U N I V E R S I T Y O F S P L I T

FACULTY OF CIVIL ENGINEERING, ARCHITECTURE AND GEODESY

DETAILED PROPOSAL OF THE STUDY PROGRAMME

POSTGRADUATE UNIVERSITY (DOCTORAL) STUDY OF CIVIL ENGINEERING

SPLIT, 2022

GENERAL INFORMATION ON THE HIGHER EDUCATION INSTITUTION

Name of the higher education institution	University of Split, Faculty of Civil Engineering, Architecture and Geodesy
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GENERAL INFORMATION ON THE STUDY PROGRAMME

Name of the study programme	POSTGRADUATE UNIVERSITY (DOCTORAL) STUDY OF CIVIL ENGINEERING		
Institution delivering the study programme	Faculty of Civil Engineering, Architecture and Geodesy		
Partner institutions			
Type of study programme	Professional study programme ☐	University study programme ☐	
Level of study programme	Undergraduate ☐	Graduate ☐	Integrated ☐
	Postgraduate university ☒	Postgraduate specialist ☐	Graduate specialist ☐
Academic/ vocational title earned at completion of study	Doctor of Engineering Science (PhD) in Civil Engineering or Fundamental Engineering Sciences		

1. INTRODUCTION

1.1. Assessment of the feasibility of the study

Since the foundation of the Faculty to this day, the Civil Engineering study programmes at undergraduate, graduate and postgraduate level have produced the most recognised experts who have left their mark both in the Republic of Croatia and abroad.

Higher education activities in Split first began in October 1971, in an institution established that year as the Department of Civil Engineering and part of the University of Zagreb Faculty of Civil Engineering. Since then, the institution has experienced dynamic growth, both in terms of local teaching staff and financial resources, but most importantly, in terms of infrastructural capacities. On 1 January 1977, the Department evolved into the Faculty of Civil Engineering Sciences, University of Split, as an independent institution.
The Faculty operated under this name until 30 June 1991, when it was renamed as the Faculty of Civil Engineering, University of Split. Starting from 23 November 2003 and the formation of the Architecture study programme, the institution became the Faculty of Civil Engineering and Architecture, University of Split. The founding cycle was completed in the academic year 2010/11, four decades after the initial idea and after several years of preparation, with the Study of Geodesy and Geoinformatics established with the assistance and support of the University of Split and the Faculty of Geodesy in Zagreb. On 11 May 2011 the Faculty was renamed to its current title Faculty of Civil Engineering, Architecture and Geodesy. Students at the Faculty have acquired the knowledge and skills for independent work in the area of Engineering Sciences, fields of Civil Engineering or Fundamental Engineering Sciences, obtaining undergraduate qualifications (B.Eng.), graduate qualifications (M.Eng.), master of science degrees (M.Sc.), and doctoral degrees (Ph.D.).

The goal of this doctoral study is to educate highly skilled doctors of science with excellent prospects at the labour market and the knowledge market. The acquired qualifications, recognised in the country, the European Union, and other parts of the world, will serve as fundamental prerequisites for renewing existing resources. To achieve this goal, the institutional development strategy of the Faculty involves:

- creating and implementing a curriculum that will be recognized for its quality and will guarantee the education of highly skilled staff, ready to actively participate in the development of a knowledge society;
- selecting the best students as the basis for introducing new workforce in the fields of science, education, and economy;
- scientific collaboration in Croatia and abroad, especially on international research projects;
- ensuring prerequisites for lifelong education, which implies mobility;
- innovative approach to designing applied and developmental projects in the economy.

There is an increased demand for experts in the field of Civil Engineering, due to growth of complex construction projects in the Republic of Croatia and the European

Union, i.e. experts who have completed the doctoral level of study in addition to the undergraduate and graduate education. Special competencies acquired at the doctoral study are regularly applied to project tasks in the field of Civil Engineering, such as: environmental and water resource analysis, modelling of transport and hydrological processes, advanced modelling of the behaviour of reinforced concrete, prestressed, steel, composite, aluminium, and glass structures under extreme loads such as wind, earthquake, and fire. Examples of project tasks requiring competencies acquired in the doctoral study in the field of fundamental engineering sciences are as follows: development of new types of construction products used in green and sustainable construction, development of new advanced numerical models based on the principles of engineering mechanics, application of decision support systems, etc.

Continuous commitment to the scientific research activities at the Faculty, which contribute to the quality of potential supervisors at the doctoral programme, is evident in the scientific and research productivity of the scientific-teaching staff of the Faculty and annual publication of a large number of scientific and professional papers in renowned international and domestic journals. It is also important to mention that the Faculty, in collaboration with the Faculty of Electrical Engineering, Mechanical Engineering, and Naval Architecture of the University of Split, is the publisher of the internationally recognized scientific journal “International Journal for Engineering Modelling”. At the end of September 2021, the Faculty completed the INFRA project "Implementation of Contemporary Scientific Research Infrastructure at FCEAG for Smart Specialization in Green and Energy Efficient Construction" (KK.01.1.1.02.0027), started in the second half of 2018. The project was financed by grants from the European Regional Development Fund, as part of the Call for Project Proposals "Investment in Organisational Reform and Infrastructure in the Research, Development and Innovation Sector" within the framework of the Operational Programme "Competitiveness and Cohesion 2014-2020". The total project value is HRK 84.513.801,36 million, of which HRK 82.772.609,88 million were financed by grants from EU sources. The connection between the mentioned project and the doctoral study is the fact that approximately HRK 40 million was spent on the purchase of modern scientific research equipment and reconstruction of the Faculty laboratory in Žrnovnica, which contains two of the Faculty’s eleven specialized laboratory units: Hydrotechnical Laboratory and Laboratory for Seismic Testing.

The special significance of the doctoral study in Civil Engineering is justified by the fact that the programme received an excellence certificate awarded by the international accreditation panel of the Agency for Science and Higher Education in 2016, identifying the doctoral study programme in Civil Engineering as one of the few programmes in the Republic of Croatia with confirmation of feasibility provided by external assessment.

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

Collaboration with the economic sector is promoted by solving engineering problems in coastal and shoreline areas, i.e. karst and flysch terrains. Additionally, activities of the Faculty staff on implementation of large construction projects in Croatia and abroad have had significant impact, receiving a number of awards. Recognition has also been

given for the very successful scientific and teaching work. The collaboration with the local community is established in particular by institutional implementation of interregional EU projects (INTERREG), IRI projects, and ESF projects. Dissemination of project activities regularly includes the publication of scientific papers in internationally recognized journals, as well as admission of project associates to the doctoral study programme in Civil Engineering, as one of the phases of conducting scientific research.
It is also important to highlight that the Faculty has established strong partnerships with the units of local self-government, on preparing study reports and strategic documentation for the local community projects.

1.3. Compliance with the requirements of professional organisations

Regarding the alignment of the study programme with the demands of the labour market, it is important to note that the purpose of the doctoral study is to fulfil the social role of the Faculty of Civil Engineering, Architecture, and Geodesy (FCEAG) as a support for the sustainable development of society. The doctoral programme has been developed and improved in accordance with the FCEAG strategic documents: Strategic programme of FCEAG scientific research for the period 2015 - 2020, FCEAG scientific and research strategy in the field of engineering sciences 2021-2025, and FCEAG scientific and research strategy in the interdisciplinary field of science 2021-2025. The goals of the scientific research strategic programme arise were developed based on a prior analysis of relevant EU and national strategic documents (priority thematic areas), and the needs of the public and private sectors elaborated in consultation with external stakeholders. The Alumni Association (association of former Faculty students, distinguished professionals in the civil engineering industry) plays a special role, providing advisory support during the modification of all civil engineering study programmes and their alignment with the changing demands of the labour market.

1.4. Partners outside the higher education system

In the process of implementation of the study programme, the Faculty is devoted to enhancing collaboration with other constituents of the University of Split, as well as faculties based in the EU and third countries. Existing partnerships at the doctoral study programme have been established via joint doctorate agreements and inter-institutional Erasmus agreements.

The Faculty also formed partnerships with public and private entities outside the higher education system, based on agreements on scientific research cooperation with companies and institutions interested in the professional development of junior experts at the doctoral study programme:

- Pomorski centar za elektroniku d.o.o. Split
- Geoprojekt d.d. Split
- GISplan d.o.o. Split
- MBS GmbH Zagreb
- Röfix d.o.o. Donja Pušća
- Trivium d.o.o. Split
- Institute of Oceanography and Fisheries Split

1.5. Funding

The postgraduate university doctoral programme is financed according to the Regulations on postgraduate university (doctoral) studies in Civil Engineering (hereinafter: Study Regulations) from multiple sources:
(1) state funds for assistants or funds for persons employed in associate positions in the science and higher education system, in accordance with the rules and conditions of the contract; (1a) funds from the Croatian Science Foundation (HRZZ) for financing doctoral candidates, provided that supervisors are selected based on excellence criteria and current projects; (2) funds from national and international scientific projects, planned in advance; (3) candidates' personal funds for the doctoral study programme tuition; (4) funds from donations by national and international associations and organizations; and (5) funds from companies and institutions that sponsor their employees for the programme.
All candidates have the right to social security benefits and medical insurance, as well as occupational safety in accordance with legal regulations and the Regulations on occupational safety. During any necessary training abroad, candidates will be provided with life insurance, and other types of insurance will be regulated by a contract with the respective institution.

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

Regarding the alignment of the study programme with similar programmes delivered at European universities, the scope and profile of the doctoral study programme in Civil Engineering is comparable with the study programmes of TU Delft (https://www.tudelft.nl/en/), ETH Zürich (https://www.ethz.ch/en.html), and KTH Stockholm (https://www.kth.se/en). The postgraduate studies at these universities include research lasting a minimum of three years (as defined by the requirements of the Croatian Qualifications Framework - CroQF and QF-EHEA), and the number of ECTS credits for each extracurricular course or group of courses is comparable to the doctoral study programme at FCEAG. The structure of the doctoral study programme at FCEAG allows the students to achieve the level 7 learning outcomes necessary for research (level 8) in the maximum amount of 60 ECTS credits which were not acquired through previous studies, by enrolling in extracurricular courses in agreement with the supervisor. The same approach concerning the acquisition of additional learning outcomes (acquisition of various transferable competencies for the purpose of conducting doctoral research) is included in the doctoral programme of TU Delft (Skills training programme), ETH Zürich (Structured PhD with additional formal education), and KTH Stockholm (study programme at the Department of Civil Engineering and Department of Land and Water Resources). Regarding the alignment of the study programme with other programmes delivered in Croatia, the profile of the FCEAG study program is comparable with other doctoral studies in Civil Engineering (studies with 180 ECTS credits).

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

The postgraduate university doctoral programme is designed and structured to allow the candidates to obtain ECTS credits at other higher education institutions in the

country and abroad during their studies, providing flexibility in forming modules that would ensure producing high-quality doctoral theses by selecting extracurricular courses based on supervisors' recommendations. In addition, students can transfer ECTS credits from this Faculty (a minimum of 90) to continue and complete their studies and to produce and defend their doctoral thesis at another higher education institution in the country or abroad. Furthermore, the study programme is based on collaboration and necessary partnership with the economy. The Faculty signed a substantial number of international mobility inter-institutional agreements within the ERASMUS programme framework and is constantly working on increasing the number of agreements in accordance with the requirements of the students. The ERASMUS mobility programme also includes teaching and non-teaching staff.

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 connects the strategic development of the Faculty and the University with national strategic development directions. The programme ensures research outcomes tailored to the new demands of the labour market, fostering creativity and innovation in entrepreneurship, resulting in creation of new jobs based on the results of doctoral research. The qualification awarded following the completion of the doctoral study in Civil Engineering opens opportunities for employment at research institutions or participating in the innovation market through start-up companies and patenting innovations resulting from the research conducted during the studies.

In the process of defining the strategic goals for the development and implementation of the doctoral study programme, the following strategic documents were taken as guidelines:

- Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth;
- Strategic documents of the European Research Area (ERA);
- Strategic Plan of the Ministry of Science and Education 2020-2022;
- Research Strategy of the University of Split 2022-2026;
- FCEAG Strategy 2018-2022;
- FCEAG Strategic Programme of Scientific Research 2015-2020;
- FCEAG Scientific and Research Strategy in the Interdisciplinary Field of Science 2021-2025;
- FCEAG Scientific and Research Strategy in the Field of Engineering Sciences 2021-2025;
- Smart Specialisation Strategy of the Republic of Croatia 2016-2020;
- European Commission Strategic plan 2020-2024 – Research and innovation.

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

The postgraduate study programme for obtaining a Master of Science degree has been delivered at the Faculty since 1990, and since 1992 the Faculty has delivered the programme for obtaining a Doctor of Science degree, in the fields of Structural

Modelling and Water Management. Since the academic year 1992/93, the study has been structured with three specialization areas: Structural Engineering, Hydrotechnical Engineering, and Traffic and Geotechnical, until the present time.
With the enforcement of the new Act on Scientific Activity and Higher Education (OG 123/2003), the prerequisites for entering the European Higher Education Area were met, with the aim of aligning the existing postgraduate studies with the principles of the Bologna Declaration.
Based on the aforementioned Act and the principles of the Bologna Declaration, the Faculty initiated the three-year postgraduate university study programme (180 ECTS credits) as the third (highest) level of education for obtaining the academic degree of Doctor of Science in the area of Engineering Sciences, in the field of Civil Engineering or Fundamental Engineering Sciences.

2. DESCRIPTION OF THE STUDY PROGRAMME

2.1. General information

Scientific/artistic area of the study programme	Engineering sciences
Duration of the study programme	3 years
Minimum number of ECTS credits required for completion of study	180
Enrolment requirements and admission procedure	Enrolment requirements are defined by the Regulations on postgraduate (doctoral) studies in Civil Engineering. Each candidate is invited to an admissions interview.

2.2. Learning outcomes of the study programme

General outcomes of the study programme:

- Design scientific research in collaboration with a supervisor to create new hypotheses and scientific knowledge within the chosen scientific field;
- Prepare and present a public presentation of the research results at an international scientific conference;
- Successfully defend the hypothesis and research results, and present arguments during the discussion at an international scientific conference;
- Critically analyse and evaluate published scientific papers by other authors within the chosen scientific field;
- As the lead author, write and successfully publish at least one scientific paper in an international peer-reviewed journal;
- Write, present and successfully defend a doctoral thesis;
- Apply the newly created knowledge and scientific insights from the doctoral thesis in practice;
- Participate in the work of scientific teams or scientific projects in Croatia or abroad.

2.3. Employment possibilities

According to the existing records at the Faculty and the labour market statistics used to monitor the employability of students, high percentage of students who complete the subject study programme remain in the higher education system in postdoctoral positions and continue their careers in higher education at their home institution or other higher education institutions in Croatia or abroad.
According to the analysis of students currently attending the studies, over the past two years the student body is composed of students from the higher education system (assistants, doctoral candidates funded by the Croatian Science Foundation, and professional associates in the higher education system), and candidates employed in different job positions who attend the programme with the aim of further developing competencies and advancing in their current positions.
One part of students who complete the study programme find employment in regional offices of units of local self-government, specialized private sector companies, public enterprises, etc. Examples of Croatian companies that employ current students: Spegra inženjering d.o.o., Cemex Hrvatska d.d., Pomorski projekti d.o.o.

2.4. Possibilities of continuing studies at a higher level

Not applicable.

2.5. Study programme/s at lower level delivered by the proposing institution or other institutions in the Republic of Croatia which qualify students for admission to the proposed study

Persons eligible for enrolment to the postgraduate university (doctoral) study programme are applicants with a level 7 university profile qualification (graduate university study) with a minimum grade point average equivalent to ‘very good’ grade (above 3.50) and acquired at least 300 ECTS credits together with a previous qualification at level 6, i.e. equivalent grade in other assessment systems, or applicants who are in the group of 20% best students of their generation.

2.6. Conditions and structure of the study

During the first research year, the candidate, in agreement with the supervisor, can enrol in extracurricular courses (up to 60 ECTS credits) if such courses are required in relation to the research topic. Additionally, it is possible to enrol in courses from other doctoral programmes at the University of Split, other universities in Croatia, or higher education institutions abroad. During the first research year, the candidate must pass all extracurricular courses and the PhD qualifying exam to be eligible for admission to the second research year. Over the three-year research period, the candidates must present the current progress of their research work at the Doctoral Candidates Congress, which is held twice a year. Before initiating the doctoral thesis proposal procedure, the candidates must publish a scientific paper related to the research topic, presented at an international peer-reviewed scientific conference. The requirement for submitting the doctoral thesis for assessment includes publishing original scientific papers in journals with an impact factor in the first two quartiles (Q1 or Q2) in the field of doctoral research. Additional requirements are defined in the Study Regulations. The students complete the doctoral study by defending the doctoral thesis. The

procedures for doctoral thesis proposal, assessment, and defence are defined and described in the Study Regulations.

2.7. Study guidance and support system

The procedure of selecting candidates is based on an individual assessment approach for each applicant. Persons eligible for enrolment in the programme are applicants who have completed a master's degree in the fields of engineering, natural, or other areas of science. The assessment of an applicant's eligibility for enrolment is conducted on an individual basis.

Each applicant expresses their interest in the research area in a letter of intent. The Studies Commission decides which courses completed by an applicant are relevant to the proposed research. The applicant must have achieved a minimum grade of 'good' (3) in these courses.

Applicants who did not complete a graduate programme in Civil Engineering, but have completed studies in the fields of engineering sciences, natural sciences, or other areas of science must undergo a following procedure. The Studies Commission evaluates the content from the undergraduate and graduate studies in Civil Engineering which is necessary for the proposed thesis and which the applicant must acquire to enrol in the postgraduate programme.

Supervisors, and if necessary, co-supervisors, are assigned to the candidates upon enrolment, to conduct supervision of the candidates' research and thesis preparation. The primary task of supervisors is to guide and advise the candidates in all phases of studies, from enrolment to the defence of the thesis, to advise on any extracurricular courses the candidate might enrol in (in Croatia and/or abroad), and ensure conditions for uninterrupted progress during the studies (literature, consultations, suggestions for conferences to attend, joint authorship of papers, selection of work-integrated learning centres for experimental work at the University of Split and other universities in Croatia and abroad, facilitating networking with teachers from other institutions and facilitating collaboration).
Any questions or inquiries related to doctoral study programme procedures can be directed to the Head of the doctoral studies. The Head of the doctoral studies holds meetings with candidates at least once per semester to provide advice and guidance on study-related issues. Specific candidate requests are resolved in writing by the Postgraduate Studies Commission.

2.8. List of courses students may enrol from other study programmes

Given the concept of this programme, it is not possible to compile and specifically determine a list of extracurricular elective courses that a candidate can choose from other study programmes. Depending on the thesis topic, the candidates may choose from a wide range of doctoral study courses, from the list of courses offered by this Faculty and courses offered in doctoral programmes at the University of Split and/or any other university in Croatia or abroad. In agreement with the supervisor, the candidates may select a group of courses that will most effectively lead to the final

result – the defence of the thesis and the publication of the required number of scientific papers.

2.9. List of courses offered in a foreign language

Classes, consultations, and exams can be delivered in English for all extracurricular courses in this doctoral programme, as specified in the course descriptions. Additionally, part of the mandatory and recommended literature is in English or another world language. Students who are native Croatian speakers can also have access to classes, consultations, and exams in English, if required by the candidate. Considering that both teachers and candidates can quickly access resources via internet search engines, and that most information, relevant literature, and scientific papers are published in English, a very good command of English is indispensable for both teachers and candidates.

2.10. Criteria and conditions for transferring the ECTS credits

The Bologna Process facilitates student mobility, enabling the transfer of ECTS credits. ECTS credits obtained by the candidate at another higher education institution or research facility will be recognized in this programme according to the mobility procedure outlined in the Regulations on Studies and the Study System at the University of Split and based on the supplied ECTS Transcript of Records, while the volume of research or learning outcomes is agreed upon with the supervisor in advance. The transfer and recognition of ECTS credits are carried out by the Postgraduate Studies Commission.

2.11. Completion of the study

Students complete the doctoral programme after accumulating at least 180 ECTS credits through research work and successfully defending their doctoral thesis. All the requirements for doctoral thesis proposal, public interview, assessment, and defence of the doctoral thesis are specified in detail in the Study Regulations.

Final requirement for completion of study	Final thesis ☐ Diploma thesis ☐	Final exam ☐ Diploma exam ☐ Doctoral thesis (dissertation) ☒
Requirements for the assessment of doctoral thesis (dissertation)	After the thesis topic is accepted, the candidate can initiate the doctoral thesis (dissertation) assessment procedure in accordance with the Regulations on postgraduate (doctoral) studies in Civil Engineering.	
Doctoral thesis (dissertation) assessment procedure	The assessment procedure for doctoral thesis (dissertation) is defined by the Regulations on postgraduate (doctoral) studies in Civil Engineering.	

2.12. List of mandatory and elective courses

All elective courses in the doctoral programme are extracurricular. During their doctoral studies all candidates are required to participate in congresses, seminars, round

tables, workshops, conferences, and other activities that are part of Research I, II, III. The selection and extent of participation in these activities are agreed upon with the supervisor.

COURSE LIST							
Year of the study programme: 1st							
Semester: 1st							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXA01	Research I					30
	Total mandatory						30
Elective		Elective courses*					
	* Extracurricular elective courses are two-semester courses, and the list is provided in tables 2-10. Students may acquire up to 30 ECTS by enrolling extracurricular courses.						

COURSE LIST							
Year of the study programme: 1st							
Semester: 2nd							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXA01	Research I					30
	Total mandatory						30
Elective		Elective courses*					
	* Extracurricular elective courses are two-semester courses, and the list is provided in tables 2-10. Students may acquire up to 30 ECTS by enrolling extracurricular courses.						

COURSE LIST							
Year of the study programme: 2nd							
Semester: 3rd							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXB01	Research II					30
	Total mandatory						30
Elective							

COURSE LIST							
Year of the study programme: 2nd							
Semester: 4th							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXB01	Research II					30
	Total mandatory						30
Elective							

COURSE LIST							
Year of the study programme: 3rd							
Semester: 5th							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXC01	Research III					30
	Total mandatory						30
Elective							

COURSE LIST							
Year of the study programme: 3rd							
Semester: 6th							
STATUS	CODE	COURSE	HOURS PER SEMESTER				ECTS
			L	S	E	F	
Mandatory	GAXC01	Research III					30
	Total mandatory						30
Elective							

The following is a list of mandatory and extracurricular courses with ECTS credits and weekly workload.

Table 1

CODE	MANDATORY RESEARCH ACTIVITIES REQUIRED FOR THE DOCTORAL DEGREE IN THE FIELD OF CIVIL ENGINEERING	ECTS credits
GAXA01	Research I	60
GAXB01	Research II	60
GAXC01	Research III	60

Table 2

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF BEARING STRUCTURES	weekly workload (L+E)	ECTS credits
GAKA01	Meshless Numerical Methods and Corresponding Adaptive Techniques	30+0	6
GAKA02	Numerical Modelling of Shell Structures	30+0	6
GAKA03	Numerical Methods for the Mechanics of Materials	30+0	6
GAKA04	Experimental Methods	30+0	6
GAKA05	Selected chapters of Structural Dynamics and Earthquake Engineering	30+0	6
GAKA06	Selected chapters of Stability of structures	30+0	6
GAKA07	Finite Element Method	30+0	6
GAKA08	Extreme Actions and Structure Safety/Stability	30+0	6
GAKA09	Steel and Composite Structures	30+0	6
GAKA10	Numerical Modelling of Concrete Structures	30+0	6
GAKA11	Design of Supporting Systems of Bridges and Structures	30+0	6
GAKA12	Mechanics of Discontinua	30+0	6
GAKA13	Numerical Modelling of Water-Soil-Structure Dynamic Interaction	30+0	6
GAKA14	Selected chapters of Concrete and Masonry Structures	30+0	6

Table 3

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF HYDROTECHNICS	weekly workload (L+E)	ECTS credits
GAHA01	Dispersion Processes in Water Resources	30+0	6
GAHA02	Theory of Risk Assessment in Environmental Engineering	30+0	6
GAHA03	Karst Water Resources	30+0	6
GAHA04	Ecohydrology	30+0	6
GAHA05	Hydrological Modelling in Karst	30+0	6
GAHA06	Marine Hydraulics, special chapters	30+0	6
GAHA07	System Engineering in Water Resources Management	30+0	6
GAHA08	Sustainable Urban Water Systems	30+0	6
GAHA09	Selected chapters on Karst Hydrogeology	30+0	6
GAHA10	Introduction to Engineering Numerical Modelling	30+0	6
GAHA11	Analysis of Hydrological Time Series	30+0	6

Table 4

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF TRANSPORTATION	weekly workload (L+E)	ECTS credits
GAPA01	Traffic Flow Theory	30+0	6
GAPA02	Highways – selected chapters	30+0	6
GAPA03	Transport Planning	30+0	6

Table 5

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF GEOTECHNICS	weekly workload (L+E)	ECTS credits
GAGA01	Selected chapters from Rock Mechanics	30+0	6
GAGA02	Soil Mechanics Models	30+0	6
GAGA03	Special chapters in Foundation Engineering	30+0	6

Table 6

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF MATERIALS	weekly workload (L+E)	ECTS credits
GAMT01	Rheology of Materials	30+0	6
GAMT02	New Materials in Civil Engineering	30+0	6

Table 7

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF FUNDAMENTAL ENGINEERING SCIENCES, BRANCH OF ORGANISATION OF WORK AND PRODUCTION	weekly workload (L+E)	ECTS credits
GALA01	System Engineering in Project Management	30+0	6
GALA02	Decision Support Systems	30+0	6
GALA03	System Theory	30 + 0	6

Table 8

CODE	EXTRACURRICULAR COURSE IN THE FIELD OF ARCHITECTURE AND URBAN PLANNING	weekly workload (L+E)	ECTS credits
GAAA01	Roads and the Environment	30+0	6

Table 9

CODE	EXTRACURRICULAR COURSES IN THE AREA OF TECHNICAL SCIENCES	weekly workload (L+E)	ECTS credits
GATA01	Methodology and Techniques of Scientific Research	30+0	6
GATA02	Information Engineering	30+0	6
GATA03	Engineering Simulations Techniques	30+0	6

Table 10

CODE	EXTRACURRICULAR COURSES IN THE FIELD OF NATURAL SCIENCES, BRANCH OF MATHEMATICS	weekly workload (L+E)	ECTS credits
GAMA01	Applied Functional Analysis	30+0	6
GAMA02	Optimisation Methods	30+0	6
GAMA03	Mathematical Analysis of Boundary-value Problems	30+0	6
GAMA04	Integral Equations	30+0	6
GAMA05	Methods of Mathematical Statistics	30+0	6

2.13. Course description

Description of mandatory research activities

<table>
<tr><td>COURSE TITLE</td><td colspan="6">RESEARCH I</td></tr>
<tr><td>Code</td><td>GAXA01</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Supervisor(s) proposed by the Postgraduate University Study Commission and approved by the Faculty Council</td><td>Credits (ECTS)</td><td colspan="4">60.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Establish a hypothesis for the research topic or define the problem to be solved through research, and accordingly, begin conducting theoretical and experimental research work in the field of civil engineering and/or other relevant branches within the field of fundamental engineering sciences, as well as other scientific fields within engineering sciences, natural sciences, and other areas of science.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">• Put forward a research hypothesis or a problem to be solved by applying a new method or approach;
• Prepare and present communication about research findings;
• Successfully defend the hypothesis or proposed method and research results and present substantiated arguments;
• Participate with the members of the team in scientific-research activities or projects.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Independent research and experimental work under the supervisor`s supervision within the corresponding research project(s) and the topic of the doctoral thesis. Individual writing of scientific papers with the supervisor. Details are defined by the supervisor depending on the topic of research/doctoral thesis.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☒ Independent research and experimental work guided by supervisors</td></tr>
<tr><td>Student obligations</td><td colspan="6">Preparation of a seminar paper on the selected research topic and presentation at a doctoral candidates' congress.</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td></td><td>Research</td><td>52.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Participating in the organisation of</td><td>2.0</td></tr>
</table>

					a scientific conference or meeting	
	Essay		Writing, preparing for defence, and defending seminar paper	2.0	Preparing a public presentation of the topic of the research/doctoral thesis	2.0
	Mid-term exams		Oral exam			
	Written exam		Preparing a research project proposal	2.0		
Assessment methods and evaluating student work in class and at the final exam	Research outcomes are tested by assessment of a publicly presented seminar paper which shows research results and/or overview of the selected area of research. The paper has to be in the format of a scientific paper. Additionally, research outcomes can be tested through scientific papers sent to journals or accepted for presentation at conferences.					
Required reading	**Title**				**Number of copies in the library**	**Availability via other media**
	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.					
Supplementary reading	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.					
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.					
Other						

<table>
<tr><td>COURSE TITLE</td><td colspan="6">RESEARCH II</td></tr>
<tr><td>Code</td><td>GAXB01</td><td>Year of the study programme</td><td colspan="4">2nd</td></tr>
<tr><td>Course leader/s</td><td>Supervisor(s) proposed by the Postgraduate University Study Commission and approved by the Faculty Council</td><td>Credits (ECTS)</td><td colspan="4">60.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">With the aim of establishing a new hypothesis or defining a problem to be solved, design a scientific research in cooperation with the supervisor, and accordingly, continue conducting theoretical and experimental research work in the field of civil engineering and/or other relevant branches within the field of fundamental engineering sciences, as well as other scientific fields within engineering sciences, natural sciences, and other areas of science.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Positive assessment of the first year of conducting theoretical and experimental research, or an accepted research hypothesis or problem to be solved by applying a new method or approach (Research I).</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">• In collaboration with the supervisor, design scientific research aimed at creating new hypotheses or solving problems;
• Prepare and present a public communication of research results at an international scientific conference;
• Successfully defend the hypothesis or problem solutions and research results at an international scientific conference;
• Participate with the members of the team in scientific-research activities or projects.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Independent research and experimental work under the supervisor`s supervision within the corresponding research project(s) and the topic of the doctoral thesis. Individual writing of scientific papers with the supervisor. Details are defined by the supervisor depending on the topic of research/doctoral thesis.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☒ Independent research and experimental work guided by supervisors</td></tr>
<tr><td>Student obligations</td><td colspan="6">Preparation of a seminar paper on the selected research topic and presentation at a doctoral candidates' congress. Preparing and presenting a paper at an international scientific conference.</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td></td><td>Research</td><td>42.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Participating in the organisation of a scientific</td><td>2.0</td></tr>
</table>

					conference or meeting	
	Essay		Writing, preparing for defense, and defending seminar paper	2.0	Preparation and/or writing of a paper for an international scientific conference and/or peer-reviewed international journal	10.0
	Mid-term exams		Oral exam		Preparing a public presentation of the topic of the research/doctoral thesis	2.0
	Written exam		Preparing a research project proposal	2.0		

Assessment methods and evaluating student work in class and at the final exam	Research outcomes are tested by assessment of a publicly presented seminar paper which shows research results and/or overview of the selected area of research. The paper has to be in the format of a scientific paper. Additionally, research outcomes can be tested through scientific papers sent to journals or accepted for presentation at conferences.		
Required reading	**Title**	**Number of copies in the library**	**Availability via other media**
	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.		
Supplementary reading	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.		
Other			

<table>
<tr><td>COURSE TITLE</td><td colspan="6">RESEARCH III</td></tr>
<tr><td>Code</td><td>GAXC01</td><td>Year of the study programme</td><td colspan="4">3rd</td></tr>
<tr><td>Course leader/s</td><td>Supervisor(s) proposed by the Postgraduate University Study Commission and approved by the Faculty Council</td><td>Credits (ECTS)</td><td colspan="4">60.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Successfully completed theoretical and experimental research work in the field of civil engineering and/or other relevant branches within the field of fundamental engineering sciences, as well as other scientific fields within engineering sciences, natural sciences, and other areas of science.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Positive assessment of the second year of conducting theoretical and experimental research, or research aimed at solving research hypotheses or problem successfully accepted by the international research community (Research II).</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">• Critically analyse and evaluate published scientific papers by other authors within the chosen scientific field;
• As the lead author, publish at least one scientific paper in a journal with specified ranking/impact;
• Independently present the hypothesis or proposed solution and research results in the doctoral thesis;
• Successfully defend the research results and present arguments during the viva voce discussion in front of the commission.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Independent research and experimental work under the supervisor`s supervision within the corresponding research project and the topic of the doctoral thesis. Individual writing of scientific papers with the supervisor. Details are defined by the supervisor depending on the topic of research/doctoral thesis.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☒ Independent research and experimental work guided by supervisors</td></tr>
<tr><td>Student obligations</td><td colspan="6">Accepted and/or published at least one paper in a peer-reviewed journal indexed in the Web of Science™ Core Collection, in the field of the selected research topic.</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td></td><td>Research</td><td>21.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Participating in the organisation of a scientific conference or meeting</td><td>2.0</td></tr>
</table>

