | 90 | | |
| | | Energy Efficient Buildings | 3 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Silva Lozančić | Building Statics 1 | 3 | 45 | 0 | 0 | | | | 90 | 150 | 150 (100%) |
| | | Building Statics 2 | 4 | 30 | 0 | 0 | | | | 60 | | |
| | Assoc. Prof. Mirjana Bošnjak-Klečina | Strength of Materials 1 | 3 | 45 | 0 | 0 | | | | 90 | 150 | 210 (70%) |
| | | Strength of Materials 2 | 4 | 30 | 0 | 0 | | | | 60 | | |
| | | Technical Mechanics 2 | 2 | | | | 30 | 0 | 0 | 60 | 60 | |
| | | Hydrology 1 | 3 | 15 | 0 | 0 | | | | 30 | 190 | 460 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Assoc. Prof. Marija Šperac | Water Supply and Sewage Systems 1 | 5 | 30 | 0 | 0 | | | | 60 | | (153%) |
| | | Introduction to hydraulic engineering | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Waste Management | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Building Installations | 6 | 20 | 0 | 0 | | | | 40 | | |
| | | Hydrology 2 | 1 | | | | 30 | 0 | 0 | 60 | | |
| | | Water Supply and Sewage Systems 2 | 3 | | | | 30 | 0 | 0 | 60 | 270 | |
| | | Hydrotechnical Systems | 2 | | | | 30 | 30 | 0 | 90 | | |
| | | Building Installations | 5 | | | | 30 | 0 | 0 | 60 | | |
| | Assoc. Prof. Krunoslav Minažek | Soil Mechanics | 4 | 45 | 0 | 0 | | | | 90 | | |
| | | Geotechnical Engineering | 5 | 30 | 0 | 0 | | | | 60 | | |
| | | Waste Management | 6 | 15 | 0 | 0 | | | | 30 | 224 | |
| | | Laboratory Soil Testing | 6 | 15 | 0 | 0 | | | | 30 | | |
| | | Introduction to Geotechnical Design | 6 | 7 | 0 | 0 | | | | 14 | | 404 (135%) |
| | | Geotechnics in Transportation Infrastructure | 2 | | | | 0 | 30 | 0 | 30 | | |
| | | Application of Geosynthetics | 3 | | | | 0 | 30 | 0 | 30 | 180 | |
| | | Soil Mechanics and Foundation | 3 | | | | 30 | 0 | 0 | 60 | | |
| | | Geotechnical Engineering | 4 | | | | 30 | 0 | 0 | 60 | | |
| | Assoc. Prof. Ivana Šandrk Nukić | Engineering Economics | 6 | 30 | 0 | 0 | | | | 60 | | |
| | | Professional Ethics, Sociology of Work and Organizational Psychology | 6 | 15 | 15 | 0 | | | | 45 | 104 | |
| | | Marketing | 3 | | | | 30 | 30 | 0 | 90 | | 311 (104%) |
| | | Energy Efficient Buildings | 3 | | | | 0 | 4 | 0 | 4 | | |
| | | Construction Economics | 3 | | | | 30 | 15 | 0 | 75 | 207 | |
| | | Construction Economics | 3 | | | | 15 | 8 | 0 | 38 | | |
| | Assoc. Prof. Dina Stober | Urban Planning and Design | 4 | 15 | 30 | 0 | | | | 60 | 60 | |
| | | Integrated Design | 3 | | | | 15 | 0 | 0 | 30 | | |
| | | Urban Planning 1 | 3 | | | | 15 | 30 | 0 | 60 | | |
| | | Urban Planning 2 | 4 | | | | 15 | 30 | 0 | 60 | | 352 (118%) |
| | | Introduction to Integrated Design | 6 | | | | 15 | 15 | 0 | 45 | 292 | |
| | | Town Planning | 6 | | | | 0 | 45 | 0 | 45 | | |
| | | Design Studio in Urban Planning and Architecture – bachelor's thesis | 6 | | | | 0 | 52 | 00 | 52 | | |
| | Assoc. Prof. Jurko Zovkić | Introduction to Timber Structures | 5 | 30 | 0 | 0 | | | | 60 | 105 | |
| | | Project Workshop | 6 | 0 | 0 | 30 | | | | 45 | | |
| | | Timber Structures 2 | 3 | | | | 30 | 0 | 0 | 60 | | 255 (85%) |
