UNIVERSITY UNDERGRADUATE STUDY PROGRAMME OF CIVIL ENGINEERING

The University Undergraduate Study of Civil Engineering at the Faculty of Civil Engineering, Architecture and Geodesy lasts three academic years and is organised in six semesters.

The curriculum consists of compulsory and elective courses. It is aligned with the European Credit Transfer and Accumulation System (ECTS) of the European Higher Education Area (EHEA) and students earn a minimum of 60 ECTS credits each academic year. In order to obtain the qualification (bachelor's degree), students must earn a minimum of 180 ECTS credits.

The holders of this qualification are entitled to use the academic title of University Bachelor of Civil Engineering (univ. bacc. ing. aedif.) and are qualified to pursue a professional activity in the field for which they have obtained the title. After graduation, they fulfil part of the requirements for entry in the Directory of Construction Site Engineers and the Directory of Works Managers of the Croatian Chamber of Civil Engineers.

After completing the University Undergraduate Study of Civil Engineering, the student acquires the right to continue studying at university and professional graduate studies in the field of Civil Engineering and other fields of technical sciences, according to the admission requirements set by the higher education institutions conducting these studies.

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1. INTRODUCTION

1.1. Assessment of the feasibility of the study

Considering the demands of the labour market, the delivery of the University Undergraduate Study Programme of Civil Engineering has a substantial significance, as there is a considerable need for professionals in the field of civil engineering in Split and the wider region. In fact, many institutions in the wider region can employ a large number of graduates: (1) large construction companies involved in the design, construction, supervision or production and sale of construction materials; (2) units of local, regional or county government; (3) public companies, (4) educational institutions for professional qualifications, (5) state agencies, and (6) small construction companies or private companies that employ a large number of students with acquired qualifications.

From 2006 to this day, the Faculty of Civil Engineering, Architecture and Geodesy in Split (the Faculty) has continuously tracked employability/non-employability data about persons with completed study programmes in civil engineering, both at undergraduate and graduate levels, in four adjacent counties: Zadar, Šibenik-Knin, Split-Dalmatia and Dubrovnik-Neretva. The employability/unemployment data in the region shows that since the end of the economic crisis that affected the Republic of Croatia in 2008, the number of unemployed highly qualified professionals in the construction sector has decreased significantly.

In accordance with the above and by observing prospective students` interest in the study programme, the ratio of enrolled and applied students has stabilised in recent years. This ratio ranges between 1:1.60 and 1:1.80. This confirms that there is continuous interest in the study programme. The total number of prospective first-year students who list the study programme as one of their options when applying for the state Matura exam ranges between 450 and 630.

As the programme is in the STEM field, it fits strategically into the mission and vision of the University of Split and as such is promoted and supported by the University and the Ministry of Science and Education (MSE).

1.2. Collaboration with the local community (economy, entrepreneurship, civil society...)

The Faculty has recently strengthened its links with the regional economy sector and local government bodies. Given the current shift in the functioning, maintenance and implementation of scientific research projects, in recent years the Faculty has applied for several infrastructure projects, some of which have been successfully completed while others are still in the evaluation process, with clear indications of successful implementation. Accordingly, the Faculty has focused on collaboration with the private sector, engaging the construction sector and its stakeholders to collaborate, especially on research projects whose results are to public benefit. Through this partnership, the following primary objectives are achieved: (1) ensuring scientific research, (2) improving scientific research infrastructure, (3) raising quality of highly qualified engineering jobs and study programmes and the competence of highly qualified engineering professionals, (4) as a result of the implementation of projects, generating products which, in some cases, are of public interest,

(5) ensuring the possibility of patenting research results, and finally (6) gaining a realistic insight into market demands concerning the required learning outcomes.

In addition to this collaboration with the economy, the Faculty has established a formal partnership relationship with local government units, producing studies and strategic documents as required.

1.3. Compliance with the requirements of professional organisations

The Faculty cooperates continuously with the representative body of the Croatian Chamber of Civil Engineers. Together with the Alumni and teaching bases/companies in the field of civil engineering in the region, they are involved in revising the relevant study programme through the work of the expert group for the revision of learning outcomes of civil engineering study programmes. In this way, the process of harmonising the study programme with the requirements of professional associations is facilitated. The Faculty is a member of the Association of Croatian Faculties of Civil Engineering which works on adequate harmonising of study programmes at the level of the Republic of Croatia in order to ensure horizontal and vertical mobility of students within the Republic of Croatia.