	Essay		Writing, preparing for defence, and defending seminar paper		Preparation and/or writing of a paper for a peer-reviewed international journal	15.0
	Mid-term exams		Oral exam		Writing, preparation for defence, and defence of the doctoral thesis	20.0
	Written exam		Preparing a research project proposal	2.0		

Assessment methods and evaluating student work in class and at the final exam	Accepted and/or published at least one paper in a peer-reviewed journal indexed in the Web of Science™ Core Collection with an impact factor in the first two quartiles (Q1 or Q2). Accepted and defended doctoral thesis.		
Required reading	**Title**	**Number of copies in the library**	**Availability via other media**
	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.		
Supplementary reading	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community. Presentation of the results of the entire research to the international research community through papers accepted for publication in a journal with international peer review, cited in the Web of Science™ Core Collection database with an impact factor in the first two quartiles (Q1 or Q2), and through papers presented at international conferences		
Other			

Description of extracurricular courses in the field of Civil Engineering, branch of Bearing Structures

<table>
<tr><td>COURSE TITLE</td><td colspan="5">MESHLESS NUMERICAL METHODS AND CORRESPONDING ADAPTIVE TECHNIQUES</td></tr>
<tr><td>Code</td><td>GAKA01</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus Blaž Gotovac, PhD
Professor Vedrana Kozulić, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Creating new knowledge about numerical modelling of engineering problems using meshless methods and establishing the possibilities of their application in research in the field of civil engineering and/or other relevant branches within the field of fundamental engineering sciences, as well as other scientific fields within engineering sciences, natural sciences, and other areas of science.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Graduate university studies</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">• Classify the types of known meshless numerical methods
• Analyse geometry of the concerned area and boundary conditions by meshless method of R functions
• Conduct analysis of engineering problems described by ordinary and partial differential equations by meshless methods
• Analyse engineering problems by applying adaptive collocation method
• Analyse stability and accuracy of adaptive meshless techniques</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Review of classical numerical methods from the aspect of selection of solutions` base functions (4 hours), Finite base functions from universal vector space from the aspect of practical use (6 hours), Influence of the geometry of the area on the required problem solution - idea of R-functions method (5 hours), Overview of adaptive techniques with the emphasis on the point collocation method and establishing numerical solutions with pre-set accuracy (5 hours), Non-linear and non-stationary analysis of structures by using adaptive technique (4 hours), Illustration of application of the adaptive procedure on simple examples, and the comparison of gained results with conventional solutions (6 hours).</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (other)</td></tr>
<tr><td>Student obligations</td><td colspan="5">Class attendance. Preparation of a seminar paper and oral presentation.</td></tr>
</table>

<table>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">The evaluation of students' work is carried out through the assessment of a seminar paper, which must be in the format of a scientific paper. Learning outcomes are verified through the oral presentation of the seminar paper.</td></tr>
<tr><td rowspan="5">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Atluri, S.N., ″Methods of Computer Modeling in Engineering & the Sciences″, Volume I, Tech Science Press, University of California, Irvine, 2005.</td><td>1</td><td></td></tr>
<tr><td colspan="3">Griebel, M. and Schweitzer, M.A. (Eds.), ″Meshfree Methods for Partial Differential Equations″, Springer-Verlag, Berlin, 2003.</td><td>1</td><td></td></tr>
<tr><td colspan="3">Liu, G.R., ″Mesh free methods : Moving beyond the Finite Element Method″, CRC Press LLC, Boca Raton, 2003.</td><td></td><td>yes</td></tr>
<tr><td colspan="3">Höllig, K. and Hörner, J., "Approximation and Modeling with B-Splines", SIAM, 2013.</td><td>1</td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">V.L. Rvačev, N.S. Sinekop (autori izvornog djela); Blaž Gotovac (prevoditelj i urednik hrvatskog prijevoda djela): Metoda R-funkcija u zadaćama teorije elastičnosti i plastičnosti, Sveučilište u Splitu, 2016.;
Gotovac B., Numeričko modeliranje inženjerskih problema pomoću glatkih finitnih funkcija, Disertacija, Fakultet građevinskih znanosti Sveučilišta u Zagrebu, Zagreb, 1986.
Kozulić V., Numeričko modeliranje metodom fragmenata pomoću Rbf funkcija, Disertacija, Građevinski fakultet, Sveučilište u Splitu, 1999.
Prenter P. M., Splines and Variational Methods, John Wiley & Sons, Inc., New York, 1989.
Chen, W., Fu, Z. J. and Chen, C. S., Recent Advances in Radial Basis Function Collocation Methods, Springer, 2014.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Course teacher.
Quality assurance and performance monitoring is also conducted by presenting seminar papers.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

COURSE TITLE	NUMERICAL MODELLING OF SHELL STRUCTURES							
Code	GAKA02	Year of the study programme	1st					
Course leader/s	Professor Vedrana Kozulić, PhD Professor Emeritus Blaž Gotovac, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives	Understanding the behaviour of shell structures under static loads. Acquiring knowledge on the numerical modelling procedures.							
Course enrolment requirements and entry competences required for the course	Graduate university studies							
Learning outcomes expected at the level of the course	• Independently create a numerical model of a building structure built of planar elements. • Properly describe arbitrary load, characteristics of material, boundary conditions at the border of a general form • Provide critical analysis of gained results in order to deliver proper engineering solutions. • Develop mathematical and numerical formulations for the purpose of modelling different shell structures.							
Course contents elaborated by class schedule	Plane stress and bending of thin plates as special cases of shell structure models. Membrane and shear locking and its illustration on the line curved girder. Relationship between axe symmetric problems and special types of rotational shell structures. Examples of shell structures with geometry described by elementary functions as plane, sphere, cylinder, cone, hyper etc. Shells with regular geometry in one direction. Review of the classical theory of shells. Shell structures of general shape (analysis by 8.-node finite elements developed from 20.-node space isoparametric finite element). Computer software: numerical simulation of mentioned phenomena and critical analysis of obtained results.							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☐ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (other)					
Student obligations	Preparation of a seminar paper and oral presentation.							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper					
	Mid-term exams		Oral exam	2.0				
	Written exam		Project					

<table>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="3">The evaluation of students' work is carried out through the assessment of a seminar paper, which must be in the format of a scientific paper. Learning outcomes are verified through the oral presentation of the seminar paper.</td></tr>
<tr><td rowspan="5">Required reading</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Bathe, K. J., Finite Element Procedures in Engineering Analysis, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1982.</td><td>1</td><td></td></tr>
<tr><td>Zienkiewicz O.C., Taylor R.L., The Finite Element Method, Vol. 2: Solid Mechanics, Fifth edition, Butterworth-Heinemann, Oxford, 2000.</td><td>1</td><td></td></tr>
<tr><td>Irons B., Ahmad S., Techniques of Finite Elements, Ellis Horwood Limited, Chichester, 1980.</td><td>1</td><td></td></tr>
<tr><td>Gotovac B., Kozulić V., Čolak I.: Uvod u numeričko modeliranje prostornih konstrukcija, Sveučilište u Mostaru, Mostar, 2001.</td><td>10</td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="3">Hou-Cheng Huang: Static and Dynamic Analysis of Plates and Shells: Theory, Software and Applications, Springer-Verlag, London, 1989.
Figueiras J.A. and Owen D.R.J.: Analysis of elasto-plastic and geometrically nonlinear anisotropic plates and shells, In: Finite element software for plates and shells, eds. E. Hinton, D. R. J. Owen, Swansea, pp. 235-322, 1984.
Hinton E. and Abdel Rahman H.H.: Mindlin plate finite elements, In: Finite element software for plates and shells, eds. E. Hinton, D. R. J. Owen, Swansea, pp. 157-229, 1984.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Course teacher.
Quality assurance and performance monitoring is also conducted by presenting seminar papers.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">NUMERICAL METHODS FOR THE MECHANICS OF MATERIALS</td></tr>
<tr><td>Code</td><td>GAKA03</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Mirela Galić, PhD</td><td>Credits (ECTS)</td><td colspan="4">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Professor Pavao Marović, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Introduce doctoral students to the concepts and current achievements in the field of mechanics of materials, teach the students how to choose the appropriate, most efficient numerical method for solving tasks in the mechanics of materials, and how to create computer software or sections of computer software for the mechanics of materials and calculations using the finite element method and the finite-discrete element method (see intended learning outcomes).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">Upon the completed course, the student will be able to:
formulate concepts and actual achievements in the area of the mechanics of materials,
select relevant numerical method at problem-solving in the area of the mechanics of materials,
create parts of computer software related to the mechanics of materials and calculations by the finite element method,
evaluate the results of numerical calculations in the area of the mechanics of materials,
suggest an appropriate numerical model depending on the type of material.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Parameters of the solid state body: strength, elasticity, viscosity, visco-elasticity, plasticity, thermoelasticity. Load, time, temperature. Mechanical properties of materials under impact and cyclic load. Strength of materials under complex stress. Static and dynamic load. Overview and introduction into different numerical methods for numerical approximation of the description of behaviour of different materials: orthotropic and anisotropic materials, concrete (macro and micro models), stone, steel, soil, elastomers (plastics, rubber), timber. Classical elasto-plastic and elasto-visco-plastic numerical models. Geometrical non-linearity of structures – finite deformations. Geometrical non-linearity of structures – large displacements. Total and update Lagrange method. Numerical modelling of time-dependent influences: creep, cyclic actions, dynamical actions. Numerical models of composite materials. Procedures for solving systems of non-linear algebraic equations: Newton-Raphson method, Modified Newton-Raphson method, quasi-Newton method, Arc-length method.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">■ lectures
■ seminars and workshops
■ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">■ independent assignments
☐ multimedia
■ laboratory
■ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td>Student obligations</td><td colspan="6">Attend all lectures. Conduct an analysis of current achievements related to the doctoral candidate’s research for the thesis. Prepare a seminar paper. Defend a seminar paper.</td></tr>
<tr><td rowspan="5">Monitoring student work:</td><td>Class attendance</td><td>1.0</td><td>Research</td><td>3.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">Approximate weighted average of the three activities: attending classes, seminar paper, oral exam.</td></tr>
<tr><td rowspan="3">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">(1) I. Alfirević: Uvod u tenzore i mehaniku kontinuuma, Golden marketing, Zagreb, 2003.</td><td>6</td><td colspan="2"></td></tr>
<tr><td colspan="3">(2) G.A. Holzapfel: Nonlinear Solid Mechanics – A Continuum Approach for Engineering, Wiley, Chichester, 2000</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(3) A. Munjiza; The combined Finite-Discrete Element Method, John Wiley and Sons, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Monitoring the attendance of all lectures and exercises. Discussions. Consultations during the preparation of a seminar paper. Oral presentation of a seminar paper. Oral exam.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="5">EXPERIMENTAL METHODS</td></tr>
<tr><td>Code</td><td>GAKA04</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Pavao Marović, PhD</td><td>Credits (ECTS)</td><td colspan="3">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Professor Mirela Galić, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introduce doctoral students to experimental methods they can use in their scientific research and enable the students to independently start conducting their own scientific research (see intended learning outcomes).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">Upon the completed course, the student will be able to:
devise an appropriate programme of testing structures, structural elements or structure models,
independently conduct experimental testing of the structure, structural element or structure model,
interpret testing results,
evaluate possible problem solutions,
critically analyse the rule of modelling and measurement,
discuss the selected model for experimental analysis of the structure, structural element or structure model.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">The importance of experimental analyses for the development of structures and calculation methods. Development of experimental methods assisted with micro-computers, micro-processors, automatics and telemetry – static and dynamic testing. Mechanical properties of materials. Strain and stress theory equations and the solid state body laws. Measurements, measurement techniques, metrology, measurement equipment and analysis of measurements. Model analysis of structures. Conditions of similarity. Modelling rules. Buckingham theorem. Materials for models. Procedures for determining deformation fields, strain fields, angles of rotation, deflections and curvatures. Implementation domain and accuracy of different measuring methods. Optic stress and optic strain methods for determining stress and strain fields. Plane photoelasticity. Space photoelasticity. Photo-plasticity, -viscoelasticity, -rheology. Dynamical photoelasticity. Methods of photoelastic coatings and brittle lacquers method. Moire method. Methods of analogy. Mathematical analogy. Electrical analogy (current and voltage). Implementation of mechanical waves, g- and x- rays in the stress state analysis.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">■ lectures
☐ seminars and workshops
■ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="2">☐ independent assignments
☐ multimedia
■ laboratory
■ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td>Student obligations</td><td colspan="6">Attend all lectures. Conduct appropriate experimental testing related to the doctoral candidate’s research for the thesis. Prepare a seminar paper. Defend a seminar paper.</td></tr>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td>3.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">Approximate weighted average of the three activities: attending classes, seminar paper, oral exam.</td></tr>
<tr><td rowspan="5">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">P. Marović, Eksperimentalne metode, Fakultet građevinarstva, arhitekture i geodezije Sveučilišta u Splitu, Split (authorised lectures ~ updated internal course reader in .ppxs format)</td><td>∞</td><td>∞</td></tr>
<tr><td colspan="3">D. Aničić, Ispitivanje konstrukcija, Građevinski fakultet Sveučilišta u Osijeku, Osijek, 2002.</td><td>1</td><td></td></tr>
<tr><td colspan="3">Mjerenje deformacija i analiza naprezanja, Autorizirana lectures, Ur. A. Kiričenko, DGITZ, Zagreb, 1982.</td><td>1</td><td>∞</td></tr>
<tr><td colspan="3">I. Alfirević, S. Jecić: Fotoelasticimetrija, Liber, Zagreb, 1983.</td><td>1</td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">J.F. Doyle: Modern Experimental Stress Analysis, Wiley, Chichester, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Monitoring the attendance of all lectures and exercises. Discussions. Consultations during the preparation of a seminar paper. Oral presentation of a seminar paper. Oral exam.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

COURSE TITLE	SELECTED CHAPTERS OF STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING					
Code	GAKA05	Year of the study programme	1st			
Course leader/s	Professor Emeritus A. Mihanović, PhD	Credits (ECTS)	6.0			
Associate teachers	Associate Professor H. Smoljanović, PhD	Type of instruction (number of hours per semester)	L	S	E	F
			15	15		
Status of the course	Extracurricular	Percentage of e-learning	50%			

COURSE DESCRIPTION						
Course objectives	Introduction to the latest global research in dynamics related to earthquake engineering and the corresponding methods.					
Course enrolment requirements and entry competences required for the course	None					
Learning outcomes expected at the level of the course	• Creating non-linear deterministic models of structures dynamic • Analysing earthquake resistance of structures by launching principle • Formulating models of direct response of structures to earthquake stimulation • Developing new meshless methods of time integration • Formulating stochastic models of structures dynamics • Modelling the interaction structure-soil in earthquake engineering					
Course contents elaborated by class schedule	Response of single-degree-of-freedom system and multiple-degree-of-freedom system by direct numerical integration. Accuracy and stability of solutions. Non-linear models a/b, steel and masonry structures under static and dynamic loading conditions. Numerical response in soil-structure interaction. Numerical response in the frequency domain. Response to random excitation by earthquake, wind, waves, and sea currents. Resonant response spectra.					
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☒ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)			
Student obligations	Class attendance, preparing a seminar paper and a project.					
Monitoring student work:	Class attendance	2.0	Research	1.0	Practical work	
	Experiments		Report			
	Essay		Seminar paper	1.0		
	Mid-term exams		Oral exam			
	Written exam		Project	2.0		
Assessment methods and evaluating student work in class and at the final exam	Oral discussions, assessment of a seminar paper, and especially project assessment. The course is delivered mostly as a workshop. No final exam.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Mihanović A., Dinamika konstrukcija 1990	50	
	Čaušević M., Dinamika konstrukcija 2005	5	
	Humar J.L., Dynamics of structures 1990	1	
	Chopra A.K., Dynamics of structures 2012	3	
	Booth E., and Key D., Earthquake design practice for building edition.	3	
	Various software solutions available for free use		yes
Supplementary reading	Articles from journals in the Faculty library. Articles from journals and proceedings available online. Books available online in the fields of earthquake engineering and structural dynamics.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Understanding course terminology through discussion. Degree of independence in preparing seminar papers and especially the degree of independence in project work.		
Other (as proposed by the institution)	Students' ability to write computer code independently.		

<table>
<tr><td>COURSE TITLE</td><td colspan="6">SELECTED CHAPTERS OF STABILITY OF STRUCTURES</td></tr>
<tr><td>Code</td><td>GAKA06</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus A. Mihanović, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Professor B. Trogrlić, PhD
Associate Professor H. Smoljanović, PhD
Associate Professor I. Balić, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>15</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4">50%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Identifying and formulating problems related to the stability of structures and solving these problems using modern numerical methods.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">• Modelling the problems of bending, shear and torsion stability on spatial framework structures using Kinetic Energy method.
• Creating global stability systems.
• Creating numerical models of material and geometrically non-linear load capacity and stability of spatial linear structures.
• Creating numerical models of load capacity and stability of plates and shells by the theory of small and large displacements.
• Modelling stability problems using FEM – DEM approach.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Unified numerical model for bending, shear, and torsion stability of line elements using the KE method. Global stability model, both materially linear and nonlinear, for spatial line structures. Specifics of cable structures. Stability of arches. Stability of plates and shells. Post-critical behaviour of plate and shell structures. Numerical modelling of stability using the virtual FEM-DEM approach.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☒ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Class attendance, preparing a seminar paper and a project</td></tr>
<tr><td rowspan="6">Monitoring student work:</td><td>Class attendance</td><td>2.0</td><td>Research</td><td>1.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>1.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>2.0</td><td></td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Assessment methods and evaluating student</td><td colspan="6">Oral discussions, assessment of a seminar paper, and especially project assessment.
The course is delivered mostly as a workshop. No final exam.</td></tr>
</table>

<table>
<tr><td>work in class and at the final exam</td><td colspan="3"></td></tr>
<tr><td rowspan="5">Required reading (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Mihanović A., Stabilnost konstrukcija 1993</td><td>50</td><td></td></tr>
<tr><td>Bažant Z.P. and Cedolin L., Stability of structures 2003</td><td>2</td><td></td></tr>
<tr><td>Munjiza A. The combined Finite-Discrete element method 2004.</td><td>5</td><td></td></tr>
<tr><td>Various software solutions available for free use</td><td></td><td>yes</td></tr>
<tr><td>Supplementary reading</td><td colspan="3">Doctoral thesis produced at the Faculty
Articles from journals in the Faculty library.
Articles from journals and proceedings available online.
Books in the fields of earthquake engineering and structural dynamics.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Understanding course terminology through discussion. Degree of independence in preparing seminar papers and especially the degree of independence in project work.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3">Students’ ability to write computer code independently.</td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">FINITE ELEMENT METHOD</td></tr>
<tr><td>Code</td><td>GAKA07</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Željana Nikolić, PhD</td><td>Credits (ECTS)</td><td colspan="4">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>20</td><td>10</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Mastering the mathematical and numerical formulations which are the foundation of the finite element method. Understanding the types of finite elements and basis functions, their applications, and limitations in the numerical solution of continuum problems in engineering tasks. Understanding the basic numerical procedures and the structure of computer software based on the finite element method.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">Upon the completed course, the student will be able to:
develop mathematical and numerical formulations for the purpose of numerical solving of different engineering tasks by finite element method;
independently create computer software using finite element method;
independently evaluate the accuracy of numerical models;
critically review the applicability of the used numerical model in the analysis of the presented task,
between several variants of solutions, select and recommend the appropriate numerical formulation and model for the solution of the given problem and provide arguments for their position.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">System discretisation. Direct approach to solving structural mechanics problems. Generalisation of the finite element concepts. Variation formulation of finite element method. Finite elements for one-dimensional analysis, two-dimensional, axe symmetric, and three-dimensional analysis. Standard and hierarchical base functions. Finite element mapping and numerical integration. Pach test, reduced integration and non-conforming elements. Infinite elements. Mixed formulations. Error estimates and convergence of numerical procedures. Adaptive techniques: h, p, hp approach. Finite element method in time dependent problems. Coupled problems: fluid-structure and soil-structure interaction. Basic numerical procedures in engineering tasks analysis using the finite element method.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☒ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td rowspan="3">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td>1.0</td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>Mid-term exams</td><td></td><td>Oral exam</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">After completing the classes, students conduct research on a given topic and prepare a seminar paper, to be defended orally. The seminar paper and its defence account for 50% of the total points. The oral exam is conducted after the seminar paper defence and accounts for 50% of the total points.</td></tr>
<tr><td rowspan="3">Required reading</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">O. C. Zienkiewicz, R. L. Taylor, J.Z. Zhu: The Finite Element Method, Vol. 1: Its Basis & Fundamentals, 6th edition, Elsevier Butterworth-Heinemann, Oxford, 2006.</td><td></td><td></td></tr>
<tr><td colspan="3">V. Jović: Uvod u inženjersko numeričko modeliranje, Aquarius engineering Split, 1993</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">R. D. Cook, D. S. Malkus, M. E. Plesha: Concepts and Applications of Finite Element Analysis, 3th edition, John Wiley & Sons, 1989.
M. A. Crisfield: Finite Elements and Solution Procedures for Structural Analysis, Vol I: Linear Analysis, Pineridge Press, Swansea, U.K., 1986.
O. C. Zienkiewicz, K. Morgan: Finite Elements and Approximations, John Wiley Sons, 1983.
E. Hinton, D. R. J. Owen: An Introduction to Finite Element Computations, Pineridge Press, Swansea, U.K., 1979.
J. Sorić: Metoda konačnih elemenata, Golden marketing – Tehnička knjiga Zagreb, 2004.
J. Brnić, M. Čanađija: Analiza deformabilnih tijela metodom konačnih elemenata: Fintrade, Tours d.o.o. Rijeka, 2009.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">University; Faculty, i.e. the Teaching Quality Assurance Commission; Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">EXTREME LOADS AND STRUCTURE SAFETY</td></tr>
<tr><td>Code</td><td>GAKA08</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Ivica Boko, PhD
Associate Professor Neno Torić, PhD
Professor Emeritus Bernardin Peroš, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Education of doctoral candidates in the field of structural reliability analysis and related calculation principles in the case of extreme loads on structures.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">Upon the completed course, the student will be able to:
anticipate the statistical model of extreme loads,
compare first and second-order reliability methods,
assess structural reliability index during extreme loads,
evaluate the probability analysis for the calibration of existing structures,
determine the level of structural safety from the aspect of durability of structures,
anticipate and self-evaluate the analysis of structure life.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Relevance of the course. Main concepts on the reliability and stability of structures. Base variables of actions on structure and structural resilience. Probability of failure of load capacity, reliability index. Analysis of extreme loads on the structures – application of modern methods for finding the optimal functions for the distribution of specific actions.
Probability models for the structure response in cases of extreme loads. Reliability model for random variables, random process and random field/domain.
The calibration procedure for complex structures considering reliability during the structure exploitation.
Non-linear methods in the computational procedure for structure reliability – interaction between the stochastic and mechanic models.
Analysis of the safety/stability degree of complex structures of the offshore type, bridges, etc. by applying the aforementioned models.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6"></td></tr>
<tr><td></td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
</table>

Monitoring student work:	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, seminar paper.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Milčić V., Peroš B.: Uvod u teoriju sigurnosti nosivih konstrukcija, Građevinski fakultet Split, 2003.	5	
	Peroš B., Boko I.: Sigurnost konstrukcija u požaru, Sveučilište u Splitu Fakultet građevinarstva, arhitekture i geodezije, Split, 2014.	5	
	Sheldon M. Ross: Introduction to probability and statistics for engineers and scientists, University of California at Berkeley, 1997.	1	
Supplementary reading	(1) Schueler, Shinozuka: Structural Safety and Reliability, Proc. Icossar, Vol 1,2,3, Innsbruck, 1993.; (2) Kiureghain L.:Structural component Reliability and Finite element, Reliability Methods, Lecture Note for "Structural Reliability - Methods and Applications", University of California at Berkeley, 1989.; (3) Structural reliability analysis program system (STRUREL).		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

COURSE TITLE	STEEL AND COMPOSITE STRUCTURES							
Code	GAKA09		Year of the study programme	1st				
Course leader/s	Professor Ivica Boko, PhD Associate Professor Neno Torić, PhD Professor Emeritus Bernardin Peroš, PhD		Credits (ECTS)	6.0				
Associate teachers			Type of instruction (number of hours per semester)	L	S	E	F	
				30				
Status of the course	Extracurricular		Percentage of e-learning					
COURSE DESCRIPTION								
Course objectives	Education of doctoral candidates in the field of advanced analysis of steel and composite structures in the event of material fatigue or fire.							
Course enrolment requirements and entry competences required for the course	None.							
Learning outcomes expected at the level of the course	Upon the completed course, the student will be able to: • determine the load capacity of steel and composite elements and systems by the first and second-order theory, • evaluate the joint calculation methods, • assess the load capacity of steel, composite elements and systems in the event of fire, • assess the load capacity of steel, composite elements and systems from the aspect of material fatigue.							
Course contents elaborated by class schedule	Elastic and plastic analysis in the computation of steel and composite structures. Frame systems – classification of global imperfection, length of element torsion, joints. Application of elastic and plastic methods in the computation of frame systems. Full-side tin supporter – problem of slab/plates stability. Composite structures of the steel – concrete type, analysis of elements in supporting systems. Problem of spatial steel systems and systems with tensile supporting structures. Application of high-quality steels for supporting steel systems and extreme spans (bridges, stadiums, halls, etc.).							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☒ laboratory ☐ mentoring ☐ (add other)					
Student obligations								
Monitoring student work:	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam					

	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, seminar paper.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Androić B., Dujmović D., Džeba I.: Čelične konstrukcije 1, IA projektiranje, Zagreb, 2009.	1	
	Androić B., Dujmović D., Lukačević I.: Projektiranje spregnutih konstrukcija prema Eurocode 4, IA projektiranje, Zagreb, 2012.	1	
	Androić B., Čaušević M., Dujmović D., Džeba I., Markulak D., Peroš B.: Čelični i spregnuti mostovi, IA projektiranje, Zagreb, 2005.	1	
	R. Englekirk: Steel structures, John Wiley & Sons, Inc., New York, 1994.	1	
	Peroš B., Boko I.: Sigurnost konstrukcija u požaru, Sveučilište u Splitu Fakultet građevinarstva, arhitekture i geodezije, Split, 2014.	5	
Supplementary reading	(1) Knowles, P.R.: Composite Steel and Concrete Construction, Butterworks, London, 1973.; (2) Johnson, R. P. and Buckly, R. P.: Composite structures of Steel and Concrete, Volume 2, Bridges, Second Edition, 1986.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="5">NUMERICAL MODELLING OF CONCRETE STRUCTURES</td></tr>
<tr><td>Code</td><td>GAKA10</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Jure Radnić, PhD
Professor Alen Harapin, PhD
Professor Domagoj Matešan, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Assistant Professor Nikola Grgić, PhD
Assistant Professor Marija Smilović-Zulim, PhD
Marina Sunara-Kusić, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introduction to advanced techniques of nonlinear modelling of the behaviour of reinforced concrete and/or composite structures under static, dynamic, and impact loads.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Bachelor’s degree (Level 6 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
select the appropriate numerical model of behaviour of concrete and/or composite structures under static, dynamic and impact load, critical assessment of results and substantiate them with arguments;
select the appropriate numerical model for the description of geometrically and materially non-linear behaviour of concrete and/or composite structures and elaborate this selection;
create the model for dimensioning o composite cross sections, evaluation of model potentials and critical assessment of results;
select the model for the calculation of width of cracks and deflections/displacements of concrete elements, compare the results with other numerical models and experiments and perform critical selection of the most reliable model;
propose the proper model for the inclusion of rheological effects (creep/shrinkage/wear) into the numerical model for the description of behaviour of concrete elements and structures.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Behaviour and modelling of concrete under uniaxial, biaxial and triaxial states of stress, and static, dynamic, and impact load
Behaviour and modelling of steel under static, cyclic, and dynamic load. Numerical modelling of unreinforced, conventionally reinforced, and prestressed concrete structures under static, dynamic, and long-term load, including the most important nonlinear effects of concrete (compression softening, cracking in tension, tensile and shear stiffness of cracked concrete, opening and closing of cracks, the effect of load rate on the mechanical properties of concrete, creep, shrinkage, and wear of concrete), conventional reinforcement (compression and tension softening, the effect of deformation rate on the mechanical properties of steel) and cables (nonlinear behaviour of steel, prestress force losses): beam structures, planar (2D) structures, plates and shells, membranes, spatial (3D) structures.
Numerical modelling of composite planar (2D) structures under static, dynamic, and long-term load, including the most important nonlinear effects of concrete and reinforcement. Some problems and dilemmas in</td></tr>
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<table>
<tr><td></td><td colspan="6">conducting static, dynamic, and time-dependent numerical analyses of structures.
• Design of composite concrete sections of arbitrary shape under shear bending, including the effects of concrete creep and shrinkage.
• Numerical modelling of width of cracks in composite concrete elements of arbitrary cross-sectional shape, including concrete creep and shrinkage.
• Modelling the dynamic interaction of concrete structures and fluids, including the most important nonlinear effects of concrete and reinforcement, as well as cavitation in water: planar (2D) structures, shells, spatial (3D) structures.
• Some computational aspects of numerical analysis of individual and related fields/domains.
• Some problems and dilemmas in the analysis of practical engineering structures. Unresolved research problems.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attending lectures and preparing a seminar paper in the selected area of research, presenting a seminar paper to the course teacher.</td></tr>
<tr><td rowspan="6">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">The learning outcomes and acquired competencies are assessed by grading the presented seminar paper, which showcases the results of research on the chosen topic.</td></tr>
<tr><td rowspan="4">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">J. Radnić, A. Harapin,D. Matešan: „Betonske ploče i ljuske“, 2006.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radnić, D. Ćubela, A. Harapin; „Modeliranje ravninskih spregnutih konstrukcija“, 2006.</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radnić, L. Markota, A. Harapin; „Raspucavanje betona – numeričko modeliranje“, 2005</td><td></td><td colspan="2"></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor.
Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="5">DESIGN OF SUPPORTING SYSTEMS OF BRIDGES AND STRUCTURES</td></tr>
<tr><td>Code</td><td>GAKA11</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Jure Radnić, PhD
Professor Alen Harapin, PhD
Professor Domagoj Matešan, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Assistant Professor Nikola Grgić, PhD
Assistant Professor Marija Smilović-Zulim, PhD
Marina Sunara-Kusić, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introduction to advanced techniques for designing supporting systems of bridges and other engineering structures.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Bachelor’s degree (Level 6 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
critically assess and evaluate the creation of simple and complex structural supporting bridge systems,
critically assess and evaluate the creation of complex structural supporting building systems,
critically assess and evaluate the creation of earthquake-resistant structural supporting systems,
critically assess and evaluate the creation of complex cable stay supporting systems.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Materials and appropriate supporting structures.
Main supporting systems for bridges: slab, beam, frame, truss, arch, suspension, cable-stayed, prestressed strips, composite.
Bridges with complex structures: arch with deck below and suspended girder, arch with lowered deck and suspended girder, arch with deck above and suspended girder, suspension and cable-stayed bridge, arch and prestressed strip, prestressed strip arch lowering, etc.
Girder bridges with prefabricated concrete beams for extreme spans.
Supporting systems of bridges for extreme spans.
Submersible bridges.
Design of supporting systems with seismic resistance.
Beam girders externally reinforced with cables.
Tensile supporting structures: cables, membranes, arch lowering, and mixed tensile structures.
Experimental verification of seismic resistance of new supporting systems.
Main supporting building systems.
Designing seismically resistant building structures.
New high-quality materials for new supporting systems and extreme spans.
Unresolved research problems..</td></tr>
</table>

<table>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attending lectures and preparing a seminar paper in the selected area of research, presenting a seminar paper to the course teacher.</td></tr>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">The learning outcomes and acquired competencies are assessed by grading the presented seminar paper, which showcases the results of research on the chosen topic.</td></tr>
<tr><td rowspan="8">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">Androić Boris i suradnici: „Čelični i spregnuti mostovi“, 2006</td><td></td><td></td></tr>
<tr><td colspan="3">M.J.Ryall, G.A.R. Parke i J.E.Harding: „Manual of bridge engineering“, 2002.</td><td></td><td></td></tr>
<tr><td colspan="3">D. Horvatić,Z. Šavor: „Metalni mostovi“, 1998.;</td><td></td><td></td></tr>
<tr><td colspan="3">Jiri Strasky: „Stress ribbon and cable-supported pedestrian bridges“, 2005.;</td><td></td><td></td></tr>
<tr><td colspan="3">Rene Walther et al.: „Cable stayed bridges“, 1988</td><td></td><td></td></tr>
<tr><td colspan="3">C.Melbourne; „Arch bridges“, 1995</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor.
Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

COURSE TITLE	MECHANICS OF DISCONTINUA							
Code	GAKA12	Year of the study programme	1st					
Course leader/s	Professor Ante Munjiza, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives	Introduction to modern techniques in mechanics and physics of discontinua; including molecular dynamics, the discrete element method, and the combined finite-discrete element method, along with their applications.							
Course enrolment requirements and entry competences required for the course	Bachelor's degree (Level 6 EQF or CroQF)							
Learning outcomes expected at the level of the course	The student will be able to: • evaluate the effect of discontinua on a simulated problem • formulate the processes of discontinua • create problem simulations with pronounced discontinua effects • evaluate search methods and contact interactions in the processes of discontinua.							
Course contents elaborated by class schedule	Introduction to Discontinuous Media: Discontinuities at the molecular level, nanomaterials and mechanics of discontinua, granular materials as a separate state of matter, concrete as a discontinuum, discontinuum in military engineering, discontinuum in astrophysics. Discontinuum Processes: Molecular processes, meso-scale processes, contact, fluid, fracture, fragmentation, progressive demolition of high-rise structures, explosions, impacts, blasting, granular flow. Discontinuum Simulations: Monte Carlo, molecular dynamics methods, discrete element methods, combined finite-discrete element method, generalization of discontinuous simulations, and APS simulations. Numerical Techniques: ADT, NBS, MR spatial searches; distributed potential contacts, rock joints, fragmentation, solvers, diagnostic methods, and searches for emergent properties. Applications: Concrete, military engineering, engineering processes, fracture and failure of structures, progressive collapse of structures.							
Format of instruction:	☒ lectures ☐ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☐ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Attending lectures and preparing a seminar paper related to the published scientific paper, selected by a student.							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report					
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam	3.0				

	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	The learning outcomes and acquired competencies are assessed by grading the presented seminar paper, which showcases the results of research and/or overview of the selected research area.					
Required reading (available in the library and via other media)	**Title**				**Number of copies in the library**	**Availability via other media**
	A.Munjiza, The Combined Finite-Discrete Element Method, textbook, Wiley&Sons, London 2004.,					
	A.Munjiza, Computational mechanics of discontinua, textbook, Wiley&Sons, London 2008.					
	Y-FDEM software package					
	A.Munjiza, Large strain finite element method, textbook, Wiley&Sons, London 2015.;					
Supplementary reading	Several papers published in international journals, as selected by a doctoral candidate.					
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.					
Other (as proposed by the institution)						

<table>
<tr><td>COURSE TITLE</td><td colspan="6">NUMERICAL MODELLING OF WATER-SOIL-STRUCTURE DYNAMIC INTERACTION</td></tr>
<tr><td>Code</td><td>GAKA13</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Jure Radnić, PhD
Professor Alen Harapin, PhD
Professor Domagoj Matešan, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marina Sunara-Kusić, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Introduction to the basics of modelling the dynamic interaction between structures and fluids.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Bachelor’s degree (Level 6 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
assess the need to use the model for modelling dynamic interaction between concrete structures and fluid in real structures;
properly/critically select the numerical model for modelling dynamic interaction between concrete structures and fluids;
assess and evaluate gained results with several models, and the assessment of relevance of specific data;
prepare, conduct critical discussion and evaluation of the model of real structure by using the existing numerical model for the simulation of dynamic water-soil- structure interaction.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Methods for solving coupled field problems. Fluid modelling. Structural modelling. Modelling fluid-structure interaction with linear and nonlinear models for fluid and structure. Simulation models of fluid-structure interaction in concrete structures (planar problems, shells, spatial problems) with a special model for simulating reinforced concrete. Some computational aspects of performing numerical analysis of single and coupled fields: spatial and temporal discretization, eigenvalue problem, solutions to nonlinear problems, modelling of mass, stiffness, and damping, numerical integration, boundary problems, nonlinear material behaviour, etc.
Experimental research on fluid-structure dynamic interaction problems.
Unresolved research problems.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attending lectures and preparing a seminar paper in the selected area of research, presenting a seminar paper to the course teacher.</td></tr>
<tr><td></td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
</table>

Monitoring student work	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	The learning outcomes and acquired competencies are assessed by grading the presented seminar paper, which showcases the results of research of the selected topic.					