| | | Timber Structures | 3 | | | | 30 | 0 | 0 | 60 | 150 | |
| | | Timber Structures | 3 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Marijana Hadzima-Nyarko | Introduction to Masonry Structures | 6 | 30 | 0 | 0 | | | | 60 | 60 | |
| | | Solid Structures 1 | 4 | | | | 30 | 0 | 0 | 60 | | |
| | | Solid Structures 1 | 4 | | | | 15 | 0 | 0 | 30 | | 270 (90%) |
| | | Earthquake Engineering | 2 | | | | 30 | 0 | 0 | 60 | 210 | |
| | | Reinforced Concrete and Masonry Structures | 4 | | | | 30 | 0 | 0 | 60 | | |
| | | Materials Science | 2 | 30 | 0 | 0 | | | | 60 | 180 | 270 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Assoc. Prof. Ivana Miličević | Construction Materials | 3 | 30 | 0 | 0 | | | | 60 | | (90%) |
| | | Concrete Technology | 6 | 30 | 0 | 0 | | | | 60 | | |
| | | Construction Materials | 2 | | | | 30 | 0 | 0 | 60 | 90 | |
| | | Construction Materials | 2 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Davorin Penava | Computer Programming in Civil Engineering | 6 | 15 | 0 | 0 | | | | 30 | 30 | 210 (70%) |
| | | Plate and Shell Theory | 2 | | | | 45 | 0 | 0 | 90 | 180 | |
| | | Analysis of Structure Stress and Load-Bearing Capacity | 2 | | | | 30 | 0 | 0 | 60 | | |
| | | Introduction to Scientific Research | 4 | | | | 15 | 0 | 0 | 30 | | |
| | Assoc. Prof. Tanja Kalman Šipoš | Building Statics 1 | 3 | 0 | 30 | 0 | | | | 30 | 30 | 240 (80%) |
| | | Statics | 2 | | | | 30 | 0 | 0 | 60 | 210 | |
| | | Basics of Non-Linear Analysis | 3 | | | | 30 | 30 | 0 | 90 | | |
| | | Technical Mechanics 1 | 1 | | | | 30 | 0 | 0 | 60 | | |
| ASSISTANT PROFESSORS | Assist. Prof. Ivana Brkanić Mihić | Elements of Building Construction | 2 | 30 | 0 | 0 | | | | 60 | 60 | 322 (108%) |
| | | Architectural Structures 1 | 1 | | | | 0 | 30 | 0 | 30 | 262 | |
| | | Architectural Structures 2 | 2 | | | | 30 | 0 | 0 | 60 | | |
| | | Architectural Structures 3 | 3 | | | | 0 | 30 | 0 | 30 | | |
| | | Residential Buildings 1 | 3 | | | | 0 | 45 | 0 | 45 | | |
| | | Residential Buildings 2 | 4 | | | | 0 | 45 | 0 | 45 | | |
| | | Design studio in Urban planning and Architecture – bachelor's thesis | 6 | | | | 0 | 52 | 00 | 52 | | |
| | Assist. Prof. Tihomir Dokšanović | Basics of Construction Informatics 1 | 1 | 15 | 0 | 0 | | | | 30 | 95 | 190 (63%) |
| | | Basics of Construction Informatics 2 | 2 | 15 | 0 | 0 | | | | 30 | | |
| | | Introduction to Steel Structures | 5 | 0 | 20 | 10 | | | | 35 | | |
| | | Metal Structures 2 | 3 | | | | 0 | 25 | 5 | 32.5 | 95 | |
| | | Aluminium Structures | 3 | | | | 30 | 25 | 5 | 62.5 | | |
| | Assist. Prof. Ivan Kraus | Introduction to Concrete Structures | 6 | 30 | 30 | 0 | | | | 90 | 90 | 210 (70%) |
| | | Modelling of Structures | 2 | | | | 30 | 30 | 0 | 90 | 120 | |
| | | Earthquake Engineering | 2 | | | | 0 | 30 | 0 | 30 | | |
| | Assist. Prof. Tamara Brleković | Water Protection | 6 | 30 | 15 | 0 | | | | 75 | 105 | 195 (65%) |
| | | Hydraulic Engineering Practicum | 6 | 0 | 30 | 0 | | | | 30 | | |