1.4. Partners outside the higher education system

For the purpose of implementing the study programme, the Faculty continuously invests in improving cooperation with teaching bases. So far, 36 agreements on scientific research cooperation have been signed, and 3 more are in the process of being signed. Efforts are being made to include companies with different areas of activity (design, supervision, construction) in the teaching bases model, thus ensuring the possibility of selection according to the students' area of interest. It is noteworthy to underline the support of the teaching bases and other partner institutions and companies in the field of civil engineering in the implementation and execution of field teaching within the study programme. *Internship I* is an elective course in the sixth semester, which is intended to give final-year students an understanding of the practical side of the profession and thus introduce them to potential employers.

1.5. Funding

The study programme is mainly funded from three sources: (1) tuition fees paid by the Ministry of Science and Education for students who have earned more than 55 ECTS credits in the previous academic year, (2) participation in tuition costs by students who have earned less than 55 ECTS credits in the previous academic year, (3) self-funding to a lesser extent.

1.6. Comparability of the study programme with the programmes of accredited higher education institutions in Croatia and the European Union

The proposed programme of the University Undergraduate Study of Civil Engineering is largely comparable to the study programme at the Faculty of Civil Engineering at Delft University of Technology (Netherlands) (https://www.tudelft.nl/en/) and ETH Zurich (Switzerland) (https://www.ethz.ch/en.html). This university undergraduate study programme lasts 6 semesters, during which students acquire a minimum of 180 ECTS credits. The defined expected learning outcomes of a large number of courses are very similar in

terms of level and scope to the above-mentioned study programmes in the Netherlands and Switzerland.

1.7. Openness of the study programme towards student mobility (horizontal, vertical in the Republic of Croatia and international)

Student mobility is ensured on several levels. Within the University, students can enrol in elective courses at institutions outside the Faculty. The harmonisation of study programmes ensures the possibility of further education or short-term mobility at undergraduate programmes of civil engineering faculties within the Republic of Croatia. The Faculty is a signatory to numerous bilateral agreements for international mobility under the ERASMUS programme and is constantly working to increase the number of agreements in accordance with the expressed interest of the student body.

1.8. Harmonisation with the mission and strategy of the University and the Faculty and with the strategic document of the Network of Higher Education Institutions

The study programme is harmonised with the strategic document of the Network of Higher Education Institutions and Study Programmes in the Republic of Croatia which encourages the opening of study programmes in the STEM field, including the proposed study programme.

The study programme is also in line with the Strategy of the University of Split for the period 2021 - 2025 (mission, vision and strategic guidelines). In addition to the mission and vision of the University of Split, the following strategic documents were used as guidelines when defining the strategic objectives:

- European Sustainable Development Strategy EU 2030;

- Strategic documents of the European Research Area (ERA);

- Strategic documents of the European Higher Education Area (EHEA);

- Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG);

- Strategy of Education, Science and Technology of the Republic of Croatia;

- Mission Statement of the European University of the Seas "SEA-EU".

The study programme is in line with the development guidelines of the Faculty of Civil Engineering, Architecture and Geodesy of the University of Split and with the mission, vision and strategic goals set out in the Development Strategy of the Faculty of Civil Engineering, Architecture and Geodesy of the University of Split for the period 2018–2022, and is fully aligned with the strategic goals of the Strategy of the Faculty of Civil Engineering, Architecture and Geodesy in Split for the period 2023-2027.

1.9. Previous experience with the implementation of equivalent or similar programmes

Since its foundation until today, the Faculty has been operating successfully. It is based on the unity of scientific research, teaching and professional activity. All areas of activity are mutually complementary, intertwining and paving the way for the prosperity of the Faculty

through a kind of interaction, the power of a multitude of positive impulses, and the principles of synergy. Every few years, the Faculty has updated the existing curricula in line with the demands of the economy and modern scientific achievements.

The quality of education is reflected in many of our students who, after graduation, continued working in the fields of science, education and business both in the country and abroad.

The study programme has been conducted in this form since 2005 and has since undergone amendments in accordance with the information gathered through the quality assurance system, with the aim of popularising and aligning it with the strategic documents and market demands. Through continuous efforts of the teaching staff, new content is constantly being added to the study programme in line with the opportunities and global achievements of the profession.

By observing the demand on the labour market, enrolment quotas are formed thus ensuring a necessary number of graduated students for the continuation of higher education at the graduate level.

2. SYLLABUS

The tables below show information for the current and the former semesters. Detail plans for specific semesters and academic years are published on the following Faculty's website: this link (for example the last one - this link).