	Title	**Number of copies in the library**	**Availability via other media**
Required reading (available in the library and via other media)	Selected articles from the field of numerical modelling of water-soil-structure dynamic interaction		
	J. Radnić: „Modeliranje interakcije fluida i konstrukcije“, doktorska disertacija, 1987.		
	A. Harapin: „Numerička simulacija dinamičkog međudjelovanja tekućine i konstrukcije“, doktorska disertacija, 2000.		
	M. Sunara-Kusić: „Numeričko modeliranje međudjelovanja konstrukcije i tekućine kombinacijom metode konačnih elemenata i hidrodinamike izglađenih čestica“, doktorska disertacija, 2017.		
Supplementary reading	Depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="6">SELECTED CHAPTERS OF CONCRETE AND MASONRY STRUCTURES</td></tr>
<tr><td>Code</td><td>GAKA14</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Jure Radnić, PhD
Professor Alen Harapin, PhD
Professor Domagoj Matešan, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Assistant Professor Nikola Grgić, PhD
Assistant Professor Marija Smilović-Zulim, PhD</td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Introduction to advanced techniques for designing concrete and masonry structures</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Bachelor’s degree (Level 6 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
select the model for calculation and evaluation of results for complex strain states in simple and complex concrete elements/cross sections;
select the model for the analysis of cracks and deflections/displacements, and the calculation of width of cracks and deflections for simple and complex concrete elements,
create, critically discuss and evaluate the manner of installing reinforced concrete in complex concrete structures,
create, critically discuss and evaluate the selected solution of the complex rc/pre-stressed concrete element/structure;
create, critically discuss and evaluate the manner of installing reinforced concrete in complex concrete structures,
create, critically discuss and evaluate the manner of installing cables in complex pre-stressed structures,
select the constructive solution and selection/composition of the model and calculation of high-rise building,
select the constructive solution and selection/composition of the model and calculation of complex masonry structure.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">CONCRETE STRUCTURES (1) General Information on Materials: standard concrete, high-strength concrete, and special concretes. Impact and calculation of rheological effects of concrete: creep, shrinkage, and aging. Calculations of width of cracks in complex sections and elements. Calculations of deflections in concrete elements. Design of slender compression elements. Design of sections under combined bending, shear, and torsion. (2) Design and Calculation of Complex Reinforced Concrete Structures: Frame structures, structures with concrete walls, mixed structures of concrete walls and frames, truss structures, wall (deep beam) girders, arch girders, slabs, shells, foundation structures, prefabricated structures, composite structures. Design of reinforcement (conventional and prestressed). (3) Design and Calculation of Complex Prestressed Concrete Structures. (4) Specific Concrete Structures: Large concrete bridges, high-rise buildings, silos, bunkers, suspended structures, concrete dams. (5)</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Design and Calculation of Seismically Resistant Structures. (6) Review of Current Standards for Concrete Structures.
• MASONRY STRUCTURES (1) General Information on Materials: Masonry blocks, masonry mortar, binders, additives. (2) Design of Masonry Structures: Unreinforced, reinforced, and confined masonry. (3) Specifics of Stone Masonry Buildings. (4) Impact of Floor Structures on the Load-Bearing Capacity and Safety of Masonry Buildings. (5) Calculation of Masonry Structures: Simplified and complex calculation models. (6) Design and Calculation of Seismically Resistant Masonry Structures. (7) Restoration and Strengthening of Masonry Structures. (8) Review of Current Standards for Masonry Structures.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Attending lectures and preparing a seminar paper in the selected area of research, presenting a seminar paper to the course teacher.</td></tr>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td>(add other)</td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td>(add other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(add other)</td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">The learning outcomes and acquired competencies are assessed by grading the presented seminar paper, which showcases the results of research of the selected topic.</td></tr>
<tr><td rowspan="8">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">I. Tomičić: „Betonske konstrukcije“,</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radić i suradnici: „ Betonske konstrukcije“, knjige 1,2,3;</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radnić, A. Harapin, D. Matešan: „Betonske ploče i ljuske“,</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radić i suradnici: „Zidane konstrukcije I“,</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Z. Sorić: „Zidane konstrukcije 1“</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radnić, A. Harapin: „Osnove betonskih konstrukcija“, interna skripta;</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">J. Radnić, A. Harapin: „Mostovi“, interna skripta</td><td></td><td colspan="2"></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(1) J. Radnić, D. Ćubela, A. Harapin: „Modeliranje ravninskih spregnutih konstrukcija“, 2006.; (2) J. Radnić, L. Markota, A. Harapin: „ Raspucavanje betona – numeričko modeliranje“ 2005.; (3) Supplementary reading depending on the topic of the research/doctoral thesis in line with the supervisor`s guidelines.</td></tr>
</table>

Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor. Quality assurance and performance monitoring is also conducted by presenting seminar papers and research/doctoral thesis topics to the academic community.
Other (as proposed by the institution)	

Description of extracurricular courses in the field of Civil Engineering, branch of Hydrotechnics

<table>
<tr><td>COURSE TITLE</td><td colspan="5">DISPERSION PROCESSES IN WATER RESOURCES</td></tr>
<tr><td>Code</td><td>GAHA01</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Roko Andričević, PhD
Professor Hrvoje Gotovac, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>30</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3">30%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introduction to the dispersion processes in rivers, lakes, groundwater, and coastal areas. Defining the basic physical processes involved in dispersion and introducing the fundamentals of modelling (numerical and analytical) transport processes as well as monitoring programs. Introduction to the stochastic description of processes due to the inherent variability of processes. The goal is particularly to inform the students about other chemical and reactive processes that may occur during the transport of various substances in the environmental medium. Demonstrating the application of dispersion theory to real-world problems in water resources and how the results can be used to meet the requirements of EU water directives.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Thorough knowledge of probability and statistics</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">• Mastering the fundamental physical processes of substance transport through the environmental medium.
• Understanding the stochastic description of dispersion process variables.
• Understanding the application of available numerical software.
• Mastering basic analytical transport techniques.
• Applying dispersion processes to practical problems in water resources.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Defining the concept of dispersion as a process of spreading in environmental media. Introduction to the fundamental physical processes involved in the transport of various substances in water resources. Introduction to the Lagrangian and Eulerian concepts of transport. Basics of stochastic modelling and uncertainty analysis in transport. Specifics of transport in groundwater and dual-porosity media. Basics of numerical modelling of transport and introduction to basic open-source software. Introduction to analytical modelling of transport processes and their application in real-world water resource problems. Basics of ecological monitoring as a foundation for verifying modelling approaches. Application of learned methods in risk assessment and implementation of core EU water directives.</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring</td></tr>
</table>

	☐ field classes			☐ (add other)		
Student obligations	Regular class attendance and preparing a seminar paper					
Monitoring student work	Class attendance	2.0	Research	2.0	Practical work	
	Experiments		Report		(add other)	
	Essay		Seminar paper	2.0	(add other)	
	Mid-term exams		Oral exam		(add other)	
	Written exam		Project		(add other)	
Assessment methods and evaluating student work in class and at the final exam	Interaction during lectures and preparing a seminar paper					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Andričević, R., Galešić, M. **Contaminant dilution measure for the solute transport in an estuary**. *Advances in Water Resources*, 117, 2018.		
	Galešić, M.; Andričević, R.; Gotovac, H.; Srzić, V.**Concentration statistics of solute transport for the near field zone of an estuary.** *Advances in Water Resources.* 94, 424-440, 2016		
	Gotovac, H.; Cvetković, V.; Andričević, R. **Significance of higher moments for complete characterization of the travel time probability density function in heterogeneous porous media using the maximum entropy principle.** *Water Resources Research*. 46, 2010.		
	Andričević, Roko. **Exposure concentration statistics in the subsurface transport.** *Advances in Water Resources*. 31 (2008) , 4; 714-725.		
	Andričević, R. **Effects of local dispersion and sampling volume on the evolution of concentration fluctuations in aquifers**. *Water Resources Research*. 34 (1998) , 5; 1115-1129.		
	Hassan, A.E.; Andricevic, R.; Cvetkovic, V. **Evaluation of analytical solute discharge moments using numerical modeling in absolute and relative dispersion frameworks.** *Water Resources Research*. 38 (2002) , 2; 1-8.		
	Zhang, D.X., Andričević, R, Sun, A.Y. **Solute flux approach to transport through spatially nonstationary flow in porous media**. *Water Resources Research*. 36 (2000), 8; 2107-2120.		
	Zheng, C. And Bennet, G.D., **Applied Contaminant transport Modeling**, John Wiley & Sons, 2002.		
Supplementary reading	None		

Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.
Other (as proposed by the institution)	None

COURSE TITLE	THEORY OF RISK ASSESSMENT IN ENVIRONMENTAL ENGINEERING							
Code	GAHA02	Year of the study programme	1st					
Course leader/s	Professor Roko Andričević, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30	30				
Status of the course	Extracurricular	Percentage of e-learning	20%					
COURSE DESCRIPTION								
Course objectives	This course introduces students to the fundamental principles and methodologies in environmental risk analysis and the techniques of environmental risk modelling in practical applications. The primary objective is to introduce students to the risk management strategies and decision-making processes for the development of environmental infrastructure. Currently, both Croatian regulations and EU directives mandate risk analysis and risk assessment as essential indicators for the approval of various projects and environmental interventions.							
Course enrolment requirements and entry competences required for the course	None							
Learning outcomes expected at the level of the course	• Analyse and assess environmental risk • Apply environmental risk modelling techniques to practical problems • Master techniques for uncertainty assessment • Propose decisions related to risk management							
Course contents elaborated by class schedule	Defining the concept of environmental risk. Hydrological risk analysis, quantification of risk exceeding threshold values; Stochastic approach to risk analysis: Hazard identification, physical/chemical properties, and routes of exposure to potential environmental contamination. Special attention is given to exposure assessment, which includes: characterization of potential contamination sources, transport processes of contaminants through various media (water, soil, air), modelling the amount of contamination at control locations, and uncertainty assessment. Characteristic features of risk and risk management decisions based on existing regulations. Incorporating social and economic aspects into risk management strategies.							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☐ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Regular class attendance and preparing a seminar paper							
Monitoring student work	Class attendance	2.0	Research	2.0	Practical work			
	Experiments		Report		(add other)			
	Essay		Seminar paper	2.0	(add other)			
	Mid-term exams		Oral exam		(add other)			

	Written exam		Project		(add other)	
Assessment methods and evaluating student work in class and at the final exam	Interaction during lectures and preparing a seminar paper					
Required reading (available in the library and via other media)	**Title**			**Number of copies in the library**	**Availability via other media**	
	Andričević, R., Galešić, M.,Contaminant dilution measure for the solute transport in an estuary. **Advances in Water Resources**, 117, 2018.				X	
	Galešić, M.; Andričević, R.; Gotovac, H.; Srzić, V., Concentration statistics of solute transport for the near field zone of an estuary. **Advances in Water Resources**. 94, 424-440, 2016.				X	
	Andričević, R.; Srzić, V.; Gotovac, H., Risk characterization for toxic chemicals transported in aquifers. Advances in Water Resources. 36 (2012) ; 86-97.				X	
	Andričević, R. And Cvetkovic, V. Evaluation of Risk from Contaminants Migrating by Groundwater, Water Resources Research, 32(3), 1996.				X	
	Andričević, R., Daniels, J., Jacobson, R., Radionuclide migration using travel time transport approach and its application in risk analysis, J. of Hydrology, 163, 1994.				X	
	Ganoulis, J, Risk Analysis of Water Pollution, Wiley-VCH Verlag GmbH & Co., 2009.				X	
	Fishoff, B., et.al., Acceptable Risk, Cambridge University Press, New York, 1981.				X	
	ECOFRAM Terrestrial Draft Report, US EPA 1999.				X	
Supplementary reading	None					
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.					
Other (as proposed by the institution)	None					

COURSE TITLE	KARST WATER RESOURCES								
Code	GAHA03		Year of the study programme	1st					
Course leader/s	Professor Emeritus Ognjen Bonacci, PhD		Credits (ECTS)	6.0					
Associate teachers			Type of instruction (number of hours per semester)	L	S	E	F		
				30					
Status of the course	Extracurricular		Percentage of e-learning						
COURSE DESCRIPTION									
Course objectives	Studying the specific processes of water circulation and storage in karst areas for the purpose of proposing and designing optimal water resources protection measures.								
Course enrolment requirements and entry competences required for the course	None								
Learning outcomes expected at the level of the course	The student will be able to: • synthesise the specificity of karst area for the purpose of proposing and designing water resources protection measures, • formulate models for assessment of the status of karts water resources • predict the effects of impacts on karst water resources, • connect and improve various offered solutions to numerous practical and theoretical problems related to karst water management.								
Course contents elaborated by class schedule	Definition of karst. Soluble karst-forming rocks, closed protrusions on the surface of the rocks, water circulation in karst, karst springs, rifts, open water streams in karst, water in karst coastal areas, karst fields and their water balance, karst aquifer.								
Format of instruction:	☒ lectures ☐ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☒ field classes			☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Class attendance, preparing a seminar paper								
Monitoring student work	Class attendance	1.0	Research		Practical work				
	Experiments		Report		Independent work	3.0			
	Essay		Seminar paper	2.0					
	Mid-term exams		Oral exam						
	Written exam		Project						
Assessment methods and evaluating student work in class and at the final exam	Oral exam, oral presentation of a seminar paper.								
Required reading (available in the	**Title**						**Number of copies in the library**	**Availability via other media**	

library and via other media)	O. Bonacci, Karst hydrology, Springer Verlag, Berlin 1987.	20	
	O. Bonacci, Posebnosti krških vodonosnika, Građevinski godišnjak ¾, Zagreb, 2004: 91-187.	5	
	D. Ford, P. Williams, Karst geomorphology and hydrology, J. Willy, 2007	1	
Supplementary reading	J. Gunn (Ed.), Encyclopedia of caves and karst science, Fitzroy Dearborn, New York, 2006.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="6">ECOHYDROLOGY</td></tr>
<tr><td>Code</td><td>GAHA04</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus Ognjen Bonacci, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Interdisciplinary understanding and treatment of water resources as hydrological and ecological systems with the aim of sustainable management.
Understanding the dynamics of river flow as the lifeblood of the river basin and landscape as essential prerequisites for managing the entire system.
Addressing flood issues as an interdisciplinary problem.
More effective protection of karst ecosystems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
connect the basic principles of ecology and hydrology in solving various engineering problems in ecohydrology,
formulate the main interaction relationship between the eco-system and hydrological cycle and anticipate the resilience of systems to anthropogenic influences and other impacts,
manage regulatory relationship between hydrological and ecological processes based on the integral systematic approach (integral basin management)
anticipate water availability in the future and the level of generated stress on the living environment in the event of water shortage.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Relationship between hydrology and ecology Concept of sustainable development. Definition of ecohydrology. Elements of hydrology and water resources essential for ecology. Hydrological systems and processes. Influence of global climate change on hydrological cycle. Floods, flooded and damp areas. Aridness, drought, scant rainfall areas. Open watercourses as part of eco-system. Open watercourses management. Environmental requirements for watercourses. Principles and problems in determining environmental flows. Methods of determining environmental flows.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☒ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Class attendance, preparing a seminar paper</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
</table>

	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, oral presentation of a seminar paper.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	O. Bonacci: Ekohidrologija, Faculty of Civil Engineering Split, 2003.	20	
	O. Bonacci: Oborine-glavna ulazna veličina u hidrološki ciklus, Geing, Split, 1994.	20	
	O. Bonacci: River the bloodstream of landscape and catchment. Acta Hydrotechnica 29(50):1-12, 2016.	2	
	T. Datry , N. Bonada , A. Boulton: Intermittent rivers and ephemeral streams - Ecology and management. Elsevier, 2017	1	
	O. Bonacci, T. Pipan, D.C. Culver: A framework for karst ecohydrology. Environ Geol 56(5):891-900, 2009.	1	internet

Supplementary reading	Monitoring current issues of flooding and pollution that frequently occur worldwide and in our region.
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.
Other (as proposed by the institution)	

COURSE TITLE	HYDROLOGICAL MODELLING IN KARST					
Code	GAHA05	Year of the study programme	1st			
Course leader/s	Professor Vesna Denić-Jukić, PhD	Credits (ECTS)	6,0			
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F
			30			
Status of the course	Extracurricular	Percentage of e-learning				

COURSE DESCRIPTION						
Course objectives	Introduction to hydrological models and the possibilities and methods of applying these models in karst hydrology.					
Course enrolment requirements and entry competences required for the course	Graduate study					
Learning outcomes expected at the level of the course	Upon completing the exam, the student will be able to: • set up and design hydrological models in karst, • synthesise developed models and apply the models to new research areas, • connect the concepts of water balance from the aspect of karst basins, • formulate and implement the verification and model calibration procedures.					
Course contents elaborated by class schedule	System approach: definitions and concepts. Problems and models in hydrology. Linear, time-variant and nonlinear models. Black box and conceptual models. Catchment runoff modelling. System unit response characteristics. Models for ungauged catchments. Propagation of water waves. Balance of groundwater in the soil. Conceptual models of karst water balance. Characteristics of recharge-discharge relations in karst aquifers. Determination of catchment areas and runoff coefficients in karst.					
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)			
Student obligations	Preparing and presenting a seminar paper showcasing research results, in the format of a scientific paper.					
Monitoring student work:	Class attendance	1.0	Research	3.0	Practical work	
	Experiments		Report			
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	The evaluation and assessment of student work are conducted through an oral exam and the grading of the seminar paper.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	(1) O. Bonacci, Karst Hydrology, Springer Verlag, Heidelberg, 1987.; (2) V.P. Singh, Hydrologic Systems, Rainfall-Runoff Modeling, Prentice Hall, 1988.; (3) Metka Petrič: Characteristics of recharge–discharge relations in karst aquifer, Inštitut za raziskovanje krasa ZRC SAZU, Založba ZRC, Postojna-Ljubljana, 2002.	1	
Supplementary reading	(1) Mc Cuen: Hydrologic analysis and design, Prentice Hall, 1989.; (2) M.P. Wanielista, Hydrology and water quantity control, John Wiley & Sons, 1990.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

COURSE TITLE	MARINE HYDRAULICS, SPECIAL CHAPTERS							
Code	GAHA06	Year of the study programme	1st					
Course leader/s	Assistant Professor Nenad Leder, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning	0 %					
COURSE DESCRIPTION								
Course objectives	Ability to understand and interpret physical processes in littoral areas: waves, sea currents, long-term sea level oscillations. Knowledge of various forms of marine pollution. Understanding and using the concepts of numerical and physical modelling of littoral processes. Ability to design and dimension maritime structures for the purpose of environmental protection.							
Course enrolment requirements and entry competences required for the course	Knowledge of hydromechanics, hydraulics, and coastal engineering.							
Learning outcomes expected at the level of the course	The student will be able to: • determine the influence of surface waves cause by wind in the littoral area, • determine the influence of sea currents in the littoral area, • assess the influence of pollution in the littoral area, • assess the influence of modelling and dimensioning of maritime structures on environment protection, • critically select the concept of numerical and physical modelling of littoral processes.							
Course contents elaborated by class schedule	Special topics in physical oceanography: theory of waves, currents and mixing processes (transport of matter), coastal oceanography. Wind-generated surface waves, long-term sea level oscillations and currents in the Adriatic Sea. Resonant oscillations in the Adriatic Sea. Tsunami. Spectral analysis. Theory of extremes. Numerical and physical modelling. Physical oceanography in relation to maritime and coastal hydrotechnical engineering projects. Field measurements.							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Class attendance, preparing a seminar paper, independent work and studying.							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0	(add other)			
	Mid-term exams		Oral exam		(add other)			
	Written exam		Project		(add other)			
Assessment methods and	Assessment of seminar paper and oral exam.							

<table>
<tr><td>evaluating student work in class and at the final exam</td><td colspan="3"></td></tr>
<tr><td rowspan="7">Required reading (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>1. B. LeMehaute, D.M. Hanes: The Sea, Ocean Engineering Science, Vol. 9, John Wiley&Sons Inc., 1990.</td><td></td><td>yes</td></tr>
<tr><td>2. J.W. Kamphuis: Physical Modelling of Coastal Processes, Advances in Coastaland Ocean Engineering (Ed. P.L.-F. Liu), Vol. 2, Word Scientific, 1996.</td><td></td><td>yes</td></tr>
<tr><td>3. B. Cushman-Roisin et al. (Eds): Physical Oceanography of the Adriatic Sea, Kluwer, Dordrecht, 2001.</td><td></td><td>yes</td></tr>
<tr><td>4. B. Johns: Physical Oceanography of Coastal and Shelf Seas, Elsevier OceanographySeries, Vol. 35, 1983.</td><td></td><td>yes</td></tr>
<tr><td>5. W.J. Emery, R.E. Thomson: Data Analysis Methods in PhysicalOceanography, Pergamon, 1998.</td><td></td><td>yes</td></tr>
<tr><td>6. D.T. Pugh: Changing Sea Levels. Effect of Tides, Weather and Climate, Cambridge University Press, 2004.</td><td></td><td>yes</td></tr>
<tr><td>Supplementary reading</td><td colspan="3">1. Leder, N., Lončar, G., Duplančić Leder, T., 2020. Measurements and Numerical Modelling of Surface Waves in Front of the Port of Split, TransNav, 14, 1, 192-197, doi:10.12716/1001.14.01.24.
2. Lončar, G., Leder, N, Duplančić Leder, T., Carević, D. 2019. Wave Energy Disbalance as Generator of Extreme Wave Occurrence in Semi-Enclosed Coastal Waters (Example of Rijeka Bay—Croatia), Journal of Marine Science and Engineering, 7 (11):420, doi: 10.3390/jmse7110420
3. N. Leder, A. Smirčić, I. Vilibić: Extreme values of surface wave heights in the northern Adriatic, Geofizika, 15, 1-13, 1998.
4. I. Vilibić, N. Leder, A. Smirčić: Storm surges in the Adriatic Sea: An impact on the coastal infrastructure, PeriodicumBiologorum, 102, Suppl. 1, 483-487, 2000.
5. I. Vilibić, N. Domijan, M. Orlić, N. Leder, M. Pasarić: Resonant coupling of a traveling air-pressure wave with the east Adriatic coastal waters, Journal of Geophysical Research – Oceans, 109, C100001, doi:10.1029/2004JC002279, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="5">SYSTEM ENGINEERING IN WATER RESOURCES MANAGEMENT</td></tr>
<tr><td>Code</td><td>GAHA07</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus Jure Margeta, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3">30</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Acquisition of knowledge for the application of a systematic approach and systems engineering tools in solving problems related to the management of water reservoirs for various purposes.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Basic knowledge of hydrology and statistics.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
apply the systematic approach and systematic analysis to solving engineering problems related to design and operation of water tanks
plan and design water tanks in solving water use problems, protection from harmful effect of waters and protection of waters
formulate mathematical stochastic and deterministic models of water tanks and apply the tools of systemic analysis in design and water tank management problem solving
set up a simulation model of water tank operation with the aim of solving various water-related problems
formulate optimisation models for solving engineering problems in planning, design and water tank management
prepare data necessary for planning and design of water tanks
anticipate the influence of water tanks on environment and define protection measures</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Water tanks and their role in water management and maintenance of sustainable water supply, food and energy production, protection from floods and droughts and water environment. The main principles water tanks design theory: planning of water resources and water tanks, main characteristics of tanks considering their capacity, volume equations. System approach to planning and design of the tank volume. Methods for determining the tank capacity; computation by applying the balance equation, methods of the critical period, methods of low water levels, methods of the probability matrix, methods based on generated data, simulation and optimisation methods. System engineering - main definitions. Formulation of optimisation problems. Introduction to linear programming. Main principles of linear programming. Application of linear programming to the tank design and management and to other water resources problems. The concept of dynamic programming. One-dimensional dynamic programming. Multi-dimensional dynamic programming. Special types of dynamic programming. Application of dynamic programming to the tank design and accumulation management and to the solution of other problems related to water resources.</td></tr>
<tr><td></td><td colspan="2">x lectures</td><td colspan="3">☐ independent assignments</td></tr>
</table>

Format of instruction:	x seminars and workshops ☐ exercises ☐ fully online x blended e-learning ☐ field classes	☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)
Student obligations	Preparing a research seminar paper	

Monitoring student work:						
	Class attendance	1.0	Research		Practical work	
	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	Oral exam, written exam, independent work, preparing a research seminar paper, continuous assessment.

Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Margeta, J.: Osnove sistemskog inženjerstva vodnih resursa, Faculty of Civil Engineering, Split, 1993.		
	Margeta, J., Uvod u sistemsko inženjerstvo u projektiranju i upravljanju akumulacijama, Split, 1988		
	Margeta, J.: Osnove gospodarenja vodama, G.F. Split		
	Margeta J.:Smjernice za integralni pristup razvoju, gospodarenju i korištenju vodnih resursa, 1999		

Supplementary reading	Smith A.A., E. Hinton, R.W. Lewis: Civil Engineering Systems Analysis and Design, John Willey and Sons, New York, 1983.; (2) Gillet, B.E.: Introduction to Operation Research, McGraw Hill, New York, 1976.; (3) J. Margeta: Projektiranje i upravljanje volumenima vodospremišta, Građevinski fakultet, Split, 1994.; (4) McMahan, T.A.: Reseroir Capacity and Yield. Elsevier Scientific Publishing Company, Amsterdam, 1978.; (5) Moran, P.A.P.: The Theory of Storage, Methuen, London, 1959.
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.
Other (as proposed by the institution)	Lectures using modern aids. Exercises involving problem-solving and independent creation of programs and homework assignments. The research seminar paper is adapted to the specialization goals of the candidate.

COURSE TITLE	SUSTAINABLE URBAN WATER SYSTEMS					
Code	GAHA08	Year of the study programme	1st			
Course leader/s	Professor Emeritus Jure Margeta, PhD	Credits (ECTS)	6.0			
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F
			30			
Status of the course	Extracurricular	Percentage of e-learning	30			
COURSE DESCRIPTION						
Course objectives	Acquisition of knowledge for solving sustainability issues of urban water systems in accordance with environmental, economic, and social goals and criteria.					
Course enrolment requirements and entry competences required for the course	Basic knowledge of water supply and drainage systems in settlements, as well as the treatment of stormwater and wastewater.					
Learning outcomes expected at the level of the course	The student will be able to: • formulate the assessment of sustainability of urban water system • apply system approach and system analysis in problem solving of sustainable urban water system • synthesise interpolation measures into existing urban water systems in line with the principles of sustainable development and sustainable living in urban environments • anticipate the influence of climatic changes on the work of urban water systems including the work of waste water purification device, influence on the environment and formulate measures for the increase of the level of sustainability and its adjustment in the future • anticipate the influence of climatic changes on the work of littoral urban water systems and formulate the measures for the increase of the level of sustainability and its adjustment to the expected increase of median water level • combine existing and develop new social and technological measures for increasing the level of sustainability of urban water systems.					
Course contents elaborated by class schedule	Sustainable development and climatic changes. Urban environments, sustainability of living in urban environments, sustainable urban water system. Integral urban water system. Urban water system water balance, vertical water balance in rainfall water eco-drainage system; Renewable energy sources and urban water system; Tasks related to management of sustainable urban water systems; Integration with other management processes; Planning of integral urban water system in line with the concept of sustainable development; Techniques and tools for decision-making support; Managing requirements; Techniques of urban water cycle; Design of water-sensitive urban environments; Risk management.					
Format of instruction:	x lectures x seminars and workshops ☐ exercises ☐ fully online x blended e-learning ☐ field classes		x independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)			
Student obligations						
	Class attendance	1.0	Research		Practical work	

Monitoring student work:	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, written exam, seminar paper, continuous assessment.					