| | | Modelling in Hydraulic Engineering | 3 | | | | 0 | 30 | 0 | 30 | 90 | |
| | | Land Reclamation 2 | 3 | | | | 15 | 30 | 0 | 60 | | |
| | Assist. Prof. Marin Grubišić | Building Statics 2 | 4 | 0 | 30 | 0 | | | | 30 | 30 | 128 (43%) |
| | | Technical Mechanics 1 | 1 | | | | 0 | 45 | 0 | 45 | 98 | |
| | | Technical Mechanics 1 | 1 | | | | 0 | 23 | 0 | 23 | | |
| | | Structural Testing | 2 | | | | 0 | 30 | 0 | 30 | | |
| POST-DOCTORAL STUDENTS | Dr Mario Jeleč | Basics of Construction Informatics 1 | 1 | 0 | 10 | 5 | | | | 18 | 81 | 144 (64%) |
| | | Basics of Construction Informatics 2 | 2 | 0 | 15 | 0 | | | | 15 | | |
| | | Introduction to Timber Structures | 5 | 0 | 25 | 5 | | | | 33 | | |
| | | Introduction to Masonry Structures | 6 | 0 | 15 | 0 | | | | 15 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Timber Structures 2 | 3 | | | | 0 | 25 | 5 | 33 | 63 | |
| | | Reinforced Concrete and Masonry Structures | 4 | | | | 0 | 30 | 0 | 30 | | |
| | Dr Željko Šreng | Hydrology 1 | 3 | 0 | 15 | 0 | | | | 15 | 110 | 225 (100%) |
| | | Water Supply and Sewage Systems 1 | 5 | 0 | 30 | 0 | | | | 30 | | |
| | | Building Installations | 6 | 0 | 15 | 10 | | | | 30 | | |
| | | Introduction to hydraulic engineering | 6 | 0 | 20 | 10 | | | | 35 | | |
| | | Water Supply and Sewage Systems 2 | 3 | | | | 0 | 30 | 0 | 30 | 105 | |
| | | Hydrology 2 | 1 | | | | 0 | 30 | 0 | 30 | | |
| | | Hydrotechnical Structures | 2 | | | | 0 | 30 | 0 | 30 | | |
| | | Building Installations | 5 | | | | 0 | 15 | 0 | 15 | | |
| | Dr Jelena Kaluđer | Soil Mechanics | 4 | 0 | 30 | 0 | | | | 30 | 105 | 135 (60%) |
| | | Geotechnical Engineering | 5 | 0 | 30 | 0 | | | | 30 | | |
| | | Waste Management | 6 | 0 | 15 | 0 | | | | 15 | | |
| | | Laboratory Soil Testing | 6 | 0 | 30 | 0 | | | | 30 | | |
| | | Soil Mechanics and Foundation | 3 | | | | 0 | 30 | 0 | 30 | 30 | |
| | Dr Martina Zagvozda | Roads | 5 | 0 | 45 | 0 | | | | 45 | 60 | 195 (87%) |
| | | Road Infrastructure | 6 | 0 | 15 | 0 | | | | 15 | | |
| | | Roads | 3 | | | | 0 | 30 | 0 | 30 | 135 | |
| | | City Transportation Infrastructure | 2 | | | | 0 | 30 | 0 | 30 | | |
| | | Maintenance and Repair of Transportation Infrastructure | 3 | | | | 0 | 15 | 0 | 15 | | |
| | | Carriageway Construction | 2 | | | | 0 | 30 | 0 | 30 | | |
| | | Lower Organisation of Transportation Infrastructure | 1 | | | | 0 | 30 | 0 | 30 | | |
| ASSISTANTS | Kristina Jeleč | Mechanics 1 | 2 | 0 | 30 | 0 | | | | 30 | 60 | 60 (40%) |
| | | Mechanics 2 | 3 | 0 | 30 | 0 | | | | 30 | | |
| | Lucia Kraus | Elements of Building Construction | 2 | 0 | 30 | 0 | | | | 30 | 30 | 75 (50%) |
| | | Buildings for Educational Purposes | 5 | | | | 0 | 45 | 0 | 45 | 45 | |
| | Robert Bušić | Materials Science | 2 | 0 | 30 | 0 | | | | 30 | 75 | 113 (75%) |
| | | Construction Materials | 3 | 0 | 30 | 0 | | | | 30 | | |
| | | Concrete Technology | 6 | 0 | 15 | 0 | | | | 15 | | |
| | | Construction Materials | 2 | | | | 0 | 23 | 0 | 23 | 38 | |
| | | Materials Science | 1 | | | | 0 | 15 | 0 | 15 | | |
