PROFESSIONAL UNDERGRADUATE STUDY PROGRAMME OF CIVIL ENGINEERING

The Professional 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, first cycle), students must earn a minimum of 180 ECTS credits.

The holders of this qualification are entitled to use the professional title of Bachelor of Civil Engineering (bacc. ing. aedif.) and are qualified to pursue a professional activity in the field for which they have acquired 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 Professional Undergraduate Study of Civil Engineering, the student has the opportunity to continue studying at the university graduate study in the field of Civil Engineering after attending differential courses and passing the required differential exams. The student can also continue studying at professional graduate studies in the field of Civil Engineering and other fields within the area of technical sciences, according to the admission requirements set by the higher education institutions conducting these studies.

1. INTRODUCTION

1.1. Assessment of the feasibility of the study

With the entry into force of the Act on Scientific Activity and Higher Education (Official Gazette, No. 123 of 31 July 2003), the conditions for joining the European Higher Education Area and harmonisation with the principles of the Bologna Declaration were created. In view of (1) the legislation at that time; (2) the need for the professional study programme in Civil Engineering for many years, as well as the existence of numerous acquired experiences in higher education of professionals for the needs of the construction industry; (3) the need for new professionals in the field of civil engineering in Split, Dalmatia and the wider area, the proposition was made to introduce a three-year professional study programme in Civil Engineering. Considering the demands of the labour market, the introduction of a professional undergraduate programme in Civil Engineering was significant, 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 region can employ a large number of graduates: (1) large construction companies involved in the design, construction or production and sale of construction materials; (2) local, regional or county government units; (3) public companies, (4) state authorities and (5) 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 1:3.50 and 1:3.80. This confirms that there is continuous interest in the study programme.

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* is the compulsory 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

While developing the proposed professional undergraduate study programme of Civil Engineering, we relied on the experience of various civil engineering study programmes in the country and abroad with the aim of creating study programmes at a European educational level. To this end, we analysed a dozen professional civil engineering programmes from related European universities (ETH Zurich, University of Hannover, TU

Graz, TH Aachen, Maribor), faculties of civil engineering from Osijek and Rijeka and the Polytechnic of Zagreb, in particular through participation in the TEMPUS project RUCE (TEMPUS J.E.P. Project No: 17062: Restructuring and Updating of Civil Engineering Curriculum), in which the following institutions were involved: University of Glasgow (project coordinator), University of Stuttgart, University of Trieste, University of Athens, University of Pécs, University of Ljubljana.

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. By harmonising the study programmes, we ensured the possibility of continuing education at the University Undergraduate Study of Civil Engineering or the University Graduate Study of Civil Engineering at the civil engineering faculties in the Republic of Croatia.

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

The Faculty has been organising and implementing a sixth-degree programme (VI/1) for the civil engineering profile since 1986. In accordance with the provisions of the Act on Higher Education Institutions (Official Gazette No. 59/1996), from the academic year 1998/99, courses for the study of the sixth-degree qualification in civil engineering were organised at the Polytechnic of Split, where most of the courses continued to be taught by teachers from the Faculty of Civil Engineering of the University of Split. By the Decision of the Minister of Science and Technology No. 533-08-01-4 of 2 October 2001, the professional study of civil engineering returned to the Faculty of Civil Engineering in Split, and classes were organised on the basis of the provisional licence for the undergraduate professional study of "Civil Engineering" issued by the Ministry of Science and Technology on 8 June 2001. Since 2005, the study programme has been harmonised and implemented in accordance with the Bologna Process. 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.

The quality of education is reflected in many of our students who, after graduation, continued working in the field of civil engineering both in the country and abroad.

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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						
S. Pavasović	Mathematics	a	1,2	1,2	GAB021	60+60	9,0
V. Kozulić	Technical mechanics I	a,b	1,2,3	1,2	GAD021	30+45	7,0
M. Vulević Pribudić	Basics of engineering informatics I	a,f	1,3	3	GAB022	15+45	4,0
T. Duplančić-Leder	Geodesy	f,h	1,2,3,4	1,2	GAF021	30+30	5,0
D. Žižić	Building elements I	g,h,l,m	1,2,3	1,2,3	GAM021	30+30	5,0
	II. semester						
L. Petričević	Building elements II	g,h,l,m	1,2,3	1,2	GAM022	30+30	5,0
N. Živaljić	Building physics	a,h,i,l,m	1,2,3	1	GAM023	15+15	2,0
M. Andrić	Descriptive geometry	a,f	1,2,3	1,2	GAC021	30+30	5,0
V. Kozulić	Technical mechanics II	a,b	1,2,3	1,2	GAD022	30+45	7,0
S. Juradin	Building materials	g,h,i,m	1,2,3,5	1,2	GAN021	30+30	6,0
V. Denić-Jukić	Hydrology	d,e,m	1,2,3,4	1,2	GAI021	30+30	5,0
	III. semester						
I. Balić, H. Smoljanović	Designing and analysing structures by computer	a,b,c,h,l,m	1,2,3	1,2,3	GAO121	30+30	5,0
K. Rogulj	Construction technology	g,h,i,l,m	1,2,3	1,2	GAL121	30+30	5,0
N. Štambuk Cvitanović, P. Miščević	Soil mechanics and foundations	a,h,j	1,2,3,4,5	1,2	GAG021	30+30	5,0
D. Cvitanić, D. Breški	Roads	f,l,m	1,2,3	1,2	GAF121	30+30	5,0
I. Andrić	Water supply and sewerage system	d,e,h	1,2,3	1,2,3	GAJ121	30+30	5,0
M. Nikolić, I. Banović	Concrete structures I	a,b,c,h,i	1,2,3	1,2,3	GAE121	45+15	5,0
	IV. semester						
N. Grgić, M. Nikolić	Concrete structures II	a,b,c,h,i,m	1,2,3,4	1,2,3	GAE122	30+45	6,0
H. Smoljanović, I. Balić	Masonry structures	a,b,c,h,i	1,2,4	1,2,3	GAO122	30+30	5,0
I. Boko	Metal structures	a,b,c,h,i	1,2,3,4	1,2,3	GAP122	30+30	5,0
D. Bojanić	Basics of water engineering	a,d,h	1,2,3,4,5	1,2	GAH121	30+30	5,0
T. Vlahović, G. Vlastelica	Engineering geology and earthworks	g,h,i,j,l	1,2,3,4	1,2	GAG022	30+15	4,0
N. Torić	Timber structures	a,b,c,h,i	1,2,3,4	1,2,3	GAP121	30+30	5,0