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Margeta, J.: Osnove sistemskog inženjerstva vodnih resursa, Građevinski fakultet, Split, 1993.;		
	UNEP: Integrated Coastal Urban water System Planning in Coastal Areas of the Mediterranean, 2007.		
	Margeta J.:Smjernice za integralni pristup razvoju, gospodarenju i korištenju vodnih resursa, 1999.		
Supplementary reading	CIRIA; C523 Sustainable Urban Drainage Systems – Best Practice Manua, 2001; Haugton, G. and Hunter, C. Sustainable Cities, Jassica Kingsley, London, 2001.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

COURSE TITLE	SELECTED CHAPTERS ON KARST HYDROGEOLOGY							
Code	GAHA09		Year of the study programme	1st				
Course leader/s	Professor Emeritus Ognjen Bonacci, PhD		Credits (ECTS)	6.0				
Associate teachers			Type of instruction (number of hours per semester)	L	S	E	F	
				30				
Status of the course	Extracurricular		Percentage of e-learning					
COURSE DESCRIPTION								
Course objectives	Interdisciplinary study of karst water phenomena for effective protection.							
Course enrolment requirements and entry competences required for the course	Knowledge of the basics of geology and petrography, as well as the application of geology in engineering interventions.							
Learning outcomes expected at the level of the course	The student will be able to: • organise the characteristics of karst morphological phenomena and connect them with underground water flow. Organise various terrains in relation to water permeability. • combine findings from karst morphology and terrain water permeability for proposing the zones of sanitary protection. • present hydrodynamic karst zones. • implement the procedures of calculating water loss from karst accumulations.							
Course contents elaborated by class schedule	Geotectonics and karst. Development of the relief model and groundwater flow in karst. Phases of karstification and morphological phenomena in karst. Positive and negative effects upon karst development; formation and development of karst fields and hydrogeological phenomena in the underground areas. Water losses from karst accumulations.							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☒ field classes			☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)				
Student obligations	Class attendance, preparing a seminar paper							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam					
	Written exam		Project					
Assessment methods and evaluating student work in class and at the final exam	Oral exam with the analysis and defence of the written report on research seminar.							

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	P. A. Domenico & F. W. Schwartz (1997): Physical and Chemical Hydrogeology. J. Wiley & Sons, Inc.p 506, New York.	1	
	M. Herak (1957): Geološka osnova nekih hidroloških pojava u dinarskom kršu. Zbornik II. kongr. geol. Jug., 523-535, Sarajevo	1	
	Bonacci O, Ljubenkov I, Knezić S (2012) The water on a small karst island: the Island of Korčula (Croatia) as an Example. Environ Earth Sci 66(5): 1345-1357	2	internet
	Bonacci O (1997) Role of speleology in karst hydrology and hydrogeology. In: Proceedings of the 12th International Congress of Speleology. La Chaudex de Fond. Vol. 2:27-30.	1	internet
	Bonacci, O. (2001.): Analysis of the maximum discharge of karst springs. Hydrogeology Journal, 9(4):328-338	1	internet
	Bonacci, O., Željković, I., Galić, A. (2013.): Karst rivers' particularity: an example from Dinaric karst (Croatia/Bosnia and Herzegovina). Environmental Earth Sciences, 70(2):963-974	2	internet
	S. Šestanović (1986): Utjecaj građevinskih objekata izvan urbaniziranih područja na vodne resurse u kršu. Acta Carsologica XIV/XV, 241-244, Ljubljana.	2	internet
	Bonacci, O., Ljubenkov, I. (2005.): Nove spoznaje o hidrologiji rijeke Krke. Hrvatske Vode, 13(52):265-281	2	internet
Supplementary reading			
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="5">INTRODUCTION TO ENGINEERING NUMERICAL MODELLING</td></tr>
<tr><td>Code</td><td>GAHA10</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Hrvoje Gotovac, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td>30</td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3">30</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Acquisition of level 7 knowledge and skills for solving engineering problems using modern state-of-the-art numerical models and techniques.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Graduate study
Basics of software programming
Applied mathematics – level 7</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
make a mathematical model of engineering problems
formulate and make a numerical model of engineering problems by finite differences method
formulate and make a numerical model of engineering problems by using finite elements technique
formulate and make a numerical model of engineering problems by using point and sub-area collocation method
analyse stationary and non-stationary engineering problems by using the aforementioned numerical methods
analyse engineering problems by using the Lagrangian (“Random walk”) and Euler-Lagrangian methods
analyse engineering problems by using the Monte-Carlo method
analyse the accuracy and stability of numerical solutions</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Introduction. Functional approximations. Approximate solutions of differential equations; procedures of strong and non-strong formulation. Method of finite differences (MODFLOW formulation in underground water flow). Galjerkin`s formulation and method of the conservation law. Method of point collocation. Method of sub-area collocation. Finite elements technique. Modelling of the stationary heat conductivity by using the method of finite elements (Konelib library), Modelling of planar state of strain and deformation and modelling of prismatic bar torsion (Konelib). Explicit, mixed and implicit procedures of numerical time integration. Modelling of non-stationary product conductivity by using the method of finite elements (Konelib), Solving large linear and non-linear equation systems (frontal procedure, conjugate gradients method, GMRES, Newton` method). Adaptive procedures. Stability and accuracy of the numerical solution. Modelling of non-stationary transport of the mass by using Lagrangian (“Random Walk Particle Tracking”) and Euler-Lagrangian methods. Monte-Carlo method.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ fully online
☒ blended e-learning
☐ field classes</td><td colspan="2">☐ independent assignments
☐ multimedia
☒ laboratory
☐ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td>Student obligations</td><td colspan="6">Prepare and defend a seminar paper</td></tr>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td>(add other)</td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td>(add other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(add other)</td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">Defence of a seminar paper
Oral exam</td></tr>
<tr><td rowspan="4">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td colspan="3">Jović V. (1993.), Uvod u inženjersko numeričko modeliranje, Aquarius Engineering</td><td>>50</td><td colspan="2"></td></tr>
<tr><td colspan="3">Zheng C., Bennet G. D. (2002), Applied Contaminant Transport Modeling, John Wiley and Sons</td><td>1</td><td colspan="2">Web</td></tr>
<tr><td colspan="3">Saad Y. (2003), Iterative methods for sparse linear systems, SIAM.</td><td>1</td><td colspan="2">Web</td></tr>
<tr><td>Supplementary reading</td><td colspan="6">Kaliakin V. N. (2002), Introduction to approximate numerical solution techniques, numerical modeling and finite element methods, Marcel Dekker.
Hollig, K., (2012), Finite element methods with B-splines, SIAM.
Cottrell J.A., Hughes T. J. R. , Bazilevs Y, (2009), Isogeometric analysis: Toward intergration of CAD and FEA</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Interactive teaching.
Supervision of seminar preparation through consultations and discussions.
Oral presentation and defence of the seminar paper.
Oral exam.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6">Improvement of the course through conducting surveys and interaction with students. Course delivered in Croatian and English.</td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">ANALYSIS OF HYDROLOGICAL TIME SERIES</td></tr>
<tr><td>Code</td><td>GAHA11</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Damir Jukić, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Introduction to the basic methods of analysing hydrological and climatological time series, and the possibilities and methods of applying these methods in hydrology and hydrotechnical engineering in general.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Enrolled course Methods of Mathematical Statistics</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">Upon the completed exam, the student will be able to:
write an analysis of time series by descriptive techniques
propose adequate models of time series
propose prognostic models
propose time series in frequency domain</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Introduction: hydrological and climatic time series and their characteristics, basic terminology goals and approaches to the analysis of hydrological time series.
Unilateral descriptive techniques: types of time series, analysis of trending series, graphical illustration and comparison of time series, analysis of series with seasonal variations, auto-correlation and correlogram, cross-correlation, partial correlation, regression, graduation of series. Models of hydrological time series: stochastic processes and their characteristics, stationary processes, “white noise”, characteristics and assessment of auto-correlation function, AR, MA, ARMA and ARIMA models, Box-Jenkins seasonal ARIMA model, adjustment and assessment of model parameters, analysis of residual values. Prognostic models, overview of prognostic procedures and their comparison. Analysis of hydrological time series in frequency domain: spectral analysis, periodogram, spectral density function, cross-spectral density function, transfer function.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Preparing and presenting a seminar paper showcasing research results, in the format of a scientific paper.</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
</table>

	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	The evaluation and assessment of student work are conducted through an oral exam and the grading of the seminar paper.		
Required reading	**Title**	**Number of copies in the library**	**Availability via other media**
	Chris Chatfield: The Analysis of Time Series: An Introduction, Sixth Edition, Texts in Statistical Science, 2003.	1	
	Deepesh Machiwal, Madan Kumar Jha.: Hydrologic Time Series Analysis: Theory and Practice, Springer, New Delhi, 2012.	1	
Supplementary reading	(1) Hrelja Husno, Mulaomerović Ajla: Analiza hidroloških vremenskih serija, Građevinski fakultet u Sarajevu, 2012. (2) George E. P. Box, Gwilym M. Jenkins, and Gregory C. Reinsel: Time Series Analysis: Forecasting and Control, Wiley Series in Probability and Statistics, 2008. (3) Shumway R.D., Stoffer D.S.: Time Series Analysis and Its Applications, Springer Verlag, 2000. (4) Napler Addison: The Illustrated Wavelet Transform Handbook, 2002.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

Description of extracurricular courses in the field of Civil Engineering, branch of Transportation

<table>
<tr><td>COURSE TITLE</td><td colspan="7">TRAFFIC FLOW THEORY</td></tr>
<tr><td>Code</td><td>GAPA01</td><td colspan="2">Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Dražen Cvitanić, PhD</td><td colspan="2">Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td colspan="2" rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td colspan="2">Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">The aim of the course is to teach students the skills necessary for calibrating, evaluating, and improving analytical and simulation models of traffic flow.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Completed course Traffic Engineering at the graduate study programme</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="7">The student will be able to:
select traffic flow parameters required for analysis (time of sequence, critical time gap, free flow speed…)
assess and develop analytical models of traffic flow at intersections without signalling lights
assess and develop analytical models of traffic flow at intersections with signalling lights
assess and develop analytical models of traffic flow at roundabout intersections
assess and develop analytical models of traffic flow of extra-urban roads
assess and develop simulation models of traffic flow</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="7">Traffic stream characteristics. Traffic flow, density, speed, spatial and temporal gaps. Measurement at a point; measurement over a short section. Two and three-dimensional speed-flow-density models. Human factors (perception-response time, braking inputs, acceleration, deceleration, etc.). Influence of gender, age and trip purpose on the flow.
Car sequence models. Lane changing models. Macroscopic traffic flow models. Analytical models and application of queuing theory. Theory of recognising time gaps. Critical time gaps. Saturated flow. Analysis models of functioning of non- signalised and signalised intersections.
Simulation traffic flow models.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="7"></td></tr>
<tr><td rowspan="2">Monitoring student work:</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td colspan="2"></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td colspan="2">3.0</td></tr>
</table>

	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam			
Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	D.R. Drew: *Traffic Flow Theory and Control*, McGraw-Hill, New York	1	
	Traffic flow theory, Transportation Research Board 1998.		online
	F.A. Haight: *Mathematical Theories of Traffic Flow*, Academic press, London	1	
	Cvitanić, D: Teorija prometnog toka, Split 2008, internal course reader available on the Faculty website		online
	Roger P. Roess, Elena S. Prassas, William R. McShane: Traffic Engineering	1	
Supplementary reading	Cvitanić, D.: *Modeliranje kapaciteta i razine usluge nesemaforiziranih raskrižja*, Građevinski fakultet Sveučilišta u Splitu, Magistarski rad. Breški, D.: *Usporedba analitičkih i simulacijskih modela za analizu funkcioniranja semaforiziranih raskrižja*, Magistarski rad.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="7">HIGHWAYS – SELECTED CHAPTERS</td></tr>
<tr><td>Code</td><td>GAPA02</td><td colspan="2">Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Associate Professor
Deana Breški, PhD</td><td colspan="2">Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td colspan="2" rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td colspan="2">Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Select optimal route elements considering various traffic conditions, road types, environment, and vehicle movement theories. Choose and apply the appropriate model for traffic analysis procedures with a critical review of influencing parameters and results. Evaluate the parameters of structural and functional properties of pavement structures</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Master’s degree (Level 7 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="7">The student will be able to:
present basic theories of vehicle circulation and forces affecting the vehicle
determine optimal route elements with regard to the category of the highway, terrain conditions, lateral impact, visibility, etc.
justify the selection of the model and procedure of traffic analysis
analyse and present the results of traffic analysis
critically judge the parameters influencing the capacity of road network elements by using different models
conduct an analysis and interpret the results for selected parameters of structural and/or functional properties of pavement structures</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="7">Main theories on vehicles circulation. Forces affecting the vehicle. Division and classification of urban and suburban roads. Development and application of the concept of the design of urban and suburban roads. Design elements: visibility, horizontal and vertical flow, terrain conditions, cross-section elements, road equipment. Intersections, channelling traffic flow, traffic control, road capacity, traffic analysis procedure. Modelling parameters relevant for road capacity analysis. Parameters and methods for defining structural and functional properties of pavement structures.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="7"></td></tr>
<tr><td rowspan="4">Monitoring student work:</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td colspan="2"></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td colspan="2">3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td colspan="2"></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td colspan="2"></td></tr>
</table>

	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	The expected learning outcomes are assessed by grading and defence of the seminar paper, and at the oral exam.		
Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	McShane,W.R. Roess, R.P., Prassas,E.S.: Traffic engineering, Prentice Hall, 2004.	1	
	A Policy on geometric design of Highways and streets, AASHTO 2001.	1	
	Maletin, M.: Planiranje i projektovanje saobraćajnica u gradovimaa, Orion art, 2009.	1	
	Scientific articles related to the topic of the seminar paper		
Supplementary reading	Transportation Impact Analyses for Site Development, Institute of Transportation Engineers (ITE), 2005.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at two levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission		
Other (as proposed by the institution)			

COURSE TITLE	TRANSPORT PLANNING					
Code	GAPA03	Year of the study programme	1st			
Course leader/s	Professor Dražen Cvitanić, PhD Associate Professor Deana Breški, PhD	Credits (ECTS)	6.0			
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F
			30			
Status of the course	Extracurricular	Percentage of e-learning				

COURSE DESCRIPTION		
Course objectives	The aim of the course is to teach students the skills required to calibrate, use, evaluate, and improve traffic planning models.	
Course enrolment requirements and entry competences required for the course	Completed course Traffic Engineering at graduate study programme	
Learning outcomes expected at the level of the course	The student will be able to: • select parameters of the traffic model required for analysis • assess and develop the models of travel generation • assess and develop models of travel distribution • assess and develop models of travel assignment	
Course contents elaborated by class schedule	Transport planning history. Interaction between transport and other activities. Travel demand forecast. Modelling of road network with intersections. Zoning, placing centroids, zone properties. Trip generation models; application of multi-dimensional regression analysis, category analyses, logistic analyses. Models of selection of transport means. Utility models. Models of travel distribution between the zones; Fratar`s method, gravity model, opportunities model. Route assignment models: capacity restrain models; multi-route assignment models. Model calibration.	
Format of instruction:	☒ lectures ☐ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes	☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)
Student obligations		

Monitoring student work:						
	Class attendance	1.0	Research		Practical work	
	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

<table>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="3"></td></tr>
<tr><td rowspan="7">Required reading (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>B.Y. Hutchinson: Principles of Urban Transport Systems Planning, Book Company.</td><td>1</td><td></td></tr>
<tr><td>Traffic flow theory, Transportation Research Board 1998.</td><td></td><td>online</td></tr>
<tr><td>F.A. Haight: Mathematical Theories of Traffic Flow, Academic press, London</td><td>1</td><td></td></tr>
<tr><td>J. Pađen: Osnove prometnog planiranja, Informator, Zagreb</td><td>1</td><td>online</td></tr>
<tr><td>Transportation planning handbook, ITE 2005.</td><td>1</td><td>online</td></tr>
<tr><td>Cvitanić: Gradske prometne površine i objekti, course reader.</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="3">R. Lane, Powel, T.J.: Analytical transport planning, Redword Burn Limited 1974.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

Description of extracurricular courses in the field of Civil Engineering, branch of Geotechnics

COURSE TITLE	SELECTED CHAPTERS OF ROCK MECHANICS							
Code	GAGA01	Year of the study programme	1st					
Course leader/s	Professor Predrag Miščević, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives								
Course enrolment requirements and entry competences required for the course	Bachelor's degree (Level 6 EQF or CroQF)							
Learning outcomes expected at the level of the course	The student will be able to: • formulate concepts and current achivements in the area of rock mechanics • critically assess and improve the measurement methods of crack, rock and rock mass parameters required for solving engineering problems in rock masses • re-evaluate and develop the classifications of rock mass • devise rock mass models • analyse weathering in soft rocks and develop models for evaluating the effects of weathering • develop rock mass design based on observation methods							
Course contents elaborated by class schedule	Correlation between engineering geological characteristics (cracks, percentage of core, RQD) and geotechnical characteristics of the rock mass. Rock and rock mass models in correlation with models applying numerical methods in solving engineering tasks in rock masses. Critical development of classification of rock mass. Weathering of soft rocks (development and application of weathering indices; durability over engineering time periods, development of new methods for assessing the durability of soft rocks; changes in soft rock parameters due to weathering). Observations of structures in rock mass and interpretation of the measured results.							
Format of instruction:	☐ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☐ independent assignments ☐ multimedia ☒ laboratory ☐ mentoring ☒ Independent research and experiments					
Student obligations	Preparation of a seminar paper, conducting laboratory tests, and analysing test results.							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work and learning	3.0		
	Essay		Seminar paper	2.0				

	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	The learning outcomes are assessed by grading and public presentation of the seminar paper, which showcases research results and a review of the selected chapter. The paper must be in the format of a scientific paper.

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Miščević P. (2015.), Inženjerska mehanika stijena, FGAG Split	30	
	Hoek E.(2007.), Practical Rock Engineering, www.rocscience.com.		x
	Vlastelica G., Miščević P. & Štambuk Cvitanović N., (2018.), „Durability of soft rocks in Eocene flysch formation (Dalmatia, Croatia)", Engineering Geology, Vol. 245 (2018); 207-217		x
	Bassett R. (2012.), A guide to field instrumentation in geotechnics: principles, installation and reading, Spon Press	1	
	Ömer Aydan (2018.), Rock Reinforcement, and Rock Support, CRC Press		x
	Miščević, P. & Vlastelica, G., (2017.), "Estimation of embankment settlement caused by deterioration of soft rock grains", Bulletin of Engineering Geology and the Environment, https://doi.org/10.1007/s10064-017-1203-4		x
	Nikolić M., Ibrahimbegović A., Miščević P. (2015.), "Brittle and ductile failure of rocks: embedded discontinuity approach for representing mode I and mode II failure mechanisms", Int. J. for Numer. Meth. in Engineering. 2015; Vol. 102, Issue 8, 1507-1526		x

Supplementary reading	Xia-Ting Feng, (2016-2017), Rock Mechanics and Engineering, Vol. 1-5, CRC Press
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.
Other (as proposed by the institution)	

<table>
<tr><td>COURSE TITLE</td><td colspan="6">SOIL MECHANICS MODELS</td></tr>
<tr><td>Code</td><td>GAGA02</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus Tanja Roje-Bonacci, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6"></td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Bachelor’s degree (Level 6 EQF or CroQF).</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
critically assess the most recent findings available in the existing literature with special emphasis on the area of small deformities;
comment on mutual relations, implementation advantages and disadvantages of known and acknowledged soil models;
independently determine, on the existing equipment in the laboratory, the input parameters for some of the known soil models;
assess and apply gained laboratory data on idealised numerical soil model;
assess obtained solutions by comparing several variants;
express substantiated opinion on the possibility of adjusting theoretical solutions for solving natural phenomena in geotechnics, which are appropriate for subject research.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Main principles of the mechanics of the continuum. Soil as a two-phase continuum. Differential equation of balance and motion. Simple constitution equations for the soil. Influence of non-linearity on the soil behaviour. Drainage and non-drainage conditions; water flow in soil and consolidation. Boundary and initial conditions. Main rules in numerical modelling for geotechnical operations. Constraints and criteria. Non-linear soil models and finite element method. Computer software: requirements and possibilities. Selection of input data. Critical approach to problem simplification. Acceptability of the results of numerical analysis. Numerical modelling of complex geotechnical operations: embankments, anchoring supporting structures etc.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☐ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ mentoring
☒ independent research and experiments</td></tr>
<tr><td>Student obligations</td><td colspan="6">Preparation of a seminar paper. Conducting laboratory tests (if required for the seminar assignment). Analysis of test results. Oral presentation of the paper with a PowerPoint (PPTX) display, lasting up to 20 minutes.</td></tr>
<tr><td rowspan="2">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work and learning</td><td>3.0</td></tr>
</table>

	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	The learning outcomes are assessed by grading and public presentation of the seminar paper, which showcases research results and a review of the selected chapter. The paper must be in the format of a scientific paper (abstract, key words, references in alphabetical order).		
Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Roje-Bonacci, T., Lasić, A., Talić, Z.: *Modeli tla i konstitutivne jednadžbe.* Građevni godišnjak 2007.13; 294-344	1	x
	Mechanics of Geomaterials: Rocks, Concrete, Soils, Z.P. Balant ed., John Wiley & Sons, Inc., New York, (1985.),		x
	Naylor, D.J., Pande, G.N., Simpson, B., Tabb, R.: *Finite Elements in Geotechnical Engineering*, Pineridge Press Ltd., Swansea (UK), (1981.),		x
	Bower, A.,F., *Applied Mechanics of Solids,* e-izdanje (2012.),		x
	Hashiguchi, K., *Elastoplasticity Theory (chapt. Constitutive Equations of Soils),* Springer, (2014.)		x
Supplementary reading	(1) Roscoe, K.H., Burland, J.B.:. *On the generalised stress-strain behaviour of an idealised wet clay*. U: Heineman i Leckie (ur.), Engineering plasticity, Cambrige University Press, 535-609, (1968.), (2) Chen, W.F.,: *Limit analysis and soil plasticity*. Elsevier, New York, (1975.), (3) Chen, W.F., Saleeb, A.F., *Constitutive Equations for Engineering Materials*. *Vol 1- Elasticity and Modeling*, Elsevier, New York, (1994.), (4) Smith, G., F., *Constitutive equations for anisotripic and isotropic materials*, in G. C. Sih ed., Mechanic and Physics of Discrete Systems, North-Holland, (1994.), (5) F. Darve, ed., *Geomaterials, Constitutive equations and modelling,* 3th ed., Taylor&Francis e-library (2008.), (6) Schofireld, A.: *Distributed Soil Properties & Geotechnical Design*. Thomas Telford, (2005.), (7) Atkinson, J.H.; Bransby, P.L.: *The mechanics of soils, An introduction to critical state soil mechanics*, McGrow-Hill, London, (1978.), (8) Britto, A.M., Gunn, M.J., *Critical State Soil Mechanics via Finite Elements*, John Wiley and Sons. (1987.), (9) GeoSlope, *Manual Sigma/W define,* version 5.01, (10) ABAQUS, *Theory Manula version 6.3*, (11) P.I.S.A. *Program for incremental stress analysis*; Elastic models, Plastic models, Critical state models. Journals: Geotechnique; Int. Jour. of Solids and Structures; Engineering Modelling; Soils and Foundations; Journal of Solis Mech. And Fuond. Engineering, ASCE.;		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

<table>
<tr><td>COURSE TITLE</td><td colspan="7">SPECIAL CHAPTERS IN FOUNDATION ENGINEERING</td></tr>
<tr><td>Code</td><td>GAGA03</td><td colspan="2">Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Emeritus Tanja Roje-Bonacci, PhD</td><td colspan="2">Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td colspan="2" rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td colspan="2">Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Introduction to the latest advancements in the field of foundation engineering, with focus on especially demanding tasks.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Bachelor’s degree (Level 6 EQF or CroQF).</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="7">The student will be able to:
assess the condition of technology of performance of unusual foundation methods form the available literature;
assess the most recent improvement possibilities of sub-foundation soil and critically review them;
model unusual foundation and improvement of sub-foundation soil for the same geotechnical conditions and set parameters;
compare and assess on a specific example all aspects of quality and effect of unusual foundation and improvement of sub-foundation soil;
test the effects of change of value and specific input data in a certain model of unusual foundation and/or improvement of foundation soil;
select the most favourable solutions in complex conditions of foundation.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="7">Foundations of silos and reservoirs; towers, chimneys, transmission lines and antenna columns, foundations of arch bridges, suspended and other types of bridges (cofferdams and abutments/piles); deep massive foundations, foundations in deep water (docks, platforms; coastal structures, foundations and transfer of horizontal forces; overcoming buoyancy for immersed structures (dry docks, rafts, dam superelevation). Correction of sloped/inclined structures. Change of stress in the structure due to the development of settlement with time. (The course contents will be adapted to the candidates' requirements since it is too complex for the proposed timetable).</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☐ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☒ independent research and application of numerical models</td></tr>
<tr><td>Student obligations</td><td colspan="7">Preparation of a seminar paper. Conducting laboratory tests (if required for the seminar assignment). Analysis of test results. Oral presentation of the paper with a PowerPoint (PPTX) display, lasting up to 20 minutes.</td></tr>
<tr><td></td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td colspan="2"></td></tr>
</table>

Monitoring student work	Experiments		Report		Independent work and learning	3.0
	Essay		Seminar paper	2.0	Presentation	
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	The learning outcomes are assessed by grading and public presentation of the seminar paper, which showcases research results and a review of the selected chapter. The paper must be in the format of a scientific paper (abstract, key words, references in alphabetical order).

	Title	Number of copies in the library	Availability via other media
Required reading (available in the library and via other media)	Roje-Bonacci, T: *Potporne građevine i građevne jame.* Građevinsko-arhitektonski fakultet u Splitu, IGH, 2005.	30	x
	Roje-Bonacci, T.:*Duboko temeljenje i poboljšanje temeljnog tla*. Sveučilište u Splitu, Građevinsko-arhitektonski fakultet, 2010	30	x
	Fang, H.-Y.: *Foundation Engineering Handbuk*, Chapman & Hall, London, (1991.)	1	x
	Zeevaert. L.: *Foundation Engineering for Diflicult Subsoil Conditions*, Van Nostrand Reinhold Company, New York, (1973.)	1	x
	Day, R.W., *Foundation Engineering Handbook,2nd ed., Design and construction with the 2009. international Building Code,* ASCEpress, McGraw-Hill, (2010.)	1	x
	Journals: *Ground Improvement,* procc. of Institution of Civil Engineers; *Alexandria Engineering Journal* (Elsevier)		x
Supplementary reading	Prudon, L. *Traveau maritime, Bibliothèque de l'ingénieur de travaux publics,* Dunod, Paris, (1936.).		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

Description of extracurricular courses in the field of Civil Engineering, branch of Materials

COURSE TITLE	RHEOLOGY OF MATERIALS							
Code	GAMT01	Year of the study programme	1st					
Course leader/s	Professor Sandra Juradin, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives	Introduction to rheological models and the possibilities and methods of applying rheological models in designing the compositions of concrete and composite material							
Course enrolment requirements and entry competences required for the course	Master's degree (Level 7 EQF or CroQF)							
Learning outcomes expected at the level of the course	After completing the course, the student will be able to: • develop and select options of rheological concrete models develop and select options of rheological special concrete models • assess functional ties between spatial and rheological properties of concrete • select the composition of concrete based on required spatial model of normal and special concrete • recommend the type rheometer for certain tests assess gained results							
Course contents elaborated by class schedule	Rheological models. Applied concrete rheology. Viscosity and boundaries of flow: determination methods. Concrete, suspension and coat rheology. Design of rheometer for liquid concretes. Rheology of fresh shotcrete. Rheology of self-compacting concrete. Sample. System of particles. Skeletal structure. Dilatation. Spatial sample model. Stability of sample. Functional relationship between spatial and rheological properties of concrete.							
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☒ laboratory ☐ mentoring ☒ independent research and experiment, supervised by course teacher					
Student obligations	Preparation of a seminar paper, oral presentation of a seminar paper							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam					
	Written exam		Project					

<table>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="3">The evaluation and assessment of student work are conducted through an oral exam and the grading of the seminar paper.</td></tr>
<tr><td rowspan="6">Required reading (available in the library and via other media)</td><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>Roussel, N: Understanding the rheology of concrete, Published by Woodhead Publishing Limited 2017</td><td></td><td>yes</td></tr>
<tr><td>Torres Perez, M.D: Advances in rheology research, Nova Science Publishers 2018</td><td></td><td>yes</td></tr>
<tr><td>Powers, T.C.: The Properties of Fresh Concrete, J.Willey and Sons, 1968</td><td>1</td><td></td></tr>
<tr><td>Krstulović, P.; Juradin, S.; Reologija materijala, course reader</td><td></td><td>yes</td></tr>
<tr><td>Bartos, P. J. M.: Special Concretes, workability and mixing, proceedings of the international RILEM workshop, Paisley, Scotland, 1993</td><td>1</td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="3">(1) Banfill, P. F.G.: Rheology of Fresh Cement and Concrete, Proceedings of the International Conference organized by the British Society of Rheology, Licerpool, UK 1990. (2) Krstulović, P: Svojstva i tehnologija betona, Građevinski fakultet Sveučilišta u Splitu i Institut građevinarstva Hrvatske, Split, 2000. (3) Tattersall, G.H.: The Workability of Concrete, Cement and Concrete Association, Wexham Springs, Slough, 1976. (4) Reiner, M.: Deformation, Strain and Flow, H. K. Lewis & Co., London, 1969 (5) Ferraris, C.F.; de Larrard F.; Martys, N.: Fresh Concrete Rheology – Recent Developments, to be published in Materials Science of Concrete, Volume VI (6) Hackley A.V.; Ferraris, C.F.: Guide to Rheological Nomenclature: Measurement in Ceramic Particulare Systems, NIST Special Publication 946, National Institute of Standards and Technology, Gaithersburg, 2001 (7) Whorlow, R.W.: Rheological Technicques, John Willey & Sons – Ellis Horwood Ltd, Chichester, England, 1980.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">NEW MATERIALS IN CIVIL ENGINEERING</td></tr>
<tr><td>Code</td><td>GAMT02</td><td colspan="2">Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Sandra Juradin, PhD</td><td colspan="2">Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td colspan="2" rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td colspan="2">Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Introduction to new materials in construction, and the possibilities and methods of applying these materials</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Master’s degree (Level 7 EQF or CroQF)</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">After completing the course, the student will be able to:
select and recommend the composition of self-compacting concrete
select and recommend the composition of light concrete (regular and self-compacting)
select and recommend the composition of recycled material concrete
select and recommend the composition of concrete with high usability properties select and recommend the composition materials
test properties, compare and recommend types of insulation materials</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Technology, structure and properties of cement composites. Special concrete (micro-reinforced concrete with high usability properties, self- compacting, light concrete with high usability properties, recycled material concrete, eco-concrete). Special concrete (smart concrete, shotcrete with high usability properties, injection mixtures, mortar, decorative concrete). Composite polymer-based materials. New types of reinforcement materials (micro fibres of different kind and origin, bearing reinforcement of different types and origin). New types of glass as building material Modern insulation materials (hydro-insulation, thermal-insulation, noise insulation).</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ mentoring
☒ independent research and experiment, supervised by course teacher</td></tr>
<tr><td>Student obligations</td><td colspan="6">Preparation of a seminar paper, oral presentation of a seminar paper</td></tr>
<tr><td rowspan="6">Monitoring student work:</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student</td><td colspan="6">The evaluation and assessment of student work are conducted through an oral exam and the grading of the seminar paper.</td></tr>
</table>

<table>
<tr><td>work in class and at the final exam</td><td colspan="3"></td></tr>
<tr><td rowspan="6">Required reading (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Öchsner, A: Engineering Applications for New Materials and Technologies, Advanced Structured Materials, Springer International Publishing AG 2018</td><td></td><td>yes</td></tr>
<tr><td>Brigante, D: New Composite Materials Selection, Design, and Application, Springer International Publishing Switzerland 2014</td><td></td><td>yes</td></tr>
<tr><td>Ukrainczyk, V.: Beton: struktura, svojstva, tehnologija, ALCOR, Zagreb, 1994</td><td>1</td><td>yes</td></tr>
<tr><td>Bartos, P. J. M.: Special Concretes, workability and mixing, proceedings of the international RILEM workshop, Paisley, Scotland, 2005</td><td></td><td>yes</td></tr>
<tr><td>Balaguru, P.; Nanni, A.; Giancaspro, J.: FRP Composites for Reinforced and Prestressed Concrete Structures, Taylor & Francis, New York and London, 2009</td><td></td><td>yes</td></tr>
<tr><td>Supplementary reading</td><td colspan="3">(1) Maso, J.C.: Interfaces ina Cementitous Composites, LMDC, INA-UPS, Touluse, France 1992, (2) Feldman, D.: Polymeric building materials, (3) Clarke, J.L.: Structural Design of Polymer Composites, The European structural polymeric composites group (4) Gjørv E., Sakai, K.: Concrete Technology for a Sustainable Development in the 21st Century, E&FN Spon (5) MacElroy D.,L.; Kimpflen J.L.: Insulation, materials, testing and applications, ASTM Symposium on Insulation materials, Baltimore 1990</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