| | Domagoj Trajber | Strength of Materials 1 | 3 | 0 | 30 | 0 | | | | 30 | 30 | 30 (20%) |
| | Filip Anić | Strength of Materials 2 | 4 | 0 | 30 | 0 | | | | 30 | 30 | 135 (90%) |
| | | Technical Mechanics 2 | 2 | | | | 0 | 30 | 0 | 30 | 105 | |
| | | Technical Mechanics 2 | 2 | | | | 0 | 15 | 0 | 15 | | |
| | | Plate and Shell Theory | 2 | | | | 0 | 30 | 0 | 30 | | |
| | | Analysis of Structure Stress and Load-Bearing Capacity | 2 | | | | 0 | 30 | 0 | 30 | | |
| | Adriana Brandis | Introduction to Structural Engineering | 4 | 0 | 20 | 10 | | | | 35 | 35 | 103 (69%) |
| | | Timber Structures | 3 | | | | 0 | 15 | 0 | 15 | 68 | |
| | | Timber Structures | 3 | | | | 0 | 8 | 0 | 8 | | |
| | | Concrete Structures 2 | 1 | | | | 0 | 30 | 0 | 30 | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Basics of Analysis and Loadings on Structures | 3 | | | | 0 | 15 | 0 | 15 | | |
| | Josip Janjić | Fluid Mechanics | 4 | 0 | 45 | 0 | | | | 45 | 45 | 45 (30%) |
| | Mihaela Domazetović | Building Technology I | 5 | 0 | 15 | 15 | | | | 38 | 38 | 38 (25%) |
| | Dino Obradovic | Construction Management I | 6 | 0 | 45 | 0 | | | | 45 | 105 | 165 (110%) |
| | | Construction Business in the Digital Environment | 6 | 0 | 30 | 0 | | | | 30 | | |
| | | Procedures and Methods for Building Condition Assessment | 6 | 0 | 30 | 0 | | | | 30 | | |
| | | Process of Planning and Monitoring Construction | 3 | | | | 0 | 30 | 0 | 30 | 60 | |
| | | Construction Management | 4 | | | | 0 | 30 | 0 | 30 | | |
| | M.Sc. Ivanka Stipančić-Klaić | Structural Geometry | 1 | 0 | 45 | 0 | | | | 45 | 45 | 279 (62%) |
| | | Engineering Graphics | 1 | | | | 15 | 15 | 0 | 45 | 234 | |
| | | Engineering Graphics | 1 | | | | 8 | 8 | 0 | 24 | | |
| | | Geometry in Architecture | 1 | | | | 30 | 30 | 0 | 90 | | |
| | | Spatial Representations in Architecture | 2 | | | | 30 | 15 | 0 | 75 | | |
| LECTURERS | M.Sc. Vladimir Moser | Geodesy | 1 | 0 | 30 | 0 | | | | 30 | 30 | 135 (30%) |
| | | Geodesy | 1 | | | | 15 | 30 | 0 | 60 | 105 | |
| | | Technical Drawing | 1 | | | | 0 | 30 | 0 | 30 | | |
| | | Architectural and Computer Graphics 1 | 2 | | | | 0 | 15 | 0 | 15 | | |
| | Lidija Kraljević | English Language I | 1 | 15 | 15 | 0 | | | | 45 | 180 | 271 (60%) |
| | | English Language 2 | 2 | 15 | 15 | 0 | | | | 45 | | |
| | | English Language 3 | 4 | 15 | 15 | 0 | | | | 45 | | |
| | | English Language 4 | 6 | 15 | 15 | 0 | | | | 45 | | |
| | | English for Architects | 1 | | | | 15 | 30 | 0 | 60 | 91 | |
| | | English Language | 1 | | | | 8 | 15 | 0 | 31 | | |
| | Anamarija Štefić | English Language 1 | 1 | 15 | 15 | 0 | | | | 45 | 270 | 390 (87%) |
| | | English Language 2 | 2 | 15 | 15 | 0 | | | | 45 | | |
| | | German Language 1 | 1 | 15 | 15 | 0 | | | | 45 | | |
| | | German Language 2 | 2 | 15 | 15 | 0 | | | | 45 | | |
| | | German Language 3 | 4 | 15 | 15 | 0 | | | | 45 | | |
| | | German Language 4 | 6 | 15 | 15 | 0 | | | | 45 | | |
| | | English Language | 1 | | | | 15 | 30 | 0 | 60 | 120 | |
| | | German for Architects | 1 | | | | 15 | 30 | 0 | 60 | | |