Teacher	Course	Related learning outcomes	Teaching and learning	Assessment	Code	Hours	ECTS
	V. semester						
N. Ostojić-Škomrlj	Construction management I	g,h,k,l,m	1,2,3	1,2	GAL122	30+30	5,0
D. Matešan	Bridges	b,h,l	1,2,3,4	1,2,3	GAE221	30+30	6,0
M. Galešić, V. Srzić	Marine structures	a,c,h	1,2,3,5	1,2,3	GAK221	30+30	6,0
B. Trogrlić	Execution of building works	g,h,j,k,l,m	1,4	3	GAP221	50+10	5,0
I. Balić, H. Smoljanović	Building regulations	h,k,l,m	1,3	2,3	GAP021	30+0	3,0
N. Jajac	Basics of entrepreneurship	g,l,m	1,2,3	1,2	GAL021	30+30	5,0
	VI. semester						
N. Ostojić-Škomrlj	Construction management II	g,h,k,l,m	1,2,3	1,2	GAL123	30+30	5,0
N. Jajac	Internship	h,k,l,m	6	3	GAL221	0+120	5,0
	Elective courses (min. 15 ECTS)						
	Undergraduate thesis	l,m+specific LO regarding thesis	7	2,3	GAX221		5,0
	Elective courses						
J. Zanchi	Building design	As listed in the detail plans at the Faculty's web site.	1,2,3	1,2	GAM121	30+30	5,0
M. Galić, I. Banović	Installations		1,2,3	1,2,3	GAM122	30+15	4,0
D. Bojanić	Tunnels and underground structures		1,2,3,4	1,2	GAH221	30+30	5,0
D. Jukić	Water protection		3	1,2,3	GAJ122	30+30	5,0
N. Jajac	Basics of Business Economy		1	3	GAL022	30+0	2,0
I. Škarica	English Language		1,2	1,2	GAA022	30+30	5,0
P. Miščević, G. Vlastelica	Retaining structures and construction pits		1,2,3	1,2,3	GAG029	30+30	5,0
G. Baloević, N. Grgić	High-performance and ultra-high performance concrete structures		1,2,3,5	1,2,3	GAN023	30+30	5,0
G. Baloević, G. Vlastelica	Laboratory and field tests of geomaterials		1,2,3,5	1,2,3	GAN022	30+30	5,0

3. LEARNING OUTCOMES – Professional Undergraduate Study of Civil Engineering

Label	Units of learning outcomes
a/SSG01	To apply mathematical analysis and linear algebra methods to solve engineering problems
b/SSG02	To recognise and understand the problems related to the stability and mechanical strength of simple, statically determinate and indeterminate structures
c/SSG03	To design reinforced concrete, metal, masonry, timber and coastal structures with simple geometry
d/SSG04	To perform calculations related to the simple problems of open channel flow and pressurised systems
e/SSG05	To interpret the results of hydrological calculation of free surface flows and water cycle in nature
f/SSG06	To create a conceptual design of a rural road
g/SSG07	To interpret construction processes and manage construction site works
h/SSG08	To participate in the process of the design, construction and obtaining of legal documents related to the construction work
i/SSG09	To recognise, classify and compare the characteristics of construction materials
j/SSG10	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/SSG11	To participate in documentation management at the construction site
l/SSG12	To participate in the appraisal of various solutions with associates and stakeholders in the construction process, while respecting ethical principles
m/SSG13	To stand for and present attitude with respect to problems concerning civil engineering and the related professions, in order to adapt to teamwork and participate in it

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

Below are the basic activities and tasks that a Bachelor of Civil Engineering may perform upon attaining this qualification:

- associate tasks in the development of simple projects, especially graphic parts of the project, parts of reinforcement plans and workshop drawings, formwork plans and cost estimates
- independent management of less complex construction sites
- management of smaller production facilities
- assistance in the management of complex construction sites
- assistance in the execution of large construction works
- tasks in the planning of construction sites for less complex buildings
- management of smaller construction investments
- maintenance of buildings and facilities
- organisation and independent management of smaller construction companies.

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 Professional Undergraduate Study of Civil Engineering, the student is trained to understand the basic construction processes and calculation methods of less complex structures, participate in teamwork on the planning, management and calculation of simpler structures and their parts, as well as to head the construction of simpler structures and perform maintenance work. He/she will have acquired the organisational skills necessary for the independent management of smaller construction companies. 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.