Description of extracurricular courses in the field of Fundamental Engineering Sciences, branch of Organisation of Work and Production

COURSE TITLE	SYSTEM ENGINEERING IN PROJECT MANAGEMENT						
Code	GALA01	Year of the study programme	1st				
Course leader/s	Professor Snježana Knezić, PhD	Credits (ECTS)	6				
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F	
			30				
Status of the course	Extracurricular	Percentage of e-learning	50%				
COURSE DESCRIPTION							
Course objectives	The aim of the course is introduction to management mechanisms and process optimization in project management, as required for research activities.						
Course enrolment requirements and entry competences required for the course	Master's degree (Level 7 CroQF), qualification profile: engineering sciences. Special competences of students: • plan the lifecycle of projects and the utilization of resources.						
Learning outcomes expected at the level of the course	The student will be able to: • apply system analysis to system modelling, i.e. project management; • plan and manage projects by using models and techniques of system engineering; optimise project processes, especially in conditions of limited resources; • apply models of operational research and expert systems in project management; • select and rank projects; • implement TQM in project management.						
Course contents elaborated by class schedule	Basics of system theory (2). System approach (2). Structured system analysis (2). Natural and managed (cybernetic) systems (2). Civil engineering project as system (2). Project planning and management. Models and techniques of system engineering (2). Operational research methods and their application in civil engineering project management (2). Project planning in conditions of limited resources (2). Selected models of linear programming, dynamic programming, game theory, and expert systems in project management (2). Mono-criteria and multi-criteria methods of project selection and ranking (2). Simulation systems in civil engineering project management (2). TQM project management (2). Software and systems for large-scale civil engineering projects management – integrated computer systems (2). New methods and trends in the project management. Examples from the civil engineering practice (2).						
Format of instruction:	☒ lectures ☐ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes	☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☒ independent activities					
Student obligations	The students have the obligation to independently prepare a seminar paper; during the process they are expected to gain autonomy and responsibility in unpredictable conditions, to develop research curiosity, and acquire appropriate knowledge and						

<table>
<tr><td></td><td colspan="6">skills through formal learning. All types of adequate informal and/or non-formal learning are comparable to formal learning.</td></tr>
<tr><td rowspan="6">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">The evaluation of learning outcomes is conducted through the assessment of seminar paper prepared on a selected topic. Independent work includes analysis and research of the chosen topic, under new (unpredictable) conditions. The method of presenting the seminar paper (text, drawing, graphics, presentation, film, etc.) depends on the topic and analysis.</td></tr>
<tr><td rowspan="4">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">H. Kerzner: Project Management, a System Approach to Planning, scheduling and, VNR New York.</td><td>1</td><td></td></tr>
<tr><td colspan="3">B.S. Blanchard: System Engineering Management, John Wiley & Sons.</td><td>1</td><td></td></tr>
<tr><td colspan="3">S. Knezić: Authorised lecture materials</td><td></td><td>yes</td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(1) L. Troncale: The system sciences: What are they? Are they one or many?, Invited Review, EJOR Vol. 31, No. 1. (2) S.E. Elmaghraby: Activity nets: A guided tour through some recent developments, Invited Review, EJOR Vol. 82, No. 3. (3) P. Brucker et al: Resource-constrained project scheduling: Notation, classification, models and methods, Invited Review, EJOR Vol. 112, No. 1</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">(1) Evaluation of results in accordance with the listed learning outcomes
(2) Feedback from students via surveys
(3) Course teacher self-evaluation
(4) Institutional and external assessment</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

COURSE TITLE	DECISION SUPPORT SYSTEMS					
Code	GALA02	Year of the study programme	1st			
Course leader/s	Professor Nikša Jajac, PhD	Credits (ECTS)	6.0			
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F
			30			
Status of the course	Extracurricular	Percentage of e-learning				

COURSE DESCRIPTION		
Course objectives	The aim of the course is to teach the doctoral students the methods of multi-criteria analysis and their application in research.	
Course enrolment requirements and entry competences required for the course	None.	
Learning outcomes expected at the level of the course	The student will be able to: • connect the basic principles of decision-making theory with specific problem • select the most appropriate method of multi-criteria analysis • integrate certain system constituents for decision-making support • evaluate the efficiency of certain systems in civil engineering practice	
Course contents elaborated by class schedule	Introduction to decision-making theory. Decision models. Decision support systems. Decision support systems concept. Structured, semi-structured and ill- structured problems. Group decision support systems. Data base management. Model management. User interface management. Information systems as parts of decision support systems. Multi-criteria decision making. Multi-criteria analysis methods (AHP, PROMETHEE, ELECTRE, etc.). Expert systems. Conceptual basis of expert systems. Knowledge base models (predicate calculus, frames, semantic networks, production systems, scripts, neural networks). Knowledge acquisition. Expert systems as parts of decision support systems. Strategy of decision support systems development. Software and application in the civil engineering practice.	
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes	☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)
Student obligations		

Monitoring student work						
	Class attendance	1.0	Research		Practical work	
	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student	Oral exam, oral presentation of seminar paper.

<table>
<tr><td>work in class and at the final exam</td><td colspan="3"></td></tr>
<tr><td rowspan="7">Required reading (available in the library and via other media)</td><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>P.G.W. Keen, M.S.C. Morton: Decison Support System: an Organisational Perspective, Addison-Wesley Publishing Company, 1978.</td><td></td><td></td></tr>
<tr><td>T.L. Saaty: The Analytic Hierarchy Process, McGraw Hill, New York, 1980.</td><td></td><td></td></tr>
<tr><td>J.P. Brans, B. Mareschal: The PROMCALC & GAIA Decision Suport System for Multicriteria Decision Aid, Vrije Universiteit Brussel, 1991.</td><td></td><td></td></tr>
<tr><td>G. DeSanctis, R.B. Gallupe:Foundation for Study of Group Support Systems, Management Science, Vol. 33, No. 5, 589-609.</td><td></td><td></td></tr>
<tr><td>E. Turban: Decision Support and Expert Systems (Management Support Systems), Macmillan Publishing Company New York, 1993.</td><td></td><td></td></tr>
<tr><td>S. Knezić: Authorised lecture materials.</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="3">(1) T.L. Saaty: Group Decision Making and the AHP, 59-67, 1987. (2) J.P. Brans, C. Macharis, B. Mareschal: The GDSS PROMETHEE Procedure, Vrije universitet Brussel, 1997. (3) L.M. Jessup, J.S. Valacich: Group Support Systems: New Perspectives, Macmillan, 1992. (4) L. Troncale: The system sciences: What are they? Are they one or many?, Invited Review, EJOR Vol. 31, No. 1.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="7">SYSTEM THEORY</td></tr>
<tr><td>Code</td><td>GALA03</td><td colspan="2">Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Snježana Knezić, PhD</td><td colspan="2">Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td colspan="2" rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td colspan="2">Percentage of e-learning</td><td colspan="4">50%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">The aim of the course is introduction to system theory, system status and management, as required for research activities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Master’s degree (Level 7 CroQF), qualification profile: engineering sciences.
Special competences of students:
• recognize and differentiate the characteristics of systems analysis, decision theory, and information technology in decision-making and management processes.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="7">The student will be able to:
• confirm the general system theory;
• recognise and analyse system entropy;
• analyse systems and propose improvements;
• create organisational structure of cybernetic systems;
• propose organisational solutions of automated system management.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="7">General system theory (3). Basic structure and characteristics of systems (3). System entropy. Models of open systems (2). System analysis (3). Lifecycle of systems (3). Linear and dynamic processes (3). Cybernetic systems (2). Basics of cybernetics (2). Regulation of systems’ functioning (2). System management (3). Automated management (2). Current applications in civil engineering (2).</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☒ independent activities</td></tr>
<tr><td>Student obligations</td><td colspan="7">The students have the obligation to independently prepare a seminar paper; during the process they are expected to gain autonomy and responsibility in unpredictable conditions, to develop research curiosity, and acquire appropriate knowledge and skills through formal learning. All types of adequate informal and/or non-formal learning are comparable to formal learning.</td></tr>
<tr><td rowspan="6">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td colspan="2"></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td colspan="2">3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td colspan="2"></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Assessment methods and evaluating student</td><td colspan="7">The evaluation of learning outcomes is conducted through the assessment of seminar paper prepared on a selected topic. Independent work includes analysis and research of the chosen topic, under new (unpredictable) conditions. The</td></tr>
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<table>
<tr><td>work in class and at the final exam</td><td colspan="3">method of presenting the seminar paper (text, drawing, graphics, presentation, film, etc.) depends on the topic and analysis.</td></tr>
<tr><td rowspan="4">Required reading (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>L. von Bertalanffy, General System TheoryGeorge Braziller</td><td>1</td><td></td></tr>
<tr><td>General Systems Theory and Cybernetics, Springer Berlin / Heidelberg, Volume 216/2007</td><td>1</td><td></td></tr>
<tr><td>S. Knezić: Authorised lecture materials</td><td></td><td>da</td></tr>
<tr><td>Supplementary reading</td><td colspan="3">L. Troncale: The system sciences: What are they? Are they one or many?, Invited Review, EJOR Vol. 31, No. 1.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="3">(1) Evaluation of results in accordance with the listed learning outcomes
(2) Feedback from students via surveys
(3) Course teacher self-evaluation
(4) Institutional and external assessment</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="3"></td></tr>
</table>

Description of extracurricular courses in the field of Architecture and Urban Planning

COURSE TITLE	ROADS AND THE ENVIRONMENT							
Code	GAAA01	Year of the study programme	1st					
Course leader/s	Professor Darovan Tušek, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives								
Course enrolment requirements and entry competences required for the course	None.							
Learning outcomes expected at the level of the course	The student will be able to: • analyse factors affecting the selected traffic solution, • assess the influences of the traffic intervention on the environment, • support conclusions on the assessment of environmental impact with appropriate regulations, • propose alternative traffic solution							
Course contents elaborated by class schedule	Integral concept of environmental protection. Main principles, documents and implementation of environmental protection. Environmental impact assessment; content of the environmental impact study. Analysis of potential environmental effects, measures for reducing the environmental threats and the programme for monitoring the state of the environment. Final evaluation of the study. Analysis of factors influencing the selection of the highway route: climate, geology, terrain, hydrology, archaeology, ecosystems and all other natural and man-made values: developmental, social, political and economic factors. Change of land use. Highway, railroad, airport and river structures. Emissions of harmful substances, noise, disasters, visual degradation of the environment. Presentation and analysis of already developed environmental impact studies for traffic - infrastructure interventions into the environment.							
Format of instruction:	☒ lectures ☐ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Class attendance							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam					

	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Defending a seminar paper.					
Required reading (available in the library and via other media)	**Title**				**Number of copies in the library**	**Availability via other media**
	Izbor iz zakonske regulative: Zakon o prostornom uređenju (NN 153/2013); Zakon o gradnji (NN 153/2013), Zakon o zaštiti okoliša (NN 80/2013, 153/2013); Uredba o procjeni utjecaja zahvata na okoliš (NN 61/2014);					
	I. Lozić: Planning and Design of Roads in Protected Areas. 12th World Congress International Road Federation, Madrid, 1993.					
	S.Jurković: Promjene vizuelnih vrijednosti krajolika gradnjom infrastrukturnih trasa. Prostor, 1,1993.					
Supplementary reading	-					
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.					
Other (as proposed by the institution)						

Description of extracurricular courses in the area of Technical Sciences

<table>
<tr><td>COURSE TITLE</td><td colspan="5">METHODOLOGY AND TECHNIQUES OF SCIENTIFIC RESEARCH</td></tr>
<tr><td>Code</td><td>GATA01</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Pavao Marović, PhD
Professor Mirela Galić, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Introduce doctoral students to science, scientific concepts, and life in science, with the aim of enabling the students to carry out independent scientific research (see expected learning outcomes).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">Upon the completed course, the student will be able to:
• differentiate between written papers and their categorisation,
• classify scientific and artistic papers by scientific fields and branches, differentiate between scientific and scientific-research titles,
• learn the signs for correcting text errors,
• write and format the scientific and professional paper, properly cite the used literature,
• correct the text of the scientific and professional paper,
• decide on the categorisation of certain scientific or professional paper, self-evaluate and review scientific and professional paper.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Science, definitions of science, historical development and importance of science. Fundamental and developmental characteristics of science. Classification of sciences (areas, fields, branches). Scientific categories. Scientific activity and scientific research. Basic concepts of scientific and professional papers: classifications of written works; relevant features of scientific, scientific-professional, and professional papers; concept and types of scientific papers; concept and types of scientific-professional papers; concept and types of professional papers; concept and types of papers at higher education institutions; author and co-author. Scientific and scientific-teaching titles, requirements for appointment. Writing and editing the text of scientific and professional papers, citing literature in the text and bibliography. Writing the text and technical processing of papers. How to present a paper at a conference. Peer-review process. Methodology of scientific research: concept and classification of scientific research methodology; concept and classification of scientific methods; scientific methods. Technology of scientific research. Application for competitive scientific projects. Copyright law. Ethics in scientific work. Patent and intellectual property protection.</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">■ lectures
■ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">☐ field classes</td><td></td></tr>
<tr><td>Student obligations</td><td colspan="7">Attend all lectures. Prepare a seminar paper. Defend a seminar paper.</td></tr>
<tr><td rowspan="6">Monitoring student work:</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>2.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td>1.0</td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="7">Approximate weighted average of the three activities: attending classes, seminar paper, oral exam.</td></tr>
<tr><td rowspan="4">Required reading</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Marović, P.: Metodologija i tehnika znanstvenoistraživačkog rada, Fakultet građevinarstva, arhitekture i geodezije Sveučilišta u Splitu, Split (authorised lectures ~ current internal course reader in .pdf and .ppxs)</td><td>0</td><td>∞</td></tr>
<tr><td colspan="4">Zelenika, R.: Metodologija i tehnologija izrade znanstvenog i stručnog djela. Ekonomski fakultet, 781 str., Rijeka, 2000.</td><td>5</td><td></td></tr>
<tr><td colspan="4">Simonić, A.: Znanost: najveća avantura i izazov ljudskog roda. Sveučilište u Rijeci, 483 str., Rijeka, 1999.</td><td>3</td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="7">• Zelenika, R.: Znanost o znanosti. 5. izmij. i dop. izd., Ekonomski fakultet, XXIII + 422 str., Rijeka, 2004.
• Silobrčić, V.: Kako sastaviti, objaviti i ocijeniti znanstveno djelo. 5. dop. izd., Medicinska knjiga, VIII + 220 str, Zagreb, 2003.
• Tkalec Verčić, A.; Sinčić Ćorić, D.; Pološki Vokić, N.: Priručnik za metodologiju istraživačkog rada: Kako osmisliti, provesti i opisati znanstveno i stručno istraživanje. M.E.P. d.o.o., Zagreb, 2010.
• Tuđman, M.: Obavijest i znanje. Radovi Zavoda za informacijske studije, knjiga 2, 264 str., Zagreb, 1990
• Ochsner, A.: Introduction to Scientific Publishing: Bacrkground, Concepts, Strategies, Springer, Heidelberg, 2013.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="7">Monitoring the attendance of lectures. Discussions. Consultations during the preparation of a seminar paper. Oral presentation of a seminar paper. Oral exam.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="7"></td></tr>
</table>

COURSE TITLE	INFORMATION ENGINEERING					
Code	GATA02	Year of the study programme	1st			
Course leader/s	Professor Ante Munjiza, PhD	Credits (ECTS)	6.0			
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F
			30			
Status of the course	Extracurricular	Percentage of e-learning				

COURSE DESCRIPTION						
Course objectives	Introduce students to state-of-the-art engineering software design, as well as development, testing, and quality control processes; including modern languages such as C, C++, Java, C#, and GUI; and modern hardware such as CMOS, clusters, and GPUs.					
Course enrolment requirements and entry competences required for the course	Master's degree (Level 7 EQF or CroQF).					
Learning outcomes expected at the level of the course	The student will be able to: • differentiate between computer languages • develop a computer application describing an engineering process • assess the advantages of structured and object-oriented approach • design the graphic interface for the application • integrate the methods of team development, spatially distributed development, parallel and distributed computer science and intelligent engineering					
Course contents elaborated by class schedule	Introduction to programming languages: C, C++, Java, C#. Design of traditional engineering software, systems, and platforms: software structures in civil engineering and architecture, software structures in systems engineering. Design of object-oriented engineering software systems and platforms: object-oriented approach to designing engineering simulations, architectural applications, and systems engineering applications. Development of engineering software: top-down approach, team development, spatially distributed development, development automation, grid computing, parallel computing, distributed computing, intelligent engineering, virtual reality, GUI. Applications: Students will apply the acquired knowledge on individual projects presented in a seminar paper.					
Format of instruction:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)			
Student obligations	Attending lectures and preparing a seminar paper related to the published scientific paper, as chosen by a student.					
Monitoring student work	Class attendance	1.0	Research		Practical work	
	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	Research outcomes are evaluated by assessment of a publicly presented seminar paper which shows research results and/or overview of the selected area of research.		
Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Robinson et al.: Professional C#. ISBN 1 86100704-3.		
	R. Winder: Developing Java Software, ISBN 13: 9780470090251.		
	T. Grandon: Introduction to Programming Using Visual C++.NET. ISBN 13: 9780471487241.		
	E. Koffman, P. Wolfgang: Objects, Abstraction, Data Structures and Design. ISBN 13: 97804171467557		
	H Van Vliet: Software Engineering. ISBN 13: 9780471975083.		
	C. Horstmann: Object-Oriented Design and Pettern, ISBN 13: 9780471744870		
	W. Emmerich: Engineering Distributed Objects, ISBN 13: 9780471986577.		
	A. Munjiza: Computational mechanics of discontinua, textbook, Wiley&Sons, London 2008.		
	A. Munjiza: The Combined Finite-Discrete Element Method, textbook, Wiley&Sons, London 2004.		
Supplementary reading	Several papers published in international journals, as selected by a doctoral candidate.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor.		
Other (as proposed by the institution)			

COURSE TITLE	ENGINEERING SIMULATIONS TECHNIQUES							
Code	GATA03	Year of the study programme	1st					
Course leader/s	Professor Ante Munjiza, PhD	Credits (ECTS)	6.0					
Associate teachers		Type of instruction (number of hours per semester)	L	S	E	F		
			30					
Status of the course	Extracurricular	Percentage of e-learning						
COURSE DESCRIPTION								
Course objectives	Introduce students to the latest simulation techniques in engineering, including exact formulations for large displacements and large strains, specifically using the finite element method; covering theoretical and algorithmic aspects such as modern approaches to tensor calculus and multiphysics simulations; particularly the combination of Eulerian and Lagrange discretization approaches.							
Course enrolment requirements and entry competences required for the course	Master's degree (Level 7 EQF or CroQF).							
Learning outcomes expected at the level of the course	The student will be able to: • integrate the formulation of finite rotations and deformities into the finite element method • formulate modern methods in engineering simulations • present scientific papers by the use of contemporary engineering notation • formulate processes of contact interaction and fragmentation in discreet systems							
Course contents elaborated by class schedule	Contemporary approach to engineering applications of tensor calculus and demonstrating the applications in finite rotations, finite strain, balance and residual formulations, contact formulations, fragmentation and crack formulations. Presentation of scientific publications using current engineering notation. Fundamental techniques of engineering simulations such as: Gaussian integration, basis functions, conjugate gradient methods, skyline method, direct integration, Runge-Kutta method, relaxation, optimization techniques. Implementation of these techniques using programming languages – This section includes preparing a seminar paper and hands-on experience. Generalization of techniques within modern methods for engineering simulations including structures, geotechnics, fluid mechanics, engineering systems, and generalization to complex systems such as biological, financial, economic, climatic, etc.							
Format of instruction	☒ lectures ☒ seminars and workshops ☐ exercises ☐ fully online ☐ blended e-learning ☐ field classes		☒ independent assignments ☐ multimedia ☐ laboratory ☐ mentoring ☐ (add other)					
Student obligations	Attending lectures and preparing a seminar paper related to the published scientific paper, as chosen by a student.							
Monitoring student work	Class attendance	1.0	Research		Practical work			
	Experiments		Report		Independent work	3.0		
	Essay		Seminar paper	2.0				
	Mid-term exams		Oral exam					

	Written exam		Project			

Assessment methods and evaluating student work in class and at the final exam	Research outcomes are evaluated by assessment of a publicly presented seminar paper which shows research results and/or overview of the selected area of research.		
Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	A.Munjiza, The Combined Finite-Discrete Element Method, textbook, Wiley&Sons, London 2004		
	A.Munjiza, Tensor Algebra in Science and Engineering, textbook, Ventus Publishing, 2010.		
	A.Munjiza, Computational Mechanics of Discontinua, textbook, Wiley&Sons, London 2008.;		
	A.Munjiza, Large strain finite element method, textbook, Wiley&Sons, London 2015.;		
Supplementary reading	Several papers published in international journals, as selected by a doctoral candidate.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Postgraduate University Study Commission and the Teaching Quality Assurance Commission; (3) Supervisor.		
Other (as proposed by the institution)			

Description of extracurricular courses in the field of Natural Sciences, branch of Mathematics

<table>
<tr><td>COURSE TITLE</td><td colspan="5">APPLIED FUNCTIONAL ANALYSIS</td></tr>
<tr><td>Code</td><td>GAMA01</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Associate Professor Slavica Ivelić Bradanović, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>60</td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">The aim of the course is to enable students to understand and acquire knowledge of selected concepts from Functional Analysis theory and their application in solving specific problems</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Fundamental knowledge in Mathematical Analysis and Linear Algebra. Probability and mathematical methods in statics. Understanding of basic concepts of ordinary and partial differential equations and their applications.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will, through basic concepts and functional analysis theorems, be able to:
formulate some boundary-value problems in the form of variation equations;
determine the existence and uniqueness of weak solutions of given boundary-value problems;
test the conditions of solving potential of linear algebraic and operation equations;
by applying the adequate algorithm, solve the task with limitations in the form of equality.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Convex set. Divergence theorem. Gradient theorem. Continuity equation. Deformity and stress tensor. Newton’s fluid. Boundary-value problems with limitations in the form of equality and inequality. Theory of normed and inner product spaces (Banach and Hilbert spaces). Linear transformations and functionals. Linear transformations on finite-dimensional spaces. Linear, bilinear and quadratic forms. Linear functionals and operators on Hilbert spaces. Representation of the linear functional. Symmetric, positive and positive-definite operator. Sobolev functional space and the functional trace from that space. Inequalities (Friedrichs, Poincare). Variation (weak) boundary-value formulation. Weak solutions. Minimum of quadratic functional. Linear algebraic equations and solvability conditions. Linear operator equations and solvability conditions and Banach`s fixed point theorem. Regularity of solution for the variation boundary-value problem and Lax-Milgram theorem. Method of Lagrange multipliers. Penalty method. Eigenvalues and Eigenvectors.</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">☐ field classes</td><td></td></tr>
<tr><td>Student obligations</td><td colspan="7">Regular class attendance</td></tr>
<tr><td rowspan="6">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td colspan="2"></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td colspan="2">3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td colspan="2"></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td colspan="2"></td></tr>
<tr><td colspan="7"></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="7">Learning outcomes are evaluated by assessing a seminar paper.</td></tr>
<tr><td rowspan="3">Required reading (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">J.N. Reddy, Applied Functional Analysis and Variational Methods in Engineering, McGraw-Hill Book Company, 1987.</td><td></td><td></td></tr>
<tr><td colspan="4">I. Aganović, Uvod u rubne zadaće mehanike kontinuuma, Zagreb, 2003.</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="7">S. Kurepa, Funkcionalna analiza- elementi teorije operatora, Školska knjiga, Zagreb, 1980.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="7">Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="7"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="6">PRACTICAL METHODS OF OPTIMISATION</td></tr>
<tr><td>Code</td><td>GAMA02</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Associate Professor Jelena Sedlar, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">For practical problems, assess whether they can be solved using mathematical optimization methods, then formulate the problem as an optimization problem if possible, select the optimization method that can solve the problem, develop an appropriate algorithm for solving the problem, and substantiate the solution.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Basic knowledge of Mathematical Analysis and Linear Algebra. Probability and mathematical methods in Statistics. Understanding of fundamental concepts of ordinary and partial differential equations and their applications.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
assess if a practical problem can be formulated as mathematical optimisation problem,
establish if the formulated problem of mathematical optimisation belongs to the type of problem which can be reliably and efficiently solved by optimisation methods (least squares method, linear programming, convex optimisation) and provide substantiated arguments for his/her position,
select optimisation method for solving the formulated problem,
develop algorithms for solving moderate size problems by the selected optimisation method,
define the optimal solution, assess performance constraints and elaborate his/her position.</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Problem classification. Convex set, convex conus. Representation of the convex set. Convex function. Convex programming. Examples. Linear programming. Minimum requirements for unconstrained problems. Numerical methods: gradient method, Newton`s method, quasi-Newton method, conjugate gradient method etc. Convex programming with constraints. Duality in convex optimisation. Kuhn-Tucker conditions. Optimisation methods: Lagrange method of multipliers, penalty method etc. Other optimisation methods: dynamic programming, 0-1 search method, stochastic programming.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Regular class attendance</td></tr>
<tr><td rowspan="3">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
</table>

	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Learning outcomes are assessed firstly at an oral exam, testing the understanding of basic theoretical facts related to optimization methods. Secondly, seminar papers with the results of research conducted on the assigned seminar topic are evaluated and publicly presented.					
Required reading (available in the library and via other media)	**Title**				**Number of copies in the library**	**Availability via other media**
	S. Boyd, L. Vandenberghe, Convex Optimization, Cambridge University Press New York, New York, 2004					yes
	M. Bazara, J. Jarvis, H. Sherali, Linear Programing and Network Flows, John Wiley & Sons, Inc., Hoboken, New Jersey, 2010				1	
	S. Zlobec, J. Perić, Nelinearno programiranje, Naučna knjiga, Beograd, 1987.				1	
Supplementary reading	F. L. Vasiljev, Čislenije metodi ekstremalnyh zadač, Nauka Moskva, 1988.					
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.					
Other (as proposed by the institution)						

<table>
<tr><td>COURSE TITLE</td><td colspan="5">MATHEMATICAL ANALYSIS OF BOUNDARY-VALUE PROBLEMS</td></tr>
<tr><td>Code</td><td>GAMA03</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Božo Vrdoljak, PhD
Associate Professor Slavica Ivelić Bradanović, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5"></td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Knowledge acquired in mathematical courses during graduate studies.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
formulate partial differential equations for given physical problems
classify partial differential equations into linear, quasi-linear and non-linear,
assess if the formulated partial differential equation can be solved by analytical methods or select the appropriate method
assess if the formulated partial differential equation can be solved by numerical methods or select the appropriate method</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Equilibrium of stretched string and membrane, oscillation and diffusion problems, equilibrium and constitutive laws. Modelling for wave, diffusion and potential equations.
Types of conditions and problems, initial and boundary-value problem, Dirichlet and Neumann problem, classification of second-order partial differential equations. Method of characteristics for first and second-order equations, transformation of equations to normal form.
Equilibrium of stretched string, Green function. Contact field and equilibrium of stretched membrane, Laplace equation, Green formula. Fundamental solutions, Green function, harmonic functions. Dirichlet and Neumann problem for circle and ball, spherical and cylindrical functions. Diffusion equation in thermodynamics, maximum principle, Poisson formula. Wave equation, Kirchoff and Poison formula. Method of separation of variables, Green method.
Calculus of variations, variation problems for functions of one or several variables, variation problems with higher derivatives and with several unknown functions, Euler differential equation in calculus of variations. Variation formulation of boundary-value problems.
Numerical solution of boundary-value problems, method of finite differences, method of collocation and least square method, variation methods, Galjerkin method, Rayleigh-Ritz method, finite element method.</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">☒ lectures
☒ seminars and workshops
☒ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
</table>

<table>
<tr><td>Student obligations</td><td colspan="6">Regular class attendance</td></tr>
<tr><td rowspan="5">Monitoring student work</td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
<tr><td>Experiments</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3.0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar paper</td><td>2.0</td><td></td><td></td></tr>
<tr><td>Mid-term exams</td><td></td><td>Oral exam</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td>Assessment methods and evaluating student work in class and at the final exam</td><td colspan="6">Oral exam, oral presentation.</td></tr>
<tr><td rowspan="4">Required reading (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="3">I. Aganović i K. Veselić, Linearne diferencijalne jednadžbe, PMF, Zagreb, 1997.</td><td></td><td></td></tr>
<tr><td colspan="3">T.A. Bick, Elementary Boundary Value Problems, Marcel Dekker, New York, 1993.</td><td></td><td></td></tr>
<tr><td colspan="3">P.K. Kythe, P. Puri and M.R. Schaferkotter, Partial Diferential Equations and Boundary Value Problems with Mathematica, Chapman & Hall/CRC, Boca Raton, 2003.</td><td></td><td></td></tr>
<tr><td>Supplementary reading</td><td colspan="6">M.A. Pinsky, Partial Differential Equations and Boundary-Value Problems with Applications, McGraw-Hill, Boston, 1998.
K. Yosida, Lectures on Differential and Integral Equations, Dover Publications, New York, 1991.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of intended learning outcomes</td><td colspan="6">Quality assurance and performance monitoring will be conducted at three levels:
(1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.</td></tr>
<tr><td>Other (as proposed by the institution)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>COURSE TITLE</td><td colspan="5">INTEGRAL EQUATIONS</td></tr>
<tr><td>Code</td><td>GAMA04</td><td>Year of the study programme</td><td colspan="3">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Božo Vrdoljak, PhD
Assistant Professor Senka Banić, PhD</td><td>Credits (ECTS)</td><td colspan="3">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="3"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5"></td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Knowledge acquired in mathematical courses during graduate studies.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="5">The student will be able to:
formulate integral equations for solving initial and boundary problems of regular and partial equations
classify integral equation and select appropriate solving method
determine if integral transformations are applicable
determine if numerical methods are applicable in solving integral equations</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="5">Definition and classification, Fredholm and Volterra integral equations, relation to differential equations.
Fredholm integral equations, equations with degenerate kernels, discussion on solutions, eigenvalues and eigenfunctions, transposed integral equation, method of successive approximations, Neumann series. Fredholm method, Fretholm theorems. Solution of homogeneous integral equation, orthonormal systems for given kernel, iterative procedure.
Volterra integral equations, solution by differentiating, method of successive approximations, Neumann series, Volterra integral equations of convolution type. Singular integral equations, Abel equation, equation with Cauchy kernel.
Hilbert-Schmidt theory of integral equations with symmetric kernels, eigenvalues and eigenfunctions, Hilbert-Schmidt theorem.
Integral equations which transform to equations with Hermite kernel. Banach fixed point theorem and existence of solution of integral equations
Integral transformations: Laplace, Fourier and Hankel, inverse transformations, properties, applications in solving initial and boundary value problems for ordinary and partial differential equations.
Numerical solution of integral equations, approximation of integral, approximation of kernel, collocation method, quadrature formula, variation methods, collocation method, least square method and Galjerkin method.</td></tr>
<tr><td>Format of instruction:</td><td colspan="2">☒ lectures
☒ seminars and workshops
☒ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="5">Regular class attendance</td></tr>
</table>

Monitoring student work	Class attendance	1.0	Research		Practical work	
	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, oral presentation.					

Required reading (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	H. Hochstadt, Integral Equations, J, Wiley, 1994.		
	K. Yosida, Lectures on Differential and Integral Equations, Dover Publications, New York, 1991.		