**Table 14** List and workload of external associates

| EXTERNAL ASSOCIATES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Title | Name and surname | Course | Semester | Plan | | | Execution | | | Standardized teaching hours | Total workload on the study programme | Total workload at the higher education institution |
| | | | | L | E | S | L | E | S | | | |
| FULL PROFESSORS | Ivan Matić | Mathematics 1 | 1 | 45 | 0 | 0 | | | | 90 | 225 | 225 (75%) |
| | | Mathematics 2 | 2 | 30 | 0 | 0 | | | | 60 | | |
| | | Structural Geometry | 1 | 15 | 45 | 0 | | | | 75 | | |
| | Mirta Benšić | Probability and Statistics | 3 | 30 | 0 | 0 | | | | 60 | 60 | 60 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | (20%) |
| | Zoran Nakić | Introduction to Geology | 1 | 30 | 0 | 0 | | | | 60 | 60 | 60 (20%) |
| ASSOCIATE PROFESSORS | Miroslav Šimun | Introduction to Railways | 6 | 30 | 0 | 0 | | | | 60 | 60 | 120 (40%) |
| | | Railways | 3 | | | | 30 | 0 | 0 | 60 | 60 | |
| ASSISTANT PROFESSORS | Dario Hrupec | Physics | 1 | 30 | 0 | 0 | | | | 60 | 60 | 60 (20%) |
| | Ivan Papić | Probability and Statistics | 3 | 0 | 30 | 0 | | | | 30 | 30 | 30 (10%) |
| | Igor Sokolić | Introduction to Geotechnical Design | 6 | 7 | 0 | 0 | | | | 14 | 14 | 14 (5%) |
| POSTDOCS | Darija Brajković Zorić | Mathematics 1 | 1 | 0 | 45 | 0 | | | | 45 | 75 | 75 (34%) |
| | | Mathematics 2 | 2 | 0 | 30 | 0 | | | | 30 | | |
| | Jelena Strišković | Physics | 1 | 0 | 30 | 0 | | | | 30 | 30 | 30 (13%) |
| LECTURERS | Zoran Malečić | Physical Education I | 1 | 0 | 30 | 0 | | | | 30 | 60 | 60 (13%) |
| | | Physical Education II | 2 | 0 | 30 | 0 | | | | 30 | | |

**Table 15** Teaching by own staff (by study programme) in the academic year 2020/2021

| Study | Total hours of lectures | Teaching by own staff | Percentage | Total hours of exercises | Teaching by own staff | Percentage |
|---|---|---|---|---|---|---|
| University undergraduate Study of Civil Engineering | 1290 | 1090 | 84.5% | 1095 | 960 | 87.7% |
| University undergraduate Study of Architecture and Urban Planning | 972 | 547 | 56.2% | 1335 | 1080 | 80.9% |
| Professional undergraduate Study of Civil Engineering) | 945 | 930 | 98.4% | 1025 | 890 | 86.8% |
| University graduate Study of Hydraulic Engineering | 390 | 315 | 80.7% | 375 | 285 | 76.0% |
| University graduate Study of Load-Bearing Structures | 420 | 390 | 92.8% | 360 | 330 | 91.6% |
| University graduate Study of Construction Management and Technology | 420 | 375 | 89.3% | 360 | 330 | 91.6% |
| University graduate Study of Transportation Infrastructure | 405 | 330 | 81.5% | 345 | 285 | 82.6% |
| University graduate Study – Elective courses | 960 | 930 | 96.8% | 1020 | 990 | 97.0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| for all specializations | | | | | | |
| Total | 5802 | 4907 | 85.5% | 5915 | 5150 | 86.8% |
| **Proposal University undergraduate Study of Civil Engineering** | **1155** | **983** | **85.10%** | **1290** | **1095** | **84.90%** |
| Total/without the "old" Undergraduate University Study of Civil Engineering | **5667** | **4955** | **85.1%** | **6110** | **5285** | **86.42%** |

## 5.8. Data on teachers who will teach the programme

Employees of the Faculty of Civil Engineering and Architecture Osijek
The data on teachers are provided in Appendix 13.