Teacher	Course	Related learning outcomes	Teaching and learning	Assessment	Code	Hours	ECTS
	I. semester						
J. Sedlar	Mathematics I	a,c	1,2	1	GAB001	60+60	10,0
N. Leder	Physics	a,c	1,2	1	GAB002	30+30	5,0
M. Andrić	Descriptive geometry	a,e,h,l	1,2,3	1,2,3	GAC001	30+30	5,0
T. Vlahović	Basics of geology and petrography	i,j,l	1,2	1	GAG001	30+15	3,5
J. Sedlar	Basics of engineering informatics	a,b,c	1,3	1	GAB003	15+45	3,5
K. Marasović	Introduction to architecture	o,p,r	1	1	GAU001	30+00	2,0
	II. semester						
S. Ivelić Bradanović	Mathematics II	a,c	1,2	1,2	GAB004	60+60	10,0
S. Ivelić Bradanović	Probability and statistics	b	1,2,3	1,2	GAB005	30+30	5,0
M. Andrić	Applied geometry	e,h,l	1,2,3	1,2,3	GAC002	30+30	5,0
Ž. Nikolić	Mechanics I	a,c,d,e	1,2	1,3	GAO001	30+45	6,0
T. Duplančić-Leder	Geodesy	a,b,l,m,o	1,2,3,4	1,2	GAF001	30+30	5,0
	III. semester						
M. Nikolić	Mechanics II	a,c,f	1,2,3	1,2,3	GAD101	45+30	6,0
M. Galić	Strength of materials I	c,d,f,g,o	1,2	1,2	GAR101	45+30	6,0
B. Trogrlić	Building statics I	c,d,e,f,g,o	1,2,3	1,2,3	GAO101	30+30	5,0
S. Juradin	Building materials I	b,i,o,r	1,2,3,5	1,2,3	GAN101	60+30	7,0
V. Denić-Jukić	Hydrology	b,k,r	1,2,3,4	1,2,3	GAI101	30+30	5,0
	Elective courses (min. 2 ECTS)						
	Elective courses						
S. Ivelić Bradanović	Introduction to programming	As listed in the detail plans at the Faculty's web site.	1,4	3	GAB101	15+30	2,0
N. Jajac	Legislation fundamentals in construction		1,7	1,2,3	GAA004	30+15	2,0
N. Jajac	Human resource management in construction		1,7	1,2,3	GAA005	30+15	2,0

Teacher	Course	Related learning outcomes	Teaching and learning	Assessment	Code	Hours	ECTS
	IV. semester						
M. Galić	Strength of materials II	c,d,f,g,o	1,2	1,2	GAR102	30+30	5,0
B. Trogrlić	Building statics II	c,d,e,f,g,o	1,2	1,2	GAO102	45+30	6,0
D. Bojanić	Hydromechanics	a,c,k,o,p	1,2,3	1,2	GAH101	45+45	7,0
N. Štambuk Cvitanović, P. Miščević	Soil mechanics and foundations	a,b,j,m,o,p,r	1,2,3,5	1,2	GAG101	45+30	6,0
V. Perković-Jović	Elements of building construction	m,o,p,r	1,2,3	1,2	GAM001	30+30	5,0
	V. semester						
A. Harapin, M. Smilović Zulim	Introduction to concrete structures	a,c,d,e,g,o,p	1,2,3,4	1,2,3	GAE201	60+30	7,0
I. Boko, N. Torić	Introduction to timber structures	a,c,d,e,h,o,p	1,2,3	1,2,3	GAP201	30+30	5,0
N. Ostojić-Škomrlj	Construction operations and equipment	b,i,n,o,p,r	1,2,3	1,2,3	GAL001	30+15	4,0
I. Andrić	Water supply and sewerage system	b,c,k,o,p,r	1,2,3	1,2,3	GAJ201	30+30	5,0
N. Ostojić-Škomrlj	Construction management	n,o,p,r	1,2,3	1,3	GAL101	45+15	5,0
D. Cvitanić, D. Breški	Roads	b,c,l,o,p,r	1,2,3	1,2,3	GAF101	30+30	5,0
	VI. semester						
I. Boko	Introduction to metal structures	a,b,c,d,e,f,h,o,p,r	1,2,3,4	1,2,3	GAP202	45+30	6,0
	Elective courses (min. 18 ECTS)						
	Undergraduate thesis	o,p,r+specific LO regarding thesis	7	2,3	GAX201		5,0
	Elective courses						
H. Gotovac	Hydraulic structures	As listed in the detail plans at the Faculty's web site.	1,2	1,2	GAK201	30+30	5,0
D. Matešan, A. Harapin	Bridges		1,2,3,4	1,2,3	GAE202	30+30	5,0
V. Srzić, M. Galešić Divić	Ports and marine structures		1,2	1,2	GAK202	30+30	5,0
S. Ivelić Bradanović	Applied mathematics		1,2	1,2	GAB701	30+30	5,0
S. Juradin	Building materials II		1,2,5	2,3	GAN701	30+30	5,0
N. Jajac	Basics of business economy		1	1,2,3	GAL002	30+0	3,0
I. Škarica	English language		1,2	1,2	GAA001	15+15	2,0
N. Jajac	Internship I		6	3	GAL003	0+40	2,0
P. Miščević, G. Vlastelica	Earthworks		1,2,3,5	1,2,3	GAG702	30+30	5,0