Supplementary reading	Aganović i K. Veselić, Linearne diferencijalne jednadžbe, PMF, Zagreb, 1997. T.A. Bick, Elementary Boundary Value Problems, Marcel Dekker, New York, 1993.
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.
Other (as proposed by the institution)	

<table>
<tr><td>COURSE TITLE</td><td colspan="6">METHODS OF MATHEMATICAL STATISTICS</td></tr>
<tr><td>Code</td><td>GAMA05</td><td>Year of the study programme</td><td colspan="4">1st</td></tr>
<tr><td>Course leader/s</td><td>Professor Božo Vrdoljak, PhD
Associate Professor Jelena Sedlar, PhD</td><td>Credits (ECTS)</td><td colspan="4">6.0</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours per semester)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Extracurricular</td><td>Percentage of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6"></td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Completed mathematical courses at the level of graduate studies.</td></tr>
<tr><td>Learning outcomes expected at the level of the course</td><td colspan="6">The student will be able to:
formulate stochastic model of practical problems with emphasis on water management
select statistical method or test for model evaluation
assess gained results of the formed stochastic model
assess constraints of the selected model</td></tr>
<tr><td>Course contents elaborated by class schedule</td><td colspan="6">Random events, random variables. Distributions of random variables: Normal or Gauss, lognormal, gamma, log-Pirson 3, chi-square, Gumbel, student t- distribution, Fisher F-distribution. Distribution function. Random vectors, independence of random variables, moments, correlation coefficient, regression. Statistical decision, estimation of parameters, sample mean, sample variance, sample range, sample correlation coefficient. Method of maximum likelihood, method of moments, distribution of parameter estimators. Some statistical distributions, confidence intervals for unknown parameters of distribution, confidence intervals for distribution function.
Hypothesis testing, hypothesis tests for distribution.
Example of applications of statistics in hydrology: Coincidence tests of empirical and theoretic distributions in hydrology, chi-square test, Kolmogorov-Smirnov test. Analysis of homogeneity of hydrological series. Testing of mean, student t- test. Testing of variance of two samples. Independence analysis of hydrological series, test for squares of differences.
Sample regression and correlation, least square method, Gauss-Markov theorem, analysis of data dispersion, testing of hypothesis on regression coefficient, generating series by linear regression model, auto-correlation. Independence analysis of time series components, linearly dependent stationary processes.
Nonlinear regression. Multiple correlation and regression.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ fully online
☐ blended e-learning
☐ field classes</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ mentoring
☐ (add other)</td></tr>
<tr><td>Student obligations</td><td colspan="6">Regular class attendance</td></tr>
<tr><td></td><td>Class attendance</td><td>1.0</td><td>Research</td><td></td><td>Practical work</td><td></td></tr>
</table>

Monitoring student work	Experiments		Report		Independent work	3.0
	Essay		Seminar paper	2.0		
	Mid-term exams		Oral exam			
	Written exam		Project			
Assessment methods and evaluating student work in class and at the final exam	Oral exam, oral presentation.					

	Title	**Number of copies in the library**	**Availability via other media**
Required reading (available in the library and via other media)	B. Vrdoljak, Vjerojatnost i statistika, Građevinsko-arhitektonski fakultet, Split, 2006.		
	Ž. Pauše, Uvod u matematičku statistiku, Školska knjiga, Zagreb, 1993.		
	J.D. Salas, J.W. Delleur, V. Yevjevich and W.L. Lane, Applied Modeling of Hidrologic Time Series, Water Resources Publications, Michigan, 1980.		
Supplementary reading	Pavlić, Statistička teorija i primjena, Tehnička knjiga, Zagreb, 1977. M. Ilijašević i Ž. Pauše, Riješeni primjeri i zadaci iz vjerojatnosti i statistike, “Zagreb”, Zagreb, 1990.		
Quality assurance methods that ensure the acquisition of intended learning outcomes	Quality assurance and performance monitoring will be conducted at three levels: (1) University; (2) Faculty, i.e. the Teaching Quality Assurance Commission; (3) Course teacher.		
Other (as proposed by the institution)			

3. STUDY PERFORMANCE CONDITIONS

3.1. Places of the study performance

Buildings of the constituent part (name existing, under construction and planned buildings)	
Identification of building	Building A
Location of building	Matice hrvatske 15
Year of completion	1976
Total floor area in m2	2728
Identification of building	Building B
Location of building	Matice hrvatske 15
Year of completion	1977
Total floor area in m2	3320
Identification of building	Building C
Location of building	Matice hrvatske 15
Year of completion	2001
Total floor area in m2	2442
Identification of building	Specialised Laboratory Unit – Hydrotechnical Laboratory
Location of building	Hrvatskih velikana 38, Žrnovnica
Year of completion	2021
Total floor area in m2	1437
Identification of building	Specialised Laboratory Unit – Laboratory for Seismic Testing
Location of building	Hrvatskih velikana 38, Žrnovnica
Year of completion	1980
Total floor area in m2	554

3.2. List of teachers and associate teachers per each course

Courses / activities	Teachers:
MANDATORY RESEARCH ACTIVITIES REQUIRED FOR THE DOCTORAL DEGREE IN THE FIELD OF CIVIL ENGINEERING	
Research I	Supervisor(s)
Research II	Supervisor(s)
Research III	Supervisor(s)
EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF BEARING STRUCTURES	
Meshless Numerical Methods and Corresponding Adaptive Techniques	Professor Emeritus Blaž Gotovac, PhD Professor Vedrana Kozulić, PhD
Numerical Modelling of Shell Structures	Professor Vedrana Kozulić, PhD Professor Emeritus Blaž Gotovac, PhD

Numerical Methods for the Mechanics of Materials	Professor Pavao Marović, PhD Professor Mirela Galić, PhD
Experimental Methods	Professor Pavao Marović, PhD Professor Mirela Galić, PhD
Selected chapters of Structural Dynamics and Earthquake Engineering	Professor Emeritus Ante Mihanović, PhD Associate Professor Hrvoje Smoljanović, PhD
Selected chapters of Stability of structures	Professor Emeritus Ante Mihanović, PhD Professor Boris Trogrlić, PhD Associate Professor H. Smoljanović, PhD Associate Professor I. Balić, PhD
Finite Element Method	Professor Željana Nikolić, PhD
Extreme Actions and Structure Safety/Stability	Professor Ivica Boko, PhD Associate Professor Neno Torić, PhD Professor Emeritus Bernardin Peroš, PhD
Steel and Composite Structures	Professor Ivica Boko, PhD Associate Professor Neno Torić, PhD Professor Emeritus Bernardin Peroš, PhD
Numerical Modelling of Concrete Structures	Professor Jure Radnić, PhD Professor Alen Harapin, PhD Professor Domagoj Matešan, PhD
Design of Supporting Systems of Bridges and Structures	Professor Jure Radnić, PhD Professor Alen Harapin, PhD Professor Domagoj Matešan, PhD
Mechanics of Discontinua	Professor Ante Munjiza, PhD
Numerical Modelling of Water-Soil-Structure Dynamic Interaction	Professor Jure Radnić, PhD Professor Alen Harapin, PhD Professor Domagoj Matešan, PhD
Selected chapters of Concrete and Masonry Structures	Professor Jure Radnić, PhD Professor Alen Harapin, PhD Professor Domagoj Matešan, PhD
EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF HYDROTECHNICS	
Dispersion Processes in Water Resources	Professor Roko Andričević, PhD Professor Hrvoje Gotovac, PhD
Theory of Risk Assessment in Environmental Engineering	Professor Roko Andričević, PhD
Karst Water Resources	Professor Emeritus Ognjen Bonacci, PhD
Ecohydrology	Professor Emeritus Ognjen Bonacci, PhD
Hydrological Modelling in Karst	Assistant Professor Vesna Denić-Jukić, PhD
Marine Hydraulics, special chapters	Assistant Professor Nenad Leder, PhD
System Engineering in Water Resources	Professor Emeritus Jure Margeta, PhD

Management	
Sustainable Urban Water Systems	Professor Emeritus Jure Margeta, PhD
Selected chapters on Karst Hydrogeology	Professor Emeritus Ognjen Bonacci, PhD
Introduction to Engineering Numerical Modelling	Professor Hrvoje Gotovac, PhD
Analysis of Hydrological Time Series	Professor Damir Jukić, PhD
EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF TRANSPORTATION	
Traffic Flow Theory	Professor Dražen Cvitanić, PhD
Highways – selected chapters	Associate Professor Deana Breški, PhD
Transport Planning	Professor Dražen Cvitanić, PhD Associate Professor Deana Breški, PhD
EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF GEOTECHNICS	
Selected chapters from Rock Mechanics	Professor Predrag Miščević, PhD
Soil Mechanics Models	Professor Emeritus Tanja Roje-Bonacci, PhD
Special chapters in Foundation Engineering	Professor Emeritus Tanja Roje-Bonacci, PhD
EXTRACURRICULAR COURSES IN THE FIELD OF CIVIL ENGINEERING, BRANCH OF MATERIALS	
Rheology of Materials	Professor Sandra Juradin, PhD
New Materials in Civil Engineering	Professor Sandra Juradin, PhD
EXTRACURRICULAR COURSES IN THE FIELD OF FUNDAMENTAL ENGINEERING SCIENCES, BRANCH OF ORGANISATION OF WORK AND PRODUCTION	
System Engineering in Project Management	Professor Snježana Knezić, PhD
Decision Support Systems	Professor Nikša Jajac, PhD
System Theory	Professor Snježana Knezić, PhD
EXTRACURRICULAR COURSE IN THE FIELD OF ARCHITECTURE AND URBAN PLANNING	
Roads and the Environment	Professor Darovan Tušek, PhD
EXTRACURRICULAR COURSES IN THE AREA OF TECHNICAL SCIENCES	
Methodology and Techniques of Scientific Research	Professor Pavao Marović, PhD Professor Mirela Galić, PhD
Information Engineering	Professor Ante Munjiza, PhD
Engineering Simulations Techniques	Professor Ante Munjiza, PhD

EXTRACURRICULAR COURSES IN THE FIELD OF NATURAL SCIENCES, BRANCH OF MATHEMATICS	
Applied Functional Analysis	Associate Professor Slavica Ivelić Bradanović, PhD
Optimisation Methods	Associate Professor Jelena Sedlar, PhD
Mathematical Analysis of Boundary-value Problems	Professor Božo Vrdoljak, PhD Associate Professor Slavica Ivelić Bradanović, PhD
Integral Equations	Professor Božo Vrdoljak, PhD Assistant Professor Senka Banić, PhD
Methods of Mathematical Statistics	Professor Božo Vrdoljak, PhD Associate Professor Jelena Sedlar, PhD

3.3. Teaching staff

Title, name and last name	Professor Roko Andričević, PhD
Title of the course at the proposed study programme	Dispersion Processes in Water Resources, Theory of Risk Assessment in Environmental Engineering
GENERAL INFORMATION ON COURSE LEADER	
Address	Put Duilova 47, Split
Telephone number	098 217 897
Email address	rokoand@gradst.hr
Personal web page	/
Year of birth	1955
Scientist ID	223606
Research or artistic rank and date of the last appointment	Scientific advisor
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured full professor 15.05.2003.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.03.2016.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Hydrotechnical Engineering
Position in the institution	Head of Department of Hydrotechnical Engineering
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	University of Minnesota, Minneapolis, USA
Place	Minnesota, Minneapolis, USA
Date	1988
INFORMATION ON ADDITIONAL TRAINING	
Year	1987-1988
Place	Stanford, California, USA
Institution	Stanford University
Field of training	Environmental Protection
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Integrated Water Resources Management, Hydropower Engineering (Graduate university study programme in Civil Engineering)
Authorship of university textbooks from the field of the course	1. Andričević, Roko; Gotovac, Hrvoje; Ljubenkov, Igor. Geostatistika : umijeće prostorne analize. Split : Tiskara POLJICA d.o.o., Dugi Rat, 2007 (university textbook).

Professional and research papers or art works published in the last five years from the field of the course **(max 5 references)**	Kvesić, M., Kalinić, H., Dželalija, M., Šamanić, I., Andričević, R. and Maravić, A. **Microbiome and antibiotic resistance profiling in submarine efflent receiving coastal waters in Croatia,** Environmental Pollution, 292, 2022. Andričević, R., Kekez, T. and Vojković, M. **Trophic status assessment of Central Eastern Adriatic Sea using water quality variables and loading capacity concept for estuaries,** *Marine Pollution Bulletin*, 173, 2021. Kvesić, M, Vojković, M., Kekez., Maravić, A. and Andričević, R. **Spatial and Temporal Vertical Distribution of Chlorophill in Relation to Submarine Wastewater Effluent Discharges**, *Water* 13, 2021. Kekez, T., Knezić, S. and Andričević, R. **Incorporating Uncertainty of the System Behavior in Flood Risk Assessment - Sava River Case Study**, *Water*, 12, 2020. Andričević, R., Galešić, M. **Contaminant dilution measure for the solute transport in an estuary**. *Advances in Water Resources*, 117, 2018.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Preparation of the Strategic Environmental Assessment of the Croatia Waste and Leachate Management Plan And Guidelines for Preparation Of Waste And Leachate Management Plans; project financed by Environmental Protection and Energy Efficiency Fund. SEA expert (2014-2015) 2. Establish Pan-European Information Space to Enhance seCurity of Citizens - EPISECC, FP7EU Grant Agreement No. 607078 Partner coordinator (2014-2017) 3. Fostering sustainability and uptake of research results through Networking activities in Black Sea & Mediterranean areas - IASON, FP7-EU Grant agreement No. 603534 Partner coordinator (2013 - 2015)
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Assistant Professor Senka Banić, PhD
Title of the course at the proposed study programme	Integral Equations
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, 21000 Split
Telephone number	021303410
Email address	sbanic@gradst.hr
Personal web page	/
Year of birth	1971
Scientist ID	220726
Research or artistic rank and date of the last appointment	Research Associate 27.05.2008.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Assistant Professor (re-appointment), January 2019
Area and field of appointment into research or artistic rank	Field: Natural Sciences, Branch: Mathematics.
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	University of Split Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.02.1997.
Job title (professor, researcher, associate teacher, etc.)	Assistant Professor
Field of research	Mathematics, teaching at the Department of Mathematics and Physics
Position in the institution	/
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD in Mathematics
Institution	Department of Mathematics, Faculty of Science
Place	Zagreb
Date	2007
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course lectures and exercises: Mathematics 1 and Mathematics 2 at the Undergraduate University Study of Civil Engineering; Mathematical Analysis and Vector Analysis at the Undergraduate University Study of Geodesy and Geoinformatics. Course exercises:

	Mathematics at the Undergraduate Professional Study of Civil Engineering. All listed courses delivered at FCEAG, University of Split. Course lectures: DIR 2 and Mathematics 3 at the Undergraduate University Study of Mathematics, Physics, Computer Science, etc., Faculty of Science and Education (FPMOZ) at the University of Mostar.
Authorship of university textbooks from the field of the course	S. Pavasović, T. Radelja, S. Banić i P. Milišić, Matematika 1 – riješeni zadaci, Građevinski Fakultet, Split, 1999.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	Banić, Senka; Klaričić Bakula, Milica. Jensen's inequality for functions superquadratic on the coordinates. // Journal of Mathematical Inequalities. 9 (2015) , 4; 1365-1375
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	*Inequalities and Applications,* HRZZ-5435 (Principal Investigator: Professor Josip Pečarić, PhD, 2014-2018), Croatian Science Foundation Research Project
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	Study Programme in *Mathematics and Physics* at the Faculty of Science and Education, University of Split (Teaching Track, Professional Title: Teacher of Mathematics and Physics)
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Ivica Boko, PhD
Title of the course at the proposed study programme	Extreme Actions and Structure Safety/Stability, Steel and Composite Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Vukovarska 142
Telephone number	095-8158-081
Email address	ivica.boko@gradst.hr
Personal web page	/
Year of birth	1971
Scientist ID	220730
Research or artistic rank and date of the last appointment	Scientific advisor 04.07.2013.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 27.09.2019.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.10.2019.
Job title (professor, researcher, associate teacher, etc.)	Tenured Full Professor
Field of research	Load-bearing structures
Position in the institution	Head of the Department of Metal and Timber Structures
INFORMATION ON EDUCATION - Highest degree achieved	

Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	28.06.2005.
INFORMATION ON ADDITIONAL TRAINING	
Year	2000.
Place	Genoa, Italy
Institution	Department of Structural and Geotechnical Engineering DISEG, University of Genoa
Field of training	International Advanced School on Wind-excited and aeroelastic vibrations of structures
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader, Faculty of Civil Engineering, Architecture and Geodesy, University of Split: - Introduction to Timber Structures, Introduction to Metal Structures (Undergraduate University Study of Civil Engineering) - Metal Structures I, Metal Structures II, Advanced Timber Structures, Glass Structures (Graduate University Study of Civil Engineering) Course leader, Faculty of Civil Engineering, University of Zagreb: - Safety of Load-bearing Structures in Fire, Fire Development Modeling (Postgraduate Specialist Study - Fire Engineering)
Authorship of university textbooks from the field of the course	Sigurnost konstrukcija u požaru, 2015. Aluminijske konstrukcije, 2017.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Juradin, S.; Boko, I.; Netinger Grubeša, I.; Jozić, D.; Mrakovčić, S.: Influence of different treatment and amount of Spanish broom and hemp fibres on the mechanical properties of reinforced cement mortars, Construction and building materials, 273 (2021), 121702, 14 doi:10.1016/j.conbuildmat.2020.121702 2. Torić, N.; Boko, I.; Burgess, I. W.; Divić, V.: The effect of high-temperature creep on buckling behaviour of aluminium grade EN6082AW T6 columns, Fire safety journal (2020) doi:10.1016/j.firesaf.2020.102971 3. Torić, Neno; Brnić, Josip; Boko, Ivica; Brčić, Marino; Burgess, Ian W.; Uzelac Glavinić, Ivana. Development of a high temperature material model for grade s275jr steel. // Journal of constructional steel research. 137 (2017) ; 161-168. 4. Torić, Neno; Brnić, Josip; Boko, Ivica; Brčić, Marino; Burgess, Ian W.; Uzelac, Ivana. Experimental Analysis of the Behaviour of Aluminium Alloy EN6082 AW T6 at High Temperature. // Metals. 7 (2017) , 4; 1-15. 5. Torić, Neno; Boko, Ivica; Juradin, Sandra; Baloević, Goran. Mechanical Properties of Light-Weight Concrete After Fire Exposure. // Structural concrete.

	17 (2016) , 6; 1071-1081.saveza građevinskih inženjera. 68 (2016) , 12; 967-978.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Principal investigator for the IRI2 Project, call for proposals "Increasing the Development of New Products and Services Arising from Research and Development Activities – Phase II", Project title: Increasing the development of new wood industry products used in construction, project ID KK.01.2.1.02.0330 Collaborator on the research project of the Croatian Science Foundation "Influence of creep strain on the load capacity of steel and aluminium columns exposed to fire"
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Master's Thesis: "Trimo Research Award" 2005 Doctoral Thesis: "Trimo Research Award" 2006 Award for Scientific Excellence – Građevinar (Journal of the Croatian Association of Civil Engineers), 2014 Award for Scientific Excellence – Građevinar (Journal of the Croatian Association of Civil Engineers), 2017

Title, name and last name	Associate Professor Deana Breški, PhD
Title of the course at the proposed study programme	Highways – selected chapters, Transport Planning
GENERAL INFORMATION ON COURSE LEADER	
Address	Dubrovačka 41
Telephone number	098 801 259
Email address	deana.breski@gradst.hr
Personal web page	/
Year of birth	1966
Scientist ID	220741
Research or artistic rank and date of the last appointment	Senior research associate 30.10.2012.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Associate Professor 28.05.2020.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	17.11.1997.
Job title (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Transportation Engineering
Position in the institution	Head of the Department of Interdisciplinarity in Civil Engineering, ECTS coordinator
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD

Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	29.05.2008.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course co-leader, Faculty of Civil Engineering, Architecture and Geodesy, University of Split: - Roads (Undergraduate University Study of Civil Engineering) - Road Interchanges, Pavement Structures, Urban Traffic Areas, Traffic Engineering, Railways (Graduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Dumanić Daniela; Breški Deana; Sandra Juradin: The use of fibers in cement stabilized base course of pavement // 6th International Conference on Road and Rail Infrastructure, Proceedings of the Conference CETRA 2020 2. Breški, Deana; Cvitanić, Dražen; Dumanić, Daniela: Impact of Exclusive Bus Lane on Urban Arterial Performance Measures // 5th International Conference on Road and Rail Infrastructure, Proceedings of the Conference CETRA 2018
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Traffic analysis of the connection to state road DC8, planned within UPU Volicija 1, 2021 2. Traffic flow analysis during the construction of the ramp connecting the upper and lower levels of the western carriageway of Ulica ZNG in Split, 2020 3. Traffic analysis of the access to the City Port in Split via state road DC410 with proposed measures and activities for traffic management during the tourist season, 2019 4. Traffic flow analysis on the section of state road DC8 in Omiš, 2018 5. Traffic analysis of the intersection of state road DC1 with Ulica A. Starčevića and Vrlička ulica in Sinj, 2018
Within which program and to what extent did the course teacher acquire methodological,	/

psychological, didactic and pedagogical competencies?	
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Dražen Cvitanić, PhD
Title of the course at the proposed study programme	Traffic Flow Theory, Transport Planning
GENERAL INFORMATION ON COURSE LEADER	
Address	Lovretska 19, Split
Telephone number	021 303311
Email address	drazen.cvitanic @gradst.hr
Personal web page	/
Year of birth	1963
Scientist ID	220752
Research or artistic rank and date of the last appointment	Scientific advisor 01.03. 2013.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor; 1.10.2018.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.12.1996.
Job title (professor, researcher, associate teacher, etc.)	Tenured Full Professor
Field of research	Transportation Engineering
Position in the institution	Head of Department of Transportation Engineering
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	14.04.2004.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course co-leader, Faculty of Civil Engineering, Architecture and Geodesy, University of Split: - Roads (Undergraduate University Study of Civil Engineering)

	- Road Interchanges, Pavement Structures, Urban Traffic Areas, Traffic Engineering, Railways (Graduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Maslać, Danijela; Cvitanić, Dražen; Lovrić, Ivan. Estimation of Critical Headway at Small Urban Roundabout // Promet - Traffic & Transportation, 32 (2020), 1; 103-117. 2. Cvitanić, Dražen; Maljković, Biljana. DETERMINATION OF APPLICABLE ADJACENT HORIZONTAL CURVE RADII USING OPERATING SPEED // Promet - Traffic & Transportation, 31 (2019), 4; 443-452 doi:10.7307/ptt.v31i4.3088. 3. Lovrić, Ivan; Čutura, Boris; Cvitanić, Dražen. DEPENDENCE OF CARRIAGEWAY CROSSFALL ON OPERATING SPEED // Electronic journal of the Faculty of Civil Engineering Osijek - e-GFOS, 18 (2019), 18; 48-56 doi:10.13167/2019.18.5 4. Cvitanić, Dražen; Maljković, Biljana. Detection and analysis of hazardous locations on roads: a case study of the croatian motorway A1. //Transport, 2017, published online Janury 2017. 5. Cvitanić, Dražen; Maljković, Biljana. OPERATING SPEED MODELS OF TWO-LANE RURAL STATE ROADS DEVELOPED ON CONTINUOUS SPEED DATA // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku, 24 (2017), 6; 1915-1921 doi:10.17559/TV-20150304133437
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Traffic analysis of the connection to state road DC8, planned within UPU Volicija 1, 2021 2. Traffic flow analysis during the construction of the ramp connecting the upper and lower levels of the western carriageway of Ulica ZNG in Split, 2020 3. Traffic analysis of the access to the City Port in Split via state road DC410 with proposed measures and activities for traffic management during the tourist season, 2019 4. Traffic flow analysis on the section of state road DC8 in Omiš, 2018 5. Traffic analysis of the intersection of state road DC1 with Ulica A. Starčevića and Vrlička ulica in Sinj, 2018
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Vesna Denić-Jukić, PhD

Title of the course at the proposed study programme	Hydrological Modelling in Karst
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15
Telephone number	021/303 404
Email address	vdenic@gradst.hr
Personal web page	/
Year of birth	1967
Scientist ID	196750
Research or artistic rank and date of the last appointment	Scientific advisor 27.09.2006.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 27.09.2018.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	15.06.1992
Job title (professor, researcher, associate teacher, etc.)	Tenured Full Professor
Field of research	Hydrology
Position in the institution	Head of Studies, Hydrotechnical Engineering Programme, University Graduate Study of Civil Engineering
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	11.07.2002.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Teaching courses at FCEAG: Hydrology, Undergraduate University Study of Civil Engineering Engineering Hydrology, Graduate University Study of Civil Engineering Irrigation and Drainage, Graduate University Study of Civil Engineering Hydrology, Undergraduate Professional Study of Civil Engineering Urban Hydrology, Graduate University Study of Civil Engineering Hydrological Modelling in Karst (Postgraduate Doctoral Study of Civil Engineering).

Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Denić-Jukić, V., Kadić, A., Jukić, D., 2017. Higher-order partial cross-correlation function as a tool for investigating hydrological investigations in karst, 17th International Multidisciplinary Scientific GeoConference SGEM 2017. 2. Kadić, A., Denić-Jukić, V., Jukić, D., 2018. Revealing hydrological relations of adjacent karst springs by partial correlation analysis. Hydrol. Res. 49, 3, 616-633. 3. Kadić, A., Denić-Jukić, V., Jukić, D., 2019. Analiza meteoroloških i hidroloških odnosa u kršu primjenom kros-korelacijske funkcije višeg reda. Hrvatske Vode 109, 201–210. 4. Denić-Jukić, V., Lozić, A., Jukić, D., 2020. An Application of Correlation and Spectral Analysis in Hydrological Study of Neighboring Karst Springs, Water 12, 3570. 5. Jukić D, Denić-Jukić V., Ana Lozić, 2021. An alternative method for groundwater recharge estimation in karst, Journal of hydrology, 600, 126671.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Principal investigator for the Ministry of Science and Education scientific research project: Water balance and runoff modelling in karst; collaborator on four scientific research projects (to date).
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Annual Award of Croatian Waters for the best doctoral thesis in the field of water resources (2002)

Title, name and last name	Professor Mirela Galić, PhD
Title of the course at the proposed study programme	Numerical methods for the mechanics of materials, Methodology and techniques of scientific research
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15
Telephone number	091-4400074
Email address	mirela.galic@gradst.hr
Personal web page	/
Year of birth	1970
Scientist ID	220774
Research or artistic rank and date of the last appointment	Scientific advisor 04.04.2014.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Full Professor 23.02.2017.

Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.07.1997.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Strength of Materials and Testing of Structures
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	27.06.2006.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course co-leader at the Faculty of Civil Engineering, Architecture and Geodesy, University of Split: - Strength of Materials I, Strength of Materials II (Undergraduate University Study of Civil Engineering) - Testing of Structures, Housing Installations, Mechanics of Materials, Strength of Materials – Special Chapters (Graduate University Study of Civil Engineering) - Bearing Structures II (Undergraduate University Study of Architecture and Urban Planning) - Installations (Undergraduate Professional Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Raič, Ana; Nikolić, Mijo; Štambuk Cvitanović, Nataša; Galić, Mirela Numerical simulation of saturated and unsaturated consolidation behaviour of marl residual soil // International Journal for Engineering Modelling, **34** (2021), 1 Regular Issue; 31-47 doi:10.31534/engmod.2021.1.ri.03b (international peer-review, scientific article) 2. Munjiza, Antonio; Galić, Mirela; Smoljanović, Hrvoje; Marović, Pavao; Mihanović, Ante; Živaljić, Nikolina; Williams, John; Avital, Eldad Aspects of the hybrid finite discrete element simulation technology in science and engineering // International journal for engineering modelling, **32** (2019), 2-4; 45-55 doi:10.31534/engmod.2019.2-4.ri.01m (international peer-review, scientific article)

	3. Galić, Mirela; Marović, Pavao. Validation of the developed triaxial nonlinear material model for concrete. // Engineering Review. 4. Uzelac Glavinić, Ivana; Smoljanović, Hrvoje; Galić, Mirela; Munjiza, Ante; Mihanović, Ante Computational aspects of the combined finite- discrete element method in static and dynamic analysis of shell structures // Materialwissenschaft und Werkstofftechnik, **49** (2018), 5; 635-651 doi:10.1002/mawe.201700276 (international peer-review, scientific article) 5. Batinić, Milko; Galić, Mirela; Trogrlić, Boris; Divić, Vladimir; Racetin, Ivan; Mihanović, Ante Combined photogrammetry and mechanical testing of fired clay brick // Materialwissenschaft und Werkstofftechnik, **49** (2018), 1399-1408 doi:10.1002/mawe.201700106 (international peer-review, scientific article)
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Report on the testing of traffic light structures on the roads of the city of Split Report on the conducted trial load and testing of the pedestrian overpass structure on state road D8 Report on the conducted trial load and testing of the roof dome structure of the church Svetište Gospe od Otoka Participation in the Croatian Science Foundation scientific project “Impact of creep deformations on the load-bearing capacity of steel and aluminium columns in the event of fire”
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Hrvoje Gotovac, PhD
Title of the course at the proposed study programme	Dispersion Processes in Water Resources, Introduction to Numerical Modelling in Engineering
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	021 303 354
Email address	hrvoje.gotovac@gradst.hr
Personal web page	http://gradst.unist.hr/o-fakultetu/adresar-imenik/agenttype/view/propertyid/1804
Year of birth	1975
Scientist ID	244885
Research or artistic rank and date of the last appointment	Scientific advisor 16.04.2010.

Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Full professor, 24.01.2019.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.08.2001.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Industrial Hydrotechnics
Position in the institution	Head of Department of Hydrotechnical Engineering, Head of Hydrotechnical Laboratory
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	KTH Royal Institute of Technology
Place	Stockholm, Sweden
Date	18.06.2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	2016., 2017.
Place	Tennessee, USA
Institution	National Laboratory Oak Ridge
Field of training	Groundwater Flow Modelling
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader/co-leader: - Hydraulic Structures (Undergraduate University Study of Civil Engineering) - Groundwater Flow and Solute Transport Modelling, Hydraulic Structures (Graduate University Study of Civil Engineering) - Introduction to Numerical Modelling in Engineering, Dispersion Processes in Water Resources (Postgraduate Doctoral Study of Civil Engineering)
Authorship of university textbooks from the field of the course	1. Andričević, Roko; Gotovac, Hrvoje; Ljubenkov, Igor. Geostatistika : umijeće prostorne analize. Split : Tiskara POLJICA d.o.o., Dugi Rat, 2007 (university textbook).
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Kamber, G, Gotovac, H, Kozulić, V, Malenica, L, Gotovac, B. Adaptive numerical modeling using the hierarchical Fup basis functions and control volume isogeometric analysis. Int J Numer Meth Fluids., 2020; 92: 1437– 1461. https://doi.org/10.1002/fld.4830. 2. Lončar, G., Krvavica, N., Gotovac, H., Oskoruš, D., Kulić, T. Numerička analiza djelovanja brane na sprječavanje prodora slane vode duž korita rijeke Neretve, Hrvatske vode, 2020; 28 (112), 113-124.

	3. L. Malenica, H. Gotovac: Full space-time adaptive method based on collocation strategy and implicit multirate time stepping, International Journal for Numerical Methods in Fluids, 93(5), 1606-1626, 2021. 4. N. Krvavica, H. Gotovac, G. Lončar: Salt-wedge dynamics in microtidal Neretva River estuary, Regional Studies in Marine Science, 43, 101713, 2021. 5. H. Gotovac, L. Malenica, B. Gotovac : Control Volume Isogeometric Analysis for groundwater flow modeling in heterogeneous porous media, Advances in Water Resources, 148, 103838, 2021
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Groundwater flow modelling in karst aquifers (Croatian Science Foundation, 2014-2018), principal investigator. 2. Multiphysics modelling of surface-subsurface water systems (Croatian Science Foundation, 2021-2025), principal investigator. 3. CAAT, Coastal Auto-purification Assessment Technology, (IRI-1 project, 2019-2022), collaborator - researcher. 4. „Monitoring Sea-water intrusion in coastal aquifers and Testing pilot projects for its mitigation“ (Interreg project Croatia-Italy, 2019-2022), collaborator - researcher. 5. Development of drainage systems on permeable concrete horizontal surfaces, (IRI-2 project, 2020-2023), principal investigator.
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Annual award of Croatian Waters for the master's thesis in the field of water resources (2005)

Title, name and last name	Professor Alen Harapin, PhD
Title of the course at the proposed study programme	Numerical Modelling of Concrete Structures, Creating a Bearing System of Bridges and Other Structures, Numerical Modelling of Dynamic Interaction Water-Soil-Structure, Selected Chapters of Concrete and Masonry Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Trondheinska 21, Split
Telephone number	091-5250-115
Email address	alen.harapin@gradst.hr
Personal web page	/
Year of birth	1966
Scientist ID	189684
Research or artistic rank and date of the last appointment	Scientific advisor 30.06.2011.

Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured full professor 15.07.2016.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	University of Split, Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.07.2001.
Job title (professor, researcher, associate teacher, etc.)	Tenured Full Professor
Field of research	Concrete Structures and Bridges
Position in the institution	Tenured Full Professor
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	11.07.2000.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course co-leader at the Faculty of Civil Engineering, Architecture and Geodesy, University of Split: - Basics of Concrete Structures (Undergraduate University Study of Civil Engineering) - Concrete Structures I, Concrete Structures II, Housing Installations, Numerical Modelling of Concrete Structures, Composite Structures (Graduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Džolan, A.; Kožul, M.; Ćubela, D.; Harapin, A.: Analysis of the concrete shrinkage effects on the real behavior of the spatial concrete and reinforced concrete structures using the thermal analogy // Engineering computations, 36 (2019), 1; 04-2019-0187, 22 doi:10.1108/EC-04-2019-0187 2. Šunjić, G.; Prskalo, M.; Milašinović, Z.; Harapin, A.: Simulation of concrete ageing on dams as illustrated by numerical analysis of Jablanica HPP // Građevinar : časopis Hrvatskog saveza građevinskih inženjera, 71 (2019), 9; 749-767 doi:10.14256/JCE.2385.2018 3. Smilović Zulim, M.; Radnić, J.; Harapin, A.: Shear effect on seismic behaviour of masonry walls // Materialwissenschaft und Werkstofftechnik, 50 (2019), 5; 565-579 doi:10.1002/mawe.201800185

	4. Sunara, M.; Radnić, J.; Grgić, N.; Harapin, A.: Sloshing in medium size tanks caused by earthquake studied by SPH // Građevinar : časopis Hrvatskog saveza građevinskih inženjera, 70 (2018), 08; 671-684 doi:10.14256/jce.2169.2017 5. Torić, Neno; Harapin, Alen; Boko, Ivica: Modelling of the influence of creep strains on the fire response of stationary heated steel members // Journal of Structural Fire Engineering, 6 (2015), 3; 155-176 doi:10.1260/2040-2317.6.3.155
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	1. Harapin, A.: Quo vadis, Scientia? (Kamo ideš znanosti?), Hrvatski graditeljski forum - Izazovi u graditeljstvu 1, 2013. 2. Harapin, A.: Obrazovanje jučer, danas, sutra…, Hrvatski graditeljski forum - Izazovi u graditeljstvu 2, 2014. 3. Harapin, A.: Gdje je nestao inženjer?, Hrvatski graditeljski forum - Izazovi u graditeljstvu 4, 2017.
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	2014-2019 Collaborator on the Croatian Science Foundation project “Influence of creep strain on the load capacity of steel and aluminium columns exposed to fire” (Principal Investigator: Neno Torić)
U sklopu kojega programa i u kojem je opsegu nositelj stekao metodičko-psihološko-didaktičko - pedagoške kompetencije?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Associate Professor Slavica Ivelić Bradanović, PhD
Title of the course at the proposed study programme	Applied Functional Analysis
GENERAL INFORMATION ON COURSE LEADER	
Address	Papandopulova 31
Telephone number	021/465-771
Email address	sivelic@gradst.hr
Personal web page	/
Year of birth	1979.
Scientist ID	265526
Research or artistic rank and date of the last appointment	Senior research associate, January 2020
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Associate Professor, September 2019
Area and field of appointment into research or artistic rank	Natural Sciences, Mathematics
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	FCEAG, University of Split
Date of employment	01.03.2004.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Teaching at the Department of Mathematics and Physics
Position in the institution	Employee
INFORMATION ON EDUCATION - Highest degree achieved	

Degree	PhD in Mathematics
Institution	Department of Mathematics, Faculty of Science
Place	Zagreb
Date	26 July 2011
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	- Course lectures and exercises: Applied Mathematics at the Graduate University Study of Civil Engineering, and Applied Mathematics at the Undergraduate University Study of Civil Engineering, course lectures: Probability and Statistics, course exercises: Mathematics I, Mathematics II at the Undergraduate University Study of Civil Engineering, course exercises: Mathematics at the Undergraduate Professional Study of Civil Engineering, FCEAG, University of Split - Course lectures: Mathematics 1, Mathematics 2 at the University of Split Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Authorship of university textbooks from the field of the course	Probability and Statistics, course reader Applied Mathematics, course reader
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	Ivelić Bradanović, Slavica; Mićić, Jadranka; Pečarić, Josip: Sherman's operator inequality // *Journal of mathematical inequalities,* 15 (2021), 2; 675-699 Ivelić Bradanović, Slavica: More Accurate Majorization Inequalities Obtained Via Superquadraticity and Convexity with Application to Entropies // *Mediterranean journal of mathematics,* 18 (2021), 2021; 1-16 doi:10.1007/s00009-021-01708-6 Ivelić Bradanović; Slavica: Sherman's inequality and its converse for strongly convex functions with applications to generalized f -divergences // *Turkish Journal of Mathematics***,** 43 (2019), 6; 2680-2696 Barbir, Ana; Ivelić Bradanović, Slavica; Pečarić, Đilda; Pečarić, Josip: Converse to the Sherman inequality with applications // *Mathematical inequalities & applications,* 22 (2019), 4; 1405-1419 doi:10.7153/mia-2019-22-98 Ivelić Bradanović, Slavica; Latif, Naveed; Pečarić, Josip: Generalizations of Sherman's Inequality Via Fink's Identity

	and Green's Function // *Ukrainian mathematical journal,* 70 (2019), 8; 1192-1204
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	Ivelić, Slavica; Vidov, Marija, Modul komunikacije u inteligentnim tutorskim sustavima, Zbornik radova MIPRO'2001, računala u obrazovanju, Opatija : Hrvatska udruga MIPRO , 2001
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	Completed the Teacher Education Program at the Faculty of Science, University of Split, earning the title of Professor of Mathematics and Informatics. Participated in professional workshops organized by the Teaching Section of the Split Mathematical Society.
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Nikša Jajac, PhD
Title of the course at the proposed study programme	Decision Support Systems
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, 21000 Split, Hrvatska
Telephone number	+38521303409
Email address	njajac@gradst.hr
Personal web page	/
Year of birth	1977
Scientist ID	265473
Research or artistic rank and date of the last appointment	Scientific advisor 06.07.2018.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Full Professor 24.11.2021.
Area and field of appointment into research or artistic rank	Interdisciplinary field, specializing in Project Management (elective fields: Civil Engineering and Economics).
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.06.2004.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Project Management, Decision Support Systems, Construction Organization and Economics, Management, Urban Infrastructure Systems Management, and Built Environment Management.
Position in the institution	Full Professor/Dean
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	University of Split, Faculty of Economics, Business and Tourism
Place	Split
Date	2010
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/

Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Construction Management, Graduate University Study of Civil Engineering Business and Investments in Civil Engineering, Graduate University Study of Civil Engineering Construction Investments Planning, Graduate University Study of Architecture and Urban Planning Basics of Business Economy, Undergraduate University Study of Civil Engineering Basics of Business Economy, Undergraduate Professional Study of Civil Engineering Basics of Entrepreneurship, Undergraduate Professional Study of Civil Engineering
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Rogulj, Katarina; Pamukovic, Jelena Kilić and Jajac, Niksa. A Decision Concept to the Historic Pedestrian Bridges Recovery Planning. Applied Sciences-Basel 11 (2021), 3; 969-969 2. Pamukovic, Jelena Kilic; Rogulj, Katarina and Jajac, Niksa. Assessing the Bonitet of Cadastral Parcels for Land Reallocation in Urban Consolidation. LAND 10 (2021), 1; 9-9 3. Pamukovic, Jelena Kilic; Rogulj, Katarina; Dumanic, Daniela; Jajac, Niksa. A Sustainable Approach for the Maintenance of Asphalt Pavement Construction. Sustainability 13 (2021), 1; 109-109 4. Ivic, Majda; Kilic, Jelena; Rogulj, Katarina; Jajac, Niksa. Decision Support to Sustainable Parking Management-Investment Planning through Parking Fines to Improve Pedestrian Flows. Sustainability 12 (2020), 22; 9485-9485 5. Jajac, Nikša; Kilic, Jelena and Rogulj, Katarina. An Integral Approach to Sustainable Decision-Making within Maritime Spatial Planning-A DSC for the Planning of Anchorages on the Island of Solta, Croatia. Sustainability 11 (2019), 1; 104-104
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. 2020 - ongoing: Increasing the development of new wood industry products used in construction – IRI 2 (OPCC 2014-2020 Strengthening the Economy through Research and Innovation – ERDF); 2. 2014–2017: Establish a Pan-European Information Space to Enhance Security of Citizens - FP7. 3. 2019 - ongoing: Development of Energy Efficiency Planning and Services for the Mobility of Adriatic MARINAs Interreg Italy-Croatia CBC Programme 2014.-2020. (ERDF)

	4. 2019 - ongoing: PRAG – The first step in your career – jobs of the future in Architecture and Civil Engineering – ESF; 5. 2018-2021: From implementation of contemporary scientific and research infrastructure at FGAG to smart specialisation in green and energy efficient building - ERDF
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	University of Split Science Award 2019

Title, name and last name	Professor Damir Jukić, PhD
Title of the course at the proposed study programme	Analyses of Hydrological Time Series
GENERAL INFORMATION ON COURSE LEADER	
Address	Dobrilina 7 Split
Telephone number	0915341907
Email address	djukic@gradst.hr
Personal web page	/
Year of birth	1964
Scientist ID	199705
Research or artistic rank and date of the last appointment	Scientific advisor 27.9.2006
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 27.09.2019.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.11.2007.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Hydrology
Position in the institution	Head of Department of Hydrology
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	15.02.2005.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5

Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	- Stream Regulation, Graduate University Study of Civil Engineering, - Surface Water-Quality Modelling, Graduate University Study of Civil Engineering, - Karst Hydrology, Graduate University Study of Civil Engineering, - Integrated Environmental Protection, Graduate University Study of Architecture and Urban Planning, - Water Protection, Undergraduate University Study of Civil Engineering
Authorship of university textbooks from the field of the course	
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. D. Jukić, V. Denić-Jukić, 2017. A theoretical basis for application of partial correlation functions in hydrological system analysis with reference to karst, 17th International Multidisciplinary Scientific GeoConference SGEM 2017. 2. Kadić, A., Denić-Jukić, V., Jukić, D., 2018. Revealing hydrological relations of adjacent karst springs by partial correlation analysis. Hydrol. Res. 49, 3, 616-633. 3. Kadić, A., Denić-Jukić, V., Jukić, D., 2019. Analiza meteoroloških i hidroloških odnosa u kršu primjenom kros-korelacijske funkcije višeg reda. Hrvatske Vode 109, 201–210. 4. Denić-Jukić, V., Lozić, A., Jukić, D., 2020. An Application of Correlation and Spectral Analysis in Hydrological Study of Neighboring Karst Springs, Water 12, 3570. 5. Jukić D, Denić-Jukić V., Ana Lozić, 2021. An alternative method for groundwater recharge estimation in karst, Journal of hydrology, 600, 126671.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Croatian Waters Award for the best doctoral thesis, 2005

Title, name and last name	Professor Sandra Juradin, PhD
Title of the course at the proposed study programme	Rheology of Materials New Materials in Civil Engineering

GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	021/303-339
Email address	sandra.juradin@gradst.hr
Personal web page	/
Year of birth	1968
Scientist ID	203911
Research or artistic rank and date of the last appointment	Scientific advisor 09.07.2014.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Full Professor 25.01.2018.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.10.1993.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Construction Materials
Position in the institution	Head of Department of Materials
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	16.10.2003.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: Building Materials I (Undergraduate University Study of Civil Engineering) Building Materials II (Undergraduate University Study of Civil Engineering) Building Materials II (Graduate University Study of Civil Engineering) Building Materials (Undergraduate Professional Study of Civil Engineering) Rheology of Materials (Postgraduate Doctoral Study of Civil Engineering) New Materials in Civil Engineering (Postgraduate Doctoral Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last	1. Juradin, Sandra; Vranješ, Lidia Karla; Jozić, Dražan; Boko, Ivica. Post-Fire Mechanical Properties of Concrete Reinforced with Spanish Broom Fibers //

five years from the field of the course (max 5 references)	Journal of Composites Science, 5 (2021), 10; 265, 17 doi:10.3390/jcs5100265 (international peer-review, scientific article) 2. Juradin, Sandra; Netinger Grubeša, Ivanka; Mrakovčić, Silvija; Jozić, Dražan. Impact of fibre incorporation and compaction method on properties of pervious concrete // Materiales de Construcción, 71 (2021), 342; e245, 11 doi:10.3989/mc.2021.08020 (international peer-review, scientific article) 3. Juradin, Sandra; Boko, Ivica; Netinger Grubeša, Ivanka; Jozić, Dražan; Mrakovčić, Silvija. Influence of different treatment and amount of Spanish broom and hemp fibres on the mechanical properties of reinforced cement mortars // Construction and building materials, 273 (2021), 121702, 14 doi:10.1016/j.conbuildmat.2020.121702 (international peer-review, scientific article) 4. Juradin, Sandra; Ostojić-Škomrlj, Nives; Brnas, Ivan; Prolić, Marina. Influence of binder, aggregate and compaction techniques on the properties of single-sized pervious concrete // Advances in Concrete Construction, 10 (2020), 3; 211-220 doi:10.12989/acc.2020.10.3.211 (international peer-review, scientific article) 5. Juradin, Sandra; Boko, Ivica; Netinger Grubeša, Ivanka; Jozić, Dražan; Mrakovčić, Silvija. Influence of harvesting time and maceration method of Spanish Broom (Spartium junceum L.) fibers on mechanical properties of reinforced cement mortar // Construction and building materials, 225 (2019), 243-255 doi:10.1016/j.conbuildmat.2019.07.207 (international peer-review, scientific article)
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Testing of porous concrete Testing of concrete reinforced with natural fibres Investigation of the reusability of crushed aggregate for beach nourishment
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Snježana Knezić, PhD
Title of the course at the proposed study programme	System Engineering in Project Management, System Theory
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	021 303 360
Email address	snjezana.knezic@gradst.hr
Personal web page	/

Year of birth	1963
Scientist ID	163740
Research or artistic rank and date of the last appointment	Scientific advisor 01.02.2006.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 25.07.2011.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Fundamental Engineering Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.03.1996.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Construction Planning and Management, System Theory, Decision Support Systems, Risk Management
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Science
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	27.02.1998.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Production in Civil Engineering (Undergraduate University Study of Civil Engineering) - Management in Civil Engineering - Decision Systems in Civil Engineering (Graduate University Study of Civil Engineering) - Project Management (Graduate university studies in Architecture) - System Engineering in Project Management, System Theory (Postgraduate University Study of Civil Engineering) - Construction Technology (Undergraduate Professional Study of Civil Engineering)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last	1. Resilient Scheduling as a Response to Uncertainty in Construction Projects, Applied Sciences, 2021, 11(14), 6493

five years from the field of the course (max 5 references)	2. Incorporating Uncertainty of the System Behavior in Flood Risk Assessment—Sava River Case Study, Water, 2020, 12(10), 2676 3. Mladineo, Nenad; Mladineo, Marko; Knezić, Snježana. Web MCA-based Decision Support System for Incident Situations in Maritime Traffic: Case Study of Adriatic Sea. // Journal of navigation. 70 (2017) , 6; 1312-1334
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. EPISECC - Establish Pan-European Information Space to Enhance seCurity of Citizens Project Num.607078, 2014-2017, FP7-EU funded project; 2. HERACLES – HEritage Resilience Against CLimate Events on Site, Project Num. 700395, 2016-2019, H2020-EU funded project. 3. IMPETUS - Intelligent Management of Processes, Ethics and Technology for Urban Safety, 2020-2022, H2020 H2020-EU funded project; 4. FIRELOGUE - Cross-sector Wildfire Risk Management Dialogue, 2021-2026, H2020 H2020-EU funded project; 5. FIRE-RES - Innovative Technologies and Socio-Ecological-Economic Solutions for FIRE RESilient Territories in Europe, 2021-2026, H2020 H2020-EU funded project
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Vedrana Kozulić, PhD
Title of the course at the proposed study programme	Meshless Numerical Methods and the Associated Adaptive Techniques, Numerical Modelling of Shell Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Trondheimska 3, 21000 Split
Telephone number	+385 91 545 4385
Email address	vedrana.kozulic@gradst.hr
Personal web page	/
Year of birth	1962
Scientist ID	176112
Research or artistic rank and date of the last appointment	Scientific advisor 24.05.2006.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured full professor 15.07.2016.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering; Fundamental Engineering Sciences
INFORMATION ON CURRENT EMPLOYMENT	

Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.10.2004.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Engineering Mechanics, Numerical Modelling
Position in the institution	Head of Department of Engineering Mechanics
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, University of Split
Place	Split
Date	28.09.1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Engineering Mechanics 1, Engineering Mechanics 2, Undergraduate Professional Study of Civil Engineering Structural Statics 1, Structural Statics 2, Undergraduate University Study of Civil Engineering, Faculty of Civil Engineering, University of Rijeka Mechanics 2, Undergraduate University Study of Civil Engineering Mechanics of Deformable Bodies, Surface Structures, Graduate University Study of Civil Engineering
Authorship of university textbooks from the field of the course	B. Gotovac; V. Kozulić; I. Čolak: Uvod u numeričko modeliranje prostornih konstrukcija, Mostar: Sveučilište u Mostaru, 2001.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. V. Kozulić, B. Gotovac, G. Kamber: Meshless method based on the R-functions and atomic basis functions for the solution of two-dimensional boundary value problems, Proceedings Multiscale computational methods for solids and fluids, Ljubljana: University of Ljubljana, 171-174, 2017. 2. Kozulić, Vedrana; Gotovac, Blaž. Application of the Solution Structure Method in Numerically Solving Poisson's Equation on the Basis of Atomic Functions. // International Journal of Computational Methods, 15 (2018), 5; 1850033, 25 3. Kozulić, Vedrana; Gotovac, Blaž. Collocation method with Fup basis functions in modeling solid mechanics problems. // ECCOMAS MSF 2019 PROCEEDINGS. Sarajevo: Faculty of Civil Engineering, University of Sarajevo, 379-382, 2019. 4. Kamber, Grgo; Gotovac, Hrvoje; Kozulić, Vedrana; Malenica, Luka; Gotovac, Blaž. Adaptive numerical modeling using the hierarchical Fup basis functions and control volume isogeometric analysis. //

	International journal for numerical methods in fluids, 92 (2020), 10; 1437-1461 5. N. Brajčić Kurbaša, B. Gotovac, V. Kozulić, H. Gotovac. Numerical Algorithms for Estimating Probability Density Function Based on the Maximum Entropy Principle and Fup Basis Functions. Entropy 2021, 23, 1559, 2021.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Multiphysics modelling of surface-subsurface water systems, IP-2020-02-2298 HRZZ (Croatian Science Foundation) / (collaborator) (2021 – 2024)
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Assistant Professor Nenad Leder, PhD
Title of the course at the proposed study programme	Marine Hydraulics, special chapters
GENERAL INFORMATION ON COURSE LEADER	
Address	Šimićeva 56, 21000 Split
Telephone number	091 2257401
Email address	nenad.leder@pfst.hr
Personal web page	http://www.pfst.unist.hr/hr/component/intranet/?view=profesor&id=3140
Year of birth	1958
Scientist ID	192292
Research or artistic rank and date of the last appointment	Senior research associate, 22.01.2018.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Assistant Professor, 01.06.2017.
Area and field of appointment into research or artistic rank	Field of Natural Sciences, Area of Interdisciplinary Natural Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Maritime Studies, University of Split
Date of employment	01.06.2017.
Job title (professor, researcher, associate teacher, etc.)	Assistant Professor
Field of research	Physics, Geophysics
Position in the institution	/

INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	University of Zagreb, Faculty of Science, Department of Geophysics
Place	Zagreb
Date	22.10.2004.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course lectures and exercises: - Physics (Undergraduate University Study of Civil Engineering, Undergraduate University Study of Geodesy, FCEAG, University of Split) - 2 courses at the Postgraduate Doctoral Study of Civil Engineering (FCEAG, University of Split)
Authorship of university textbooks from the field of the course	/
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Leder, N., Duplančić Leder, T., 2017. Satellite derived bathymetry – Low cost survey system, 7th International Maritime Science Conference, April 20th-21st, 2017, Solin, Croatia, 516-520. 2. Matić, F., Kovač, Z.Ž., Vilibić, I., Mihanović, H., Morović, M., Grbec, B., Leder, N., Džoić, T. 2017. Oscillating Adriatic temperature and salinity regimes mapped using the Self-Organizing Maps method, Continental Shelf Research, 132, 11-18, doi:10.1016/j.csr.2016.11.006. 3. Lončar, G., Leder, N, Duplančić Leder, T., Carević, D. 2019. *Wave Energy Disbalance as Generator of Extreme Wave Occurrence in Semi-Enclosed Coastal Waters (Example of Rijeka Bay—Croatia)*, Journal of Marine Science and Engineering, 7 (11):420, doi: 10.3390/jmse7110420 (Q2, IF 1,732) 4. Leder, N., Duplančić Leder, T., Bačić S. 2020. *Analysis of State-of-the Art Hydrographic Survey Technologies,* FIG Working Week 2020, Amsterdam, Nizozemska, FIG 2020, 1-15. 5. Leder, N., Lončar, G., Duplančić Leder, T., 2020. *Measurements and Numerical Modelling of Surface Waves in Front of the Port of Split,* TransNav, 14, 1, 192-197, doi:10.12716/1001.14.01.24.
Professional and research papers in methodology	/

and quality of teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Award for the Best Poster at the 39th CIESM Congress (Commission Internationale pour l' Exploration Scientifique de la Mer Mediterranee), Venice, 2010: *Pasarić, M., Čupić, S., Domijan, N., Leder, N., Orlić, M., 2010. Record-breaking sea levels in the northern Adriatic on 1 December 2008, Rapport du Commission Internationale pour l'exploration scientifique de la Mer Mediteranee, 39, 157.* Award for the Best Paper of the Month from the International Federation of Surveyors (FIG), Copenhagen, 2021: *Duplančić Leder, T., Leder, N., 2020. Optimal Conditions for Satellite Derived Bathymetry – Case Study of the Adriatic Sea, FIG Working Week 2020, Amsterdam, The Netherlands, FIG 2020, 1-15.*

Title, name and last name	Professor Pavao Marović, PhD
Title of the course at the proposed study programme	Experimental Methods, Methodology and Techniques of Scientific Research
GENERAL INFORMATION ON COURSE LEADER	
Address	Velebitska 125, 21000, Split
Telephone number	091-561-29-75
Email address	pavao.marovic@gradst.hr
Personal web page	/
Year of birth	1954
Scientist ID	70744
Research or artistic rank and date of the last appointment	Scientific advisor
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured full professor 12.07.2001.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	06.04.1998.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Strength of Materials and Structural Testing

Position in the institution	Head of Department of Strength of Materials and Structural Testing
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, University of Zagreb
Place	Zagreb
Date	1987
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader/ co-leader: - Strength of Materials I, Strength of Materials II (Undergraduate University Study of Civil Engineering) - Mechanics of Materials (Graduate University Study of Civil Engineering) - Numerical Methods for the Mechanics of Materials, Experimental Methods, Methodology and Techniques of Scientific Research (Postgraduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	1. Mihanović, Ante; Marović, Pavao; Dvornik, Josip. Nelinearni proračuni armirano betonskih konstrukcija. Zagreb : Društvo hrvatskih građevinskih konstruktora, 1993. (academic monograph).
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Galić, Mirela; Marović, Pavao; Harapin, Alen. Parametric analysis of constant-moment zone length in four point bending of reinforced concrete beams. // Materialwissenschaft und Werkstofftechnik. 44 (2013), 5; 449-457 2. Galić, Mirela; Marović, Pavao. Validation of the developed triaxial nonlinear material model for concrete. // Engineering review : znanstveni časopis za nove tehnologije u strojarstvu, brodogradnji i elektrotehnici. 37 (2017) , 3; 298-313 3. Nikolić, Željana; Krstevska, Lidija; Marović, Pavao; Smoljanović, Hrvoje. Shaking table test of scaled model of Protiron dry stone masonry structure. // Proceedia Engineering. 199 (2017) ; 3386-3391 4. Galić, Mirela; Marović, Pavao. An overview of some characteristic numerical models for concrete. // International journal for engineering modelling. 25 (2012) , 1-4; 65-75
Professional and research papers in methodology and quality of	/

teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Domagoj Matešan, PhD
Title of the course at the proposed study programme	Numerical Modelling of Concrete Structures Creating a Bearing System of Bridges and Other Structures Numerical Modelling of Dynamic Interaction Water-Soil-Structure Selected Chapters of Concrete and Masonry Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Bračka 11, 21000 Split
Telephone number	021/303-362
Email address	domagoj.matesan@gradst.hr
Personal web page	/
Year of birth	1970
Scientist ID	237143
Research or artistic rank and date of the last appointment	Scientific advisor, tenured 24.03.2021.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 08.09.2021.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.05.2008.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Concrete Structures and Bridges, Numerical Modelling
Position in the institution	Tenured Full Professor
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Science, Civil Engineering
Institution	Faculty of Civil Engineering and Architecture, University of Split
Place	Split
Date	19.07.2007.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian

Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German, 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	- Undergraduate Professional Study of Civil Engineering: Bridges (3rd year) - Undergraduate University Study of Architecture: Bearing Structures I (2nd year) - Undergraduate University Study of Civil Engineering: Bridges (3rd year) - Graduate University Study of Civil Engineering: Prestressed Concrete (1st year), Concrete Structures (2nd year), Numerical Modelling of Concrete Structures (2nd year) - Postgraduate Doctoral Study of Civil Engineering: Numerical Modelling of Concrete Structures, Creating a Bearing System of Bridges and Other Structures
Authorship of university textbooks from the field of the course	Radnić J., Matešan D., Harapin A.: Betonske ploče i ljuske, Split, 2004.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Radnić, J., Matešan, D., Banović, I.: "Bridges with multiple structural systems: The example of Trilj Bridge reconstruction in Croatia", Bridge structures, 17 (2021); 1-2; 65-75. 2. Radnić, J., Matešan, D., Abaza, A.: "Restoration and Strengthening of Historical Buildings: The Example of Minceta Fortress in Dubrovnik", Advances in Civil Engineering, 2020 (2020); 1-17. 3. Baloević, G.; Radnić, J.; Grgić, N.; Matešan, D.: "Behavior of fiber reinforced mortar composites under impact load", Latin American Journal of Solids and Structures, 15 (2018), 2; 1-13. 4. Banović, I., Radnić, J., Grgić, N., Matešan, D.: "The use of limestone sand for the seismic base isolation of structures", Advances in Civil Engineering, 2018 (2018); 1-12. 5. Grgić, N.; Radnić, J.; Matešan, D.; Banović, I.: "Stirrups effect on the behavior of concrete columns during an earthquake", Materialwissenschaft und Werkstofftechnik, 48 (2017), 5; 406-419.
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Expertise and Opinion on the Load-Bearing Capacity of the "Steel Lattice Tower at the Military Location POM Mljet", Ministry of Defence. 2. Expertise and Opinion on the Load-Bearing Capacity of the "Steel Lattice Tower at the Military Location POM Lastovo", Ministry of Defence. 3. Expertise and Opinion on the Load-Bearing Capacity of the "Steel Lattice Tower at the Military Location POM Vis", Ministry of Defence. 4. Expertise and Opinion on the Load-Bearing Capacity of the "Steel Lattice Tower at the Military Location POM Dugi Otok", Ministry of Defence.

	5. Implementation Project “Split Airport: Reconstruction and Expansion of the Passenger Terminal”, City of Kaštela, Kaštel Štafilić.
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	1. Scientific Excellence Award, Journal “Građevinar” (2013)

Title, name and last name	Professor Predrag Miščević, PhD
Title of the course at the proposed study programme	Selected Chapters from Rock Mechanics
GENERAL INFORMATION ON COURSE LEADER	
Address	A.B. Šimića 46, Split
Telephone number	+38521303353
Email address	predrag.miscevic@gradst.hr
Personal web page	/
Year of birth	1961
Scientist ID	137614
Research or artistic rank and date of the last appointment	Scientific advisor 20.10.2005.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 18.11.2010.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	18.11.1985.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Geotechnical Engineering
Position in the institution	Head of Department of Geotechnical Engineering
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	06.11.1996.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (2)
COMPETENCES FOR THE COURSE	

Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Soil Mechanics and Foundations, Undergraduate University Study of Civil Engineering, Level 6; Geotechnical Engineering, Graduate University Study of Civil Engineering, Level 7; Rock Mechanics, Graduate University Study of Civil Engineering, Level 7
Authorship of university textbooks from the field of the course	1. Roje-Bonacci T., Miščević P. (1998.), Temeljenje, udžbenici Građevinskog fakulteta Sveučilišta u Splitu 2. Miščević, P. (1999.), priručnik "Zbirka riješenih zadataka iz mehanike tla", drugo dopunjeno izdanje, Građevinski fakultet Sveučilišta u Splitu, 122 stranice. 3. Miščević P., Štambuk Cvitanović N. & Vlastelica G., (2020.), "Dimenzioniranje gravitacijskih potpornih zidova", Sveučilište u Splitu, FGAG, ISBN 978-953-6116-84-3 4. Miščević P., (2015.), Inženjerska mehanika stijena, knjiga, Sveučilište u Splitu, Fakultet građevinarstva i arhitekture, 332 stranice, ISBN 978-953-6116-68-3
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Nikolić Mijo, Karavelić Emir, Ibrahimbegovic Adnan, Miščević Predrag (2018.), Lattice Element Models and Their Peculiarities. Archives of Computational Methods in Engineering. 25(3), 753–784, 2018. https://doi.org/10.1007/s11831-017-9210-y 2. Vlastelica G., Miščević P. & Štambuk Cvitanović N., (2018.), „Durability of soft rocks in Eocene flysch formation (Dalmatia, Croatia)", Engineering Geology, Vol. 245 (2018); 207-217. https://doi.org/10.1016/j.enggeo.2018.08.015 3. Miščević, P. & Vlastelica, G., (2019.), "Estimation of embankment settlement caused by deterioration of soft rock grains", Bulletin of Engineering Geology and the Environment (2019) 78: 1843., Issue 3, pp 1843–1853, https://doi.org/10.1007/s10064-017-1203-4 4. Miščević P., Štambuk Cvitanović N. & Vlastelica G., (2020.), "Soft Rock Mechanics and Engineering, Chapter 12: Degradation Processes in Civil Engineering Slopes in Soft Rocks", Editors: Milton Kanji, Manchao He, Luís Ribeiro e Sousa, Springer Nature Switzerland AG 2020, ISBN 978-3-030-29476-2, ISBN 978-3-030-29477-9 (eBook), https://doi.org/10.1007/978-3-030-29477-9 , https://doi.org/10.1007/978-3-030-29477-9_12 pp 335-371 5. Vučemilović, H., Mulabdić, M. & Miščević, P. (2021.) Corrected Rock Fracture Parameters and Other Empirical Considerations for the Rock Mechanics of Rock Masses of Doha, Qatar. Geotechnical and Geological Engineering, 39(4), 2823-2847 (2021). https://doi.org/10.1007/s10706-020-01658-y
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course	1. Croatian Science Foundation - UIP-2017-05-3429: Experimental and numerical investigations of mechanisms in

carried out in the last five years **(max 5 references)**	unsaturated geomaterials. Study of the unsaturated state in geomaterials and the relationship between suction and deformation on the example of soft rock, i.e., modelling the unsaturated state and the associated problem of material durability. The project will be conducted over a five-year period from March 2018 to February 2023, and the project team consists of: principal investigator Assistant Professor Nataša Štambuk Cvitanović, PhD, researchers Mijo Nikolić, PhD, and Goran Vlastelica, PhD, collaborator Professor Predrag Miščević, PhD, and a PhD student. 2. PRAG – The first step in your career – jobs of the future in Architecture and Civil Engineering, ID no. UP.03.1.1.04.0047, Operational Programme Efficient Human Resources financed from the European Social Fund (ESF) 2014 – 2020, call for proposals UP.03.1.1.04, Development, improvement, and implementation of professional practice in higher education
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	2020 – Scientific Excellence Award – “Građevinar” Journal of the Croatian Association of Civil Engineers

Title, name and last name	Professor Ante Munjiza, PhD
Title of the course at the proposed study programme	Mechanics of Discontinua, Information Engineering, Engineering Simulation Techniques
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15
Telephone number	021 303 349
Email address	ante.munjiza©gradst.hr
Personal web page	-
Year of birth	1960
Scientist ID	121890
Research or artistic rank and date of the last appointment	Scientific advisor
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 12.07.2007.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	University of Split Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.04.2016.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Simulation Engineering
Position in the institution	Professor
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	University of Wales
Place	Swansea
Date	September 1992
INFORMATION ON ADDITIONAL TRAINING	

Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Japanese, 5
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Courses with the same content taught at the Imperial College of London, University of London and University of Toronto
Authorship of university textbooks from the field of the course	Computational mechanics of discontinua Large strain finite element method: a practical course Large strain finite element method: a practical course
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. I Balić, H Smoljanović, B Trogrlić, A Munjiza, Seismic Analysis of the Bell Tower of the Church of St. Francis of Assisi on Kaptol in Zagreb by Combined Finite-Discrete Element Method, Buildings 11 (8), 373 2. I Đepina, V Divić, A Munjiza, B Peroš, Perfomance-based wind engineering assessment of critical telecommunication infrastructure subjected to bora wind, Engineering Structures 236, 112083, 2021 3. H Smoljanović, N Živaljić, Ž Nikolić, A Munjiza, Numerical Simulation of the Ancient Protiron Structure Model Exposed to Seismic Loading, International Journal of Architectural Heritage 15 (5), 779-789. 4. H Smoljanović, I Balić, B Trogrlić, N Živaljić, A Munjiza, Finite strain numerical model for the nonlinear analysis of thin shells, Engineering Structures 234, 111964 5. Z. Lei, E Rougier, EE Knight, M Zang, A Munjiza, Impact Fracture and Fragmentation of Glass via the 3D Combined Finite-Discrete Element Method, Applied Sciences 11 (6), 2484
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	-
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	-

PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	- University of Split Science Award, 2020 - University of Split Science Award, 2018

Title, name and last name	Professor Željana Nikolić, PhD
Title of the course at the proposed study programme	Finite Element Method
GENERAL INFORMATION ON COURSE LEADER	
Address	Split, Marina Getaldića 14
Telephone number	091 528 5557
Email address	zeljana.nikolic@gradst.hr
Personal web page	http://gradst.unist.hr/o-fakultetu/adresar-imenik/agenttype/view/propertyid/1753
Year of birth	1963
Scientist ID	176101
Research or artistic rank and date of the last appointment	Scientific advisor, Field of Civil Engineering 01.02.2006. Scientific advisor, Field of Fundamental Engineering Sciences 24.05.2006.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 28.06.2011.
Area and field of appointment into research or artistic rank	Area of Engineering Sciences, Field of Civil Engineering Area of Engineering Sciences, Field of Fundamental Engineering Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.10.1990.
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Theory of Structures, Numerical Mechanics, Earthquake Engineering, Building Physics
Position in the institution	Head of the Laboratory for Numerical Modelling
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Engineering Sciences
Institution	Faculty of Civil Engineering, University of Split
Place	Split
Date	21.04.1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	2010, 2011, 2012, 2013, 2014, 2016, 2017, 2018, 2019
Place	Zagreb, Split
Institution	University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Field of training	Energy Certification of Buildings, Alternative Energy Systems in Buildings
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	

Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Mechanics 1 (Undergraduate University Study of Civil Engineering) - Dynamics of Structures and Earthquake Engineering (Graduate University Study of Civil Engineering) - Dynamic Models of Earthquake Engineering (Graduate University Study of Civil Engineering) - Introduction to load-bearing structures 1, 2 (Undergraduate University Study of Architecture) - Finite Element Method (Postgraduate Doctoral Study of Civil Engineering)
Authorship of university textbooks from the field of the course	Ž. Nikolić: Mehanika 1, Sveučilite u Splitu, Građevinsko-arhitektonski fakultet, 2009.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Nikolić, Željana; Runjić, Luka; Ostojić Škomrlj, Nives; Benvenuti, Elena. Seismic Vulnerability Assessment of Historical Masonry Buildings in Croatian Coastal Area // Applied Sciences-Basel, 11 (2021), 13; 1, 27. doi:10.3390/app11135997 2. Čarija, Jadran; Nikolić, Mijo; Ibrahimbegovic, Adnan; Nikolić, Željana: Discrete softening-damage model for fracture process representation with embedded strong discontinuities // Engineering fracture mechanics, 236 (2020), 107211, 15. doi:10.1016/j.engfracmech.2020.107211 3. Nikolić, Željana; Krstevska, Lidija; Marović, Pavao; Smoljanović, Hrvoje. Experimental investigation of seismic behaviour of the ancient Protiron monument model // Earthquake engineering & structural dynamics, 48 (2019), 6; 573-593 doi:10.1002/eqe.3149 4. Nikolić, Mijo; Nam Do, Xuan; Ibrahimbegovic, Adnan; Nikolić, Željana. Crack propagation in dynamics by embedded strong discontinuity approach: Enhanced solid versus discrete lattice model // Computer methods in applied mechanics and engineering, 340 (2018), 480-499 doi:10.1016/j.cma.2018.06.012 5. Nikolić, Željana; Živaljić, Nikolina; Smoljanović, Hrvoje; Balić, Ivan. Numerical modelling of reinforced-concrete structures under seismic loading based on the finite element method with discrete inter-element cracks. // Earthquake engineering & structural dynamics. 46 (2017) , 1; 159-178
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Development of numerical models for reinforced-concrete and stone masonry structures under seismic loading based on discrete cracks (Croatian Science Foundation - HRZZ, 2015-2019) 2. Preventing, managing and overcoming natural-hazards risks to mitigate economic and social impact - PMO-GATE ID 10046122 (EUROPEAN UNION, Programme Interreg Italy-Croatia, 2019-2022) 3. Numerical Modelling in Civil Engineering, SAR project, FCEAG Split (2019-2024)
Within which program and to what extent did the course teacher	/

acquire methodological, psychological, didactic and pedagogical competencies?	
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Jure Radnić, PhD
Title of the course at the proposed study programme	Numerical Modelling of Concrete Structures Creating a Bearing System of Bridges and Other Structures Numerical Modelling of Dynamic Interaction Water-Soil-Structure Selected Chapters of Concrete and Masonry Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Skradinska 13, 21000 Split
Telephone number	0915773796
Email address	jure.radnic@gradst.hr
Personal web page	/
Year of birth	1952
Scientist ID	70834
Research or artistic rank and date of the last appointment	Scientific advisor 07.09.2005.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor, 28.10.2005.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.04.1977.
Job title (professor, researcher, associate teacher, etc.)	Tenured Full Professor
Field of research	Concrete Structures and Bridges
Position in the institution	Head of Department of Concrete Structures and Bridges
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, University of Zagreb
Place	Zagreb
Date	1987
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of	Course leader/ co-leader:

course, study programme where it is/was held, and level of study programme)	– Concrete Structures I, Concrete Bridges, Construction of Engineering Structures, Numerical Modelling of Concrete Structures, Durability of Structures, Masonry Structures, Prestressed Concrete, Concrete Structures II, Composite Structures (Graduate University Study of Civil Engineering) – Bearing Structures I (Undergraduate University Study of Architecture) – Numerical Modelling of Concrete Structures, Creating a Bearing System of Bridges and Other Structures, Numerical Modelling of Dynamic Interaction Water-Soil-Structure, Selected Chapters of Concrete and Masonry Structures (Postgraduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	1. Radnić, Jure; Harapin, Alen; Ćubela, Dragan. Spregnute konstrukcije: numerički model za analizu pod kratkotrajnim mirnim opterećenjem . Split : Građevinsko-arhitektonski fakultet Sveučilišta, 2005 (textbooks and course reader). 2. Radnić, Jure; Harapin, Alen; Markota, Lada. Raspucavanje betona : numerički model proračuna širina pukotina savijanih betonskih konstrukcij . Split : Građevinsko-arhitektonski fakultet Sveučilišta, 2005 (textbooks and course reader). 3. Radnić, Jure; Matešan, Domagoj; Harapin, Alen. Betonske ploče i ljuske . Split, Zagreb : Građevinsko-arhitektonski fakultet Sveučilišta, Institut građevinarstva Hrvatske, 2004 (textbooks and course reader). 4. Radnić, Jure; Matešan, Domagoj; Harapin, Alen. Static Analysis of Concrete Shells . Split : Radnić d.o.o., 2003 (academic monograph) 5. Radnić, Jure; Harapin, Alen. Uporabna naprezanja pravokutnih AB presjeka : priručnik za proračun . Split : Građevinski fakultet Sveučilišta ; Radnić, 1998 (academic monograph).
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Baloević, Goran; Radnić, Jure; Grgić, Nikola; Matešan, Domagoj. Shake-table study of plaster effects on the behavior of masonry-infilled steel frames. // Steel and composite structures. 23 (2017) , 2; 195-204 (scientific article). 2. Buzov, A.; Radnić, J.; Grgić, N.; Baloević, G. Effect of the joint type on the bearing capacity of a multi–drum column under static load. // International Journal of Architectural Heritage. 12 (2017) , 1; 1-16 (scientific article). 3. Grgić, Nikola; Radnić, Jure; Matešan, Domagoj; Banović, Ivan. Stirrups effect on the behavior of concrete columns during an earthquake. // Materialwissenschaft und Werkstofftechnik. 48 (2017) , 5; 406-419 (scientific article). 4. Jajac, Nikša; Rogulj, Katarina; Radnić, Jure. Selection of the Method for Rehabilitation of Historic Bridges-A Decision Support Concept for the Planning of Rehabilitation Projects. // International Journal of

	Architectural Heritage. 11 (2017) , 2; 261-277 (scientific article) 5. Baloević, Goran; Radnić, Jure; Grgić, Nikola; Matešan, Domagoj. The application of a reinforced plaster mortar for seismic strengthening of masonry structures. // Composites. Part B, Engineering. 93 (2016) ; 190-202 (scientific article).
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	1. Construction Project of Split Airport 2. Suspension Bridge Project in Trilj 3. Krka River Bridge Project, above Roški Slap 4. Renovation Project of three protected stone bridges over the Cetina River 5. Reconstruction of Hotel Jure and Hotel Ivan in the Solaris Hotel Resort
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	1. Rector's Award of the University of Split for Outstanding Contribution to the Development of the University of Split (2015) 2. Award for Scientific Excellence, Journal "Građevinar" (2013) 3. Plaque for Exceptional Contribution to the Preservation and Development of the Faculty of Civil Engineering, University of Mostar (2008) 4. City of Trogir Award for the project "Drveni most" (2006) 5. Recognition for Significant Contribution to Bridge Construction in Croatia, Croatian Association of Civil Engineers (2005) 6. Recognition for Exceptional Contribution to the Development of the Faculty of Civil Engineering, University of Mostar (2003)

Title, name and last name	Associate Professor Jelena Sedlar, PhD
Title of the course at the proposed study programme	Optimization Methods
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, 21000 Split
Telephone number	021/303315
Email address	jsedlar@gradst.hr
Personal web page	/
Year of birth	1979
Scientist ID	244896
Research or artistic rank and date of the last appointment	Scientific advisor 6.10.2020

Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Associate Professor, 13.9.2017
Area and field of appointment into research or artistic rank	Natural Sciences, Mathematics
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	1.12.2001.
Job title (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Mathematics
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Science in Mathematics
Institution	Department of Mathematics at the Faculty of Science
Place	Zagreb
Date	2009
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Analytical Geometry and Linear Algebra, Differential Geometry (Undergraduate University Study of Geodesy and Geoinformatics) - Mathematics II (Undergraduate University Study of Architecture and Urban Planning)
Authorship of university textbooks from the field of the course	Mathematical Analysis, course reader Analytical Geometry and Linear Algebra, course reader Differential Geometry, course reader
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	Sedlar, Jelena; Škrekovski, Riste; *Remarks on the Local Irregularity Conjecture* // Mathematics, 9 (2021), 24; 3209. Sedlar, Jelena; Škrekovski, Riste; *Bounds on metric dimensions of graphs with edge disjoint cycles* // Applied Mathematics and Computation, 396 (2021), 125908. Sedlar, Jelena; Škrekovski, Riste; *Extremal mixed metric dimension with respect to the cyclomatic number* // Applied mathematics and computation, 404 (2021), 126238. Sedlar, Jelena; Škrekovski, Riste; *Mixed metric dimension of graphs with edge disjoint cycles* // Discrete applied mathematics, 300 (2021), 1-8. Milat, Martina; Knezić, Snježana; Sedlar, Jelena; *Resilient Scheduling as a Response to Uncertainty in Construction Projects* // Applied Sciences-Basel, 11 (2021), 14; 6493.
Professional and research papers in methodology and quality of	/

teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	Undergraduate Study Program in Mathematics and Computer Science, Teaching Track
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Associate Professor Neno Torić, PhD
Title of the course at the proposed study programme	Extreme Actions and Structure Safety, Steel and Composite Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice Hrvatske 15, Split
Telephone number	+38521303366
Email address	neno.toric@gradst.hr
Personal web page	www.researchgate.net/profile/Neno_Toric
Year of birth	1983
Scientist ID	291876
Research or artistic rank and date of the last appointment	Scientific advisor, 15.11.2019.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Associate Professor, 01.09.2019.
Area and field of appointment into research or artistic rank	Engineering Sciences, Field of Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	11.12.2006.
Job title (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Impact of fire on load-bearing structures – experimental and numerical analysis, research on the behaviour of new types of load-bearing wooden structures
Position in the institution	Vice Dean for Science, Innovation and International Relations
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Science
Institution	University of Split, Faculty of Civil Engineering, Architecture and Geodesy
Place	Split
Date	18.07.2012.
INFORMATION ON ADDITIONAL TRAINING	
Year	2012-2014
Place	Sheffield, United Kingdom
Institution	University of Sheffield, Department of Civil and Structural Engineering
Field of training	Impact of fire on load-bearing structures, development of a numerical model for structural behaviour in fire based on the finite element method
MOTHER TONGUE AND FOREIGN LANGUAGES	

Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Norwegian (2)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Previous work experience as assistant in various courses of the undergraduate university study programme in Civil Engineering (Introduction to Timber Structures, Introduction to Metal Structures), undergraduate university study programme in Architecture and Urban Planning (Bearing Structures II), undergraduate professional study programme in Civil Engineering (Timber Structures, Metal Structures), graduate study programme in Civil Engineering (Metal Structures I, Metal Structures II, Reliability of Structures, Metal Bridges)
Authorship of university textbooks from the field of the course	Boko I., Skejić D., Torić, N., Aluminijske konstrukcije, 2017.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	• Torić, Neno; Boko, Ivica; Burgess, Ian W.; Divić, Vladimir: The effect of high-temperature creep on buckling behaviour of aluminium grade EN6082AW T6 columns, Fire Safety Journal 112 (2020), doi: 10.1016/j.firesaf.2020.102971 • Boko, Ivica; Skejić, Davor; Torić, Neno; Čolić, Antonela, Optimalni izbor legure za aluminijske konstrukcije izložene požaru, Građevinar 72 (2020), 03, 225-235, doi: 10.14256/JCE.2853.2019 • Uzelac Glavinić, Ivana; Boko, Ivica; Torić, Neno; Lovrić Vranković, Jelena, Primjena tvrdih listača za izradu lameliranih nosača u Europi, Građevinar 72 (2020), 07, 607-616, doi: 10.14256/JCE.2741.2019 • Torić, Neno; Boko, Ivica; Divić, Vladimir; Burgess, Ian W.: Behaviour of Steel Grade S275JR Columns under the Influence of High-Temperature Creep // Metals, 8 (2018), 11; 874, 16, doi:10.3390/met8110874 • Goreta, Marko; Torić, Neno; Divić, Vladimir; Boko, Ivica; Lovrić Vranković, Jelena: Testing the influence of creep on fire-exposed aluminium columns, Proceedings of 9th International Congress of Croatian Society of Mechanics Split: Croatian Society of Mechanics, 2018. 39, 10
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological,	/

psychological, didactic and pedagogical competencies?	
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	2013: Award for the best doctoral thesis in the field of Civil Engineering in 2013, discipline Structures, awarded by the Croatian Association of Civil Engineers at the Croatian Civil Engineering Forum 2013 2014: Award for Scientific Excellence, awarded by the journal "Građevinar" at the Croatian Civil Engineering Forum 2014 2017: Award for Scientific Excellence, awarded by the journal "Građevinar" at the Croatian Civil Engineering Forum 2017

Title, name and last name	Professor Boris Trogrlić, PhD
Title of the course at the proposed study programme	Nonlinear Building Statics, Masonry Structures, Building Physics, Design of Structures by Computer
GENERAL INFORMATION ON COURSE LEADER	
Address	Strožanačka cesta 23/B, Podstrana
Telephone number	+38591 407 9968
Email address	boris.trogrlic@gradst.hr
Personal web page	http://gradst.unist.hr/o-fakultetu/adresar-imenik/agenttype/view/propertyid/1783
Year of birth	1968
Scientist ID	210964
Research or artistic rank and date of the last appointment	Scientific advisor 2021
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Full Professor 23.02.2017.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.02.1996.
Job title (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Theory of Structures
Position in the institution	Full Professor
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Engineering Sciences
Institution	Faculty of Civil Engineering, Architecture and Geodesy, Split
Place	Split
Date	22.12.2003.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5

Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Undergraduate University Study of Civil Engineering: - Building Statics I (lectures) - Building Statics II (lectures) Graduate University Study of Civil Engineering: - Nonlinear Building Statics (lectures) - Masonry Structures - Building Physics Postgraduate University Study of Civil Engineering: - Selected Chapters of Stability of Structures (lectures)
Authorship of university textbooks from the field of the course	1. Mihanović, Ante; Trogrlić, Boris; Akmadžić, Vlaho. Građevna statika II. Split : Fakultet građevinarstva, arhitekture i geodezije u Splitu, 2014 (academic monograph). 2. Mihanović, Ante; Trogrlić, Boris. Građevna statika I. Split : Sveučilište u Splitu ; Fakultet građevinarstva, arhitekture i geodezije, 2011 (textbooks and course reader) 3. Akmadžić, Vlaho; Trogrlić, Boris; Prusac, Kristina građevna Statika II - metoda sila kroz primjere, Sveučilište u Mostaru, 2016.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Balić, Ivan; Smoljanović, Hrvoje; Trogrlić, Boris; Munjiza, Ante: Seismic Analysis of the Bell Tower of the Church of St. Francis of Assisi on Kaptol in Zagreb by Combined Finite-Discrete Element Method // Buildings, 11 (2021), 8; 373, 17, doi:10.3390/buildings11080373 2. Smoljanović, Hrvoje; Balić, Ivan; Trogrlić, Boris; Živaljić, Nikolina; Munjiza, Ante: Finite strain numerical model for the nonlinear analysis of thin shells // Engineering structures, 234 (2021), 111964, 19, doi:10.1016/j.engstruct.2021.111964 3. Smoljanović, Hrvoje; Balić, Ivan; Munjiza, Ante; Akmadžić, Vlaho; Trogrlić, Boris: Analysis of dynamic stability of beam structures // Acta mechanica, 231 (2020), 11; 4701-4715, doi:10.1007/s00707-020-02793-6 4. Munjiza, Ante; Smoljanović, Hrvoje; Živaljić, Nikolina; Mihanović, Ante; Divić, Vladimir; Uzelac, Ivana; Nikolić, Željana; Balić, Ivan; Trogrlić, Boris: Structural applications of the combined finite- discrete element method // Computational particle mechanics, 7 (2020), 1029-1046, doi:10.1007/s40571-019-00286-5 5. Batinić, Milko; Galić, Mirela; Trogrlić, Boris; Divić, Vladimir; Racetin, Ivan; Mihanović, Ante: Combined photogrammetry and mechanical testing of fired clay brick // Materialwissenschaft und Werkstofftechnik, 49 (2018), 1399-1408, doi:10.1002/mawe.201700106

Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Development and application of advanced building materials for the construction of healthy buildings: protection from non-ionizing radiation - Z2grade, Applicant: Josip Juraj Strossmayer University of Osijek, Faculty of Civil Engineering Osijek - GFOS, 2021
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	Pilot introduction of a human resource management system at the Faculty of Civil Engineering, Architecture, and Geodesy in Split, Faculty of Humanities and Social Sciences, University of Rijeka, Centre for Applied Psychology. Rijeka, 2018
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Rector's Award, University of Split (1989)

Title, name and last name	Professor Darovan Tušek, PhD
Title of the course at the proposed study programme	Roads and the Environment
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	021 303 314
Email address	dtusek@gradst.hr
Personal web page	-
Year of birth	1954.
Scientist ID	163762
Research or artistic rank and date of the last appointment	Scientific advisor, 2006.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor, 2011
Area and field of appointment into research or artistic rank	Technical Sciences, Architecture and Urban Planning
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy, Split
Date of employment	1989
Job title (professor, researcher, associate teacher, etc.)	Professor
Field of research	Contemporary Architecture
Position in the institution	-
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Architecture
Place	Zagreb
Date	1993
INFORMATION ON ADDITIONAL TRAINING	
Year	-
Place	-
Institution	-
Field of training	-
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian

Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English - 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French - 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	-
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	-
Authorship of university textbooks from the field of the course	-
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	-
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	-
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	-
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	Undergraduate and Graduate University Study of Architecture and Urban Planning Undergraduate University Study of Civil Engineering
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Association of Croatian Architects “Neven Šegvić” Award (1996; 2018) University of Split Award for outstanding contribution to the development of the University (2012) Faculty of Civil Engineering, Architecture and Geodesy Award for special contribution to the development of the Faculty in the field of Architecture and Urban Planning studies (2021)

Title, name and last name	Professor Emeritus Ognjen Bonacci, PhD
Title of the course at the proposed study programme	Karst Water Resources, Ecohydrology, Selected Chapters in Karst Hydrogeology
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	0981744556
Email address	obonacci@gradst.hr
Personal web page	
Year of birth	1942.
Scientist ID	4434
Research or artistic rank and date of the last appointment	Tenured Full Professor Professor Emeritus – October 2012, 2013

Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	
Area and field of appointment into research or artistic rank	
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	November 1976
Job title (professor, researcher, associate teacher, etc.)	Professor Emeritus
Field of research	Civil Engineering
Position in the institution	Retired
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering, University of Zagreb
Place	Zagreb
Date	June 1976
INFORMATION ON ADDITIONAL TRAINING	
Year	autodidact
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Russian (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French (2)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	
Authorship of university textbooks from the field of the course	1. Karst hydrology, Springer Verlag. 1987. 2. Oborina glavna ulazna veličina u hidrološki ciklus. 1994. 3. Ekohidrologija. 2003. 4. Okolišno prihvatljivo upravljanje vodotocima. 2019.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1.Bonacci, Ognjen; Andrić, Ivo; Vrsalović, Adrijana; Bonacci, Duje Precipitation Regime Changes at Four Croatian Meteorological Stations // Atmosphere, 12 (2021), 7; 885, 14 doi:10.3390/ atmos12070885 2. Bonacci, Ognjen; Bonacci, Duje; Roje-Bonacci, Tanja Different air temperature changes in continental and Mediterranean regions: a case study from two Croatian stations // Theoretical and applied climatology, 145 (2021), 3-4; 1333-1346 doi:10.1007/s00704-021-03702-0

	3. Bonacci, Ognjen; Bonacci, Duje; Patekar, Matko; Pola, Marco
	Increasing Trends in Air and Sea Surface Temperature in the Central Adriatic Sea (Croatia) // Journal of marine science and engineering, 9 (2021), 4; 358-377 doi:10.3390/jmse9040358
	4. Bonacci, Ognjen; Ljubenkov, Igor; Roje-Bonacci, Tanja
	Different Climate Changes at Two Locations on a Small Karst Island Korčula (Adriatic Sea, Croatia) // Naše more : znanstveni časopis za more i pomorstvo, 68 (2021), 1; 1-13 doi:10.17818/NM/2021/1.1
	5. Bonacci, Ognjen; Terzić, Josip; Roje-Bonacci, Tanja; Frangen, Tihomir
	An Intermittent Karst River: The Case of the Čikola River (Dinaric Karst, Croatia) // Water, 11 (2019), 11; 2415, 18 doi:.org/10.3390/w11112415

Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	1. National Annual Science Award “Nikola Tesla” (1988) 2. City of Split Award (1988) 3. National Lifetime Achievement Award for comprehensive scientific research in the field of Engineering Sciences (June 25, 2011) 4. SLOBODNA DALMACIJA Lifetime Achievement Award for Science (June 16, 2021)

Title, name and last name	Professor Emeritus Blaž Gotovac, PhD
Title of the course at the proposed study programme	Meshless Numerical Methods and the Associated Adaptive Techniques, Numerical Modelling of Shell Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Vukovarska 117, 21 000 Split
Telephone number	+385(21) 465-117
Email address	blaz.gotovac@gradst.hr
Personal web page	/
Year of birth	1951.
Scientist ID	14020
Research or artistic rank and date of the last appointment	Scientific advisor
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured full professor 26.01.2006.
Area and field of appointment into research or artistic rank	Engineering Sciences, Field of Fundamental Engineering Sciences Engineering Sciences, Field of Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	
Job title (professor, researcher, associate teacher, etc.)	Professor Emeritus
Field of research	Theory of Structures
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering - Zagreb
Place	Zagreb
Date	1987
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Russian, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Mechanics II (Undergraduate University Study of Civil Engineering) - Construction of Historical Buildings, Mechanics of Deformable Bodies, Surface Structures (Graduate University Study of Civil Engineering) - Meshless Numerical Methods and the Associated Adaptive Techniques, Numerical Modelling of Shell Structures (Postgraduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	Teaching supplements and educational software

Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. V. Kozulić, B. Gotovac: Computational Modeling of Structural Problems using Atomic Basis Functions, Advanced Structured Materials, Vol. 70: Mechanical and Materials Engineering of Modern Structure and Component Design / Öchsner, A.; Altenbach, H. (Eds.), Springer, Chapter 17, pp. 207-230, 2015. 2. V. Kozulić, B. Gotovac: Numerical Solution of Poisson's Equation in an Arbitrary Domain by Using Meshless R-Function Method, Proceedings of the 27th DAAAM International Symposium on Intelligent Manufacturing and Automation / Katalinic, B. (ur.), Vienna: DAAAM International, pp. 245-254, 2016. 3. N. Brajčić Kurbaša, B. Gotovac, V. Kozulić: Atomic Exponential Basis Function Eup(x,ω) - Development and Application, CMES: Computer Modeling in Engineering & Sciences, 111 (2016), 6, pp. 493-530, 2016. 4. V. Kozulić, B. Gotovac, G. Kamber: Meshless method based on the R-functions and atomic basis functions for the solution of two-dimensional boundary value problems, Proceedings Multiscale computational methods for solids and fluids / A. Ibrahimbegović, B. Brank, I. Kožar (ur.), Ljubljana: University of Ljubljana, pp. 171-174, 2017. 5. V. Kozulić, B. Gotovac: Application of the Solution Structure Method in Numerically Solving Poisson's Equation on the Basis of Atomic Functions, International Journal of Computational Methods (pre-print)
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	Recognition for 10 years of teaching at the Faculty of Civil Engineering in Mostar - Bosnia and Herzegovina

Title, name and last name	Professor Emeritus Jure Margeta, PhD
Title of the course at the proposed study programme	Systems Engineering in Planning and Management of Water Reservoirs, Sustainable Urban Water Systems
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice hrvatske 15, Split
Telephone number	021 303 356
Email address	jure.margeta@gradst.hr

Personal web page	/
Year of birth	1950
Scientist ID	70755
Research or artistic rank and date of the last appointment	Scientific advisor 11.09.1991.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 13.10.1997.
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy
Date of employment	01.10.1976.
Job title (professor, researcher, associate teacher, etc.)	Professor Emeritus
Field of research	Water Management and Water Protection
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	PhD
Institution	Faculty of Civil Engineering
Place	Zagreb
Date	05.10.1983.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Russian, 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Course leader: - Water Supply and Sewerage System (Undergraduate University Study of Civil Engineering) - Hydrotechnical Systems, Protection of Water Resources, Municipal Wastewater and Stormwater Treatment, Municipal Solid Waste Management (Graduate University Study of Civil Engineering - Systems Engineering in Planning and Management of Water Reservoirs, Sustainable Urban Water Systems (Postgraduate Doctoral Study of Civil Engineering)
Authorship of university textbooks from the field of the course	1. Margeta, Jure. Upravljanje krutim komunalnim otpadom. Split : Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, 2017. 2. Margeta, Jure. Vodoopskrba naselja: Planiranje, projektiranje, upravljanje, obrada vode. Split : Građevinsko-arhitektonski fakultet, 2011.

	3. Margeta, Jure. Kanalizacija naselja ; odvodnja i zbrinjavanje otpadnih i oborinskih voda. Split : Sveučilište u Splitu, Građevinsko-arhitektonski fakultet ; Geotehnički fakultet u Varaždinu, 2009. 4. Jure Margeta. Oborinske i otpadne vode: teret onečišćenja, mjere zaštite. Split : Sveučilište u Splitu, Građevinsko-arhitektonski fakultet, 2007.
Professional and research papers or art works published in the last five years from the field of the course (max 5 references)	1. Marasović, Katja; Margeta, Jure; Perojević, Snježana; Bojanić, Davor; Katić, Miroslav. The aqueduct of the Roman town Salona – Croatia. // Water Science and Technology-Water Supply. 17 (2017) , 4; 929-939 2. Margeta, Jure; Đurin, Bojan. Multi-criteria approach in solar urban water supply systems. // Proceedings of the institution of civil engineers-water management. 170 (2017) , 6; 273-286 3. Đurin, Bojan; Margeta, Jure. Analysis of the Possible Use of Solar Photovoltaic Energy in Urban Water Supply Systems. // Water. 6 (2014) , 6; 1546-1561 4. Margeta, Jure; Glasnović, Zvonimir. Theoretical settings of photovoltaic-hydro energy system for sustainable energy production. // Solar energy. 86 (2012) , 3; 972-982
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	Roman Water Systems of City of Salona and Diocletian's Palace and Their Impact on Urban Sustainability, Croatian Science Foundation - HRZZ, 1.9.2014.-31.8.2018.
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	/

Title, name and last name	Professor Emeritus Ante Mihanović, PhD
Title of the course at the proposed study programme	Selected Chapters of Dynamics of Structures and Earthquake Engineering Selected Chapters of Stability of Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Papanopulova 29, 21 000 Split
Telephone number	00385 21 303 357; 00385 98 370 355
Email address	ante.mihanovic@gradst.hr
Personal web page	http://gradst.unist.hr/o-fakultetu/adresar-imenik/agenttype/view/propertyid/1750
Year of birth	1948
Scientist ID	30725
Research or artistic rank and date of the last appointment	Scientific advisor 29.09.1995.
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Tenured Full Professor 28.02.2001.

Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	Faculty of Civil Engineering, Architecture and Geodesy, Split
Date of employment	
Job title (professor, researcher, associate teacher, etc.)	Professor Emeritus
Field of research	Civil Engineering, Department of Theory of Structures
Position in the institution	
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Engineering Sciences
Institution	Faculty of Civil Engineering
Place	Zagreb
Date	1980
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Undergraduate University Study of Civil Engineering: - Building Statics I - Building Statics II Graduate University Study of Civil Engineering: - Dynamics of Structures and Earthquake Engineering - Stability of Structures - Nonlinear Building Statics - Dynamic Models of Earthquake Engineering Undergraduate Professional Study of Civil Engineering: - Building Physics Postgraduate University Study of Civil Engineering: - Selected Chapters of Dynamics of Structures and Earthquake Engineering - Selected Chapters of Stability of Structures
Authorship of university textbooks from the field of the course	1. Mihanović, Ante; Trogrlić, Boris; Akmadžić, Vlaho. **Građevna statika II** . Split : Fakultet građevinarstva, arhitekture i geodezije u Splitu, 2014 (academic monograph). 2. Mihanović, Ante; Trogrlić, Boris. **Građevna statika I** . Split : Sveučilište u Splitu ; Fakultet građevinarstva, arhitekture i geodezije, 2011 (textbooks and course reader). 3. Mihanović, Ante. **Dinamika konstrukcija** .

	Split : Fakultet građevinarstva, 1995 (academic monograph). 4. Mihanović, Ante. **Stabilnost konstrukcija** . Zagreb : Društvo hrvatskih građevinskih konstruktora, 1993 (academic monograph). 5. Mihanović, Ante; Marović, Pavao; Dvornik, Josip