External associates involved in the implementation of the programme
The data on teachers are provided in Appendix 14.

## 5.9. Estimation of study costs per student (financial evaluation)

**Table 16** Revenues and expenses

| | | N | N+1 | N+2 |
|---|---|---|---|---|
| 1. | Revenues | 756,000.00 | 732,000.00 | 792,000.00 |
| a) | Assistance from abroad (grants) and from entities within the government | | | |
| b) | Property income | | | |
| c) | Revenues from administrative fees and according to special regulations | 36,000.00 | 12,000.00 | 72,000.00 |
| d) | Own revenues (revenues generated on the market) | | | |
| e) | Donations from legal and natural persons outside the government | | | |
| f) | Revenues from the budget to finance the regular activities of budget users | 720,000.00 | 720,000.00 | 720,000.00 |
| 2. | Expenditures | 556,000.00 | 532,000.00 | 592,000.00 |
| a) | Expenses for employees (salaries, contributions and other expenses for employees) | | | |
| b) | Material expenses (compensation of employees, materials and energy, expenses for services and other expenses) | 496,000.00 | 472,000.00 | 532,000.00 |
| c) | Financial expenses (interest and other financial expenses) | 10,000.00 | 10,000.00 | 10,000.00 |
| d) | Subsidies | | | |
| e) | Assistance sent abroad and within the general state | | | |
| f) | Insurance and other benefits to citizens and households | | | |
| g) | Other expenses | 50,000.00 | 50,000.00 | 50,000.00 |
| 3. | Surplus/deficit of operating income (1-2) | 200,000.00 | 200,000.00 | 200,000.00 |
| a) | Income from sale of non-financial assets | | | |

| | | | | |
|---|---|---|---|---|
| b) | Expenditures for the acquisition of non-financial assets construction, plant and equipment, means of transport, books, etc. | 200,000.00 | 200,000.00 | 200,000.00 |
| 4. | Surplus/deficit of income from non-financial assets (7 - 4) | -200,000.00 | -200,000.00 | -200,000.00 |
| a) | Receipts from financial assets and loans | | | |
| b) | Expenditures on financial assets and loan repayments | | | |
| 5. | Surplus/deficit of receipts from financial assets and liabilities (8 - 5) | | | |
| 6. | Total revenues and receipts | 756,000.00 | 732,000.00 | 792,000.00 |
| 7. | Total expenses and expenditures | 756,000.00 | 732,000.00 | 792,000.00 |
| 8. | Surplus/deficit of income and receipts | 0.00 | 0.00 | 0.00 |

**Table 17** Sources of funding

| | N | N+1 | N+2 |
|---|---|---|---|
| 1. State | | | |
| a) budget of the Ministry of Science, Education and Sports | 720,000.00 | 720,000.00 | 792,000.00 |
| b) other competent ministries and state institutions | | | |
| c) local and regional self-government units | | | |
| 2. Own income | | | |
| a) tuition fees (student participation) | 36,000.00 | 12,000.00 | 72,000.00 |
| b) research projects | | | |
| c) publishing activity | | | |
| d) other from own activity | | | |
| 3. Donations | | | |
| 4. Other | | | |
| 5. Total (1+2+3+4) | 756,000.00 | 732,000.00 | 792,000.00 |

**Table 18** Total number of students per year

| | 2016./2017. | 2017./2018. | 2018./2019. | 2019./2020. | 2020./2021. |
|---|---|---|---|---|---|
| Total number of students | 843 | 871 | 942 | 958 | 1087 |
| 1) Full-time | 712 | 767 | 836 | 848 | 888 |
| a) with the support of the Ministry of Science and Education | 386 | 475 | 514 | 497 | 528 |
| b) covering their cost themselves | 326 | 292 | 322 | 351 | 360 |
| 2) Part-time | 131 | 104 | 106 | 110 | 199 |