3. LEARNING OUTCOMES – University Undergraduate Study of Civil Engineering

Label	Units of learning outcomes
a/PSG01	To apply mathematical analysis and linear algebra methods to solve engineering problems
b/PSG02	To implement basic tools for analysis of random fields in civil engineering
c/PSG03	To apply methods of static, kinematic and dynamic analysis to solve engineering problems
d/PSG04	To determine the dimensions of the elements of linear and statically determinate and indeterminate structures, taking into account strength, stiffness and stability analysis, in response to all types of load
e/PSG05	To recognise and apply adequate geometric simplifications to linear structures
f/PSG06	To estimate the significance of deformation parameters on the behaviour of static models
g/PSG07	To analyse the structural principles of simple reinforced concrete and masonry buildings and elements
h/PSG08	To develop and design connections used in timber and steel structures
i/PSG09	To recognise, classify and compare the characteristics of construction materials
j/PSG10	To classify and determine the physical and mechanical properties of soil, to determine the dimensions of foundations and retaining structures, as well as to calculate slope stability
k/PSG11	To solve basic problems in hydrology, open channel flow and pressurised systems, as well as water supply and sewage systems
l/PSG12	To create a conceptual design of a rural road
m/PSG13	To plan and manage construction works
n/PSG14	To plan and an organise production in construction plants
o/PSG15	To cooperate on project design development, construction processes and project management
p/PSG16	To appraise various solutions and to recommend an adequate solution to associates and stakeholders in the construction process
r/PSG17	To stand for and present opinions with respect to problems concerning civil engineering and the related professions, in order to adapt to teamwork and participate in it, while respecting the ethical principles of the profession

4. TEACHING AND LEARNING

1. Lectures: a teacher teaches ex-cathedra or uses some forms of interactive lectures
2. Theoretical exercises: a teacher demonstrates to students how to solve standard mathematical or engineering tasks
3. Practical exercises: students solve and prepare practical assignments under the supervision of the teacher in standard or IT-equipped classrooms
4. Field exercises: students and teachers visit, or students perform small-scale practical work at construction sites, factories, production plants, etc.
5. Lab exercises: the teacher demonstrates experiments/tasks to students, or students perform their own experiments/tasks in the laboratory under the supervision of teachers and/or technicians
6. Internship: students perform practical work at construction sites during semester or summer vacations
7. Independent work: theoretical or practical assignment under the supervision of a teacher

5. ASSESSMENT

1. Written exams: students solve tasks as the paperwork or by a computer in IT-equipped classrooms. They may be performed throughout the semester or during the examination period
2. Oral exams: a teacher poses questions to students in a spoken form
3. Presentation or defence of a practical or written assignment

The student who attains the University Bachelor`s Degree in Civil Engineering shall:

- acquire basic competencies for working on certain jobs and tasks in the construction industry, as well as basic knowledge that enables him/her to pursue graduate studies in civil engineering and various lifelong learning programmes
- develop the ability to identify and describe various engineering problems in construction and solve them to a certain level
- be qualified for dimensioning simple building structures or parts of more complex structures to static loads using modern computer tools for the implementation of calculations and for collaborative work in the preparation and elaboration of project and technical documentation in the field of structures, hydraulic engineering and roads
- be qualified for the organisation of construction and management of smaller construction projects, as well as cooperative tasks in the planning, execution, supervision and maintenance of larger buildings
- be qualified for associate tasks in the operation of professional services of utility companies, local and state administration.

A student who has met the criteria for passing each course, fulfilled all the requirements prescribed by the study programme, and completed and successfully defended the undergraduate thesis will obtain a diploma. Upon completion of the University Undergraduate Study of Civil Engineering, the student will have acquired basic engineering skills necessary for understanding and exchanging information in the professional field, planning, designing, managing and construction work, and will have been trained to identify engineering problems, define methods of solving them and participate in the preparation of technical documentation. He/she will have been trained to understand basic construction processes and calculation methods of less complex constructions. The student can acquire other knowledge and skills through elective courses. He/she can further deepen and develop his/her knowledge during the graduate study.