## 5.10. Monitoring quality and successful delivery of the study programme

The Faculty of Civil Engineering and Architecture Osijek has established an operational and efficient quality assurance system. Since it is necessary to ensure and continuously improve the quality system in accordance with the applicable regulations (especially the Act on Quality Assurance in Science and Higher Education), all employees of the Faculty are familiar with the functioning of the system. Monitoring the quality and success of the study programme is done through the collection, processing, analysis and comparison of various quality indicators. For example, statistical indicators on revision test and exam pass rates, duration of study, study success and other indicators important for the quality and success of a particular study programme are monitored. Monitoring and analysis of indicators and their presentation to the Management, as well as making proposals of measures for improving the quality and performance is carried out through the Office for Quality Development and Assurance in

Higher Education and the Commission for Quality Monitoring and Assurance in Higher Education in cooperation with other Faculty services. Internal audits certainly play an important role in quality assurance. Internal audits are organized by the Office for Quality Development and Assurance in Higher Education in cooperation with the Commission for Quality Monitoring and Assurance in Higher Education. All procedures carried out within the quality assurance system as well as stakeholder satisfaction surveys result in proposing measures that should contribute to quality improvement. The objectives of internal audit are to ensure the implementation of standards and guidelines for quality assurance in the higher education system, to ensure and improve the quality of learning and teaching, and to ensure the quality of service provision and management of the Faculty. Student participation in surveys is also a way of monitoring the quality and success of the study programme, for example through the ECTS workload survey, the survey on the quality of teaching and teachers, the survey of graduates after graduation and employment. By expressing opinions and giving comments and suggestions for improving the quality of study programmes, students directly participate in quality assurance and ultimately improve the success of the study programme.
The revision of study programmes is a procedure regulated by relevant legal regulations and provided for in the GRAFOS Quality Handbook (PO-7-14). This procedure is applied when, based on the monitoring of quality and performance, the need for amendments to the study programme arises to improve the quality and performance of the study programme.
External quality assurance audits take place on the basis of applicable legal provisions. The most important procedure when it comes to external audits is the re-accreditation of study programmes implemented by the Agency for Science and Higher Education, which is carried out every five years.

### 5.11. HEI's support to students

At the Faculty of Civil Engineering and Architecture Osijek, the academic and professional support to students is provided by teaching and administrative staff, and primarily by employees of the Student Office. If the Student Office is not responsible an inquiry, it will refer students to other competent services.
An introductory lecture is organized for first-year undergraduate students, giving them basic information and advice related to study, studying, student life, psychological counselling, important legal documents and offices at the Faculty and University intended to support students. Students are introduced to the way of life and work at the Faculty, the rules of study and supporting services that help the functioning of the system. Students are instructed to regularly follow the Faculty's website, which is functional, clear and regularly updated.
Each academic year, the Faculty Council makes a decision on the appointment of mentors for first-year students. Each teacher-mentor is assigned an average of three students who, if necessary, can get advice during their studies and their work and achievements are monitored.
Also, postgraduate students are assigned mentors who monitor their progress and provide support during their studies.
Student Union representatives, student representatives at the Faculty Council and the Student Ombudsperson, whom students can contact in order to learn about their rights and obligations and, if necessary, ways to protect their rights, also provide student support.
The Faculty continuously invests material resources in computer and other equipment in the Faculty building in order to provide students with resources for work. In addition, the Management (co-)finances the participation of students in various events and competitions and supports the organization of such events at the Faculty.
The Dean of the Faculty organizes regular monthly meetings with student representatives where it is possible to ask questions, but also to give remarks and suggestions for improvements and discuss everything directly with the Dean.
Support to students is tailored to their needs, for example for part-time students, classes are organized in the afternoon and on Saturdays, since most students are employed. Teachers have office hours by appointment in the afternoons or on Saturdays.

Students with learning difficulties are supported in terms of extending the time of written exams by one third of the prescribed time and have the opportunity to express the desired form of taking the exam (written or oral). The same practice has been extended to the admissions test for studies in Architecture and Urban Planning.

The Faculty building was built in such a way as to ensure the movement of people with reduced mobility and accessibility of all rooms in the building (access, marked paths, elevators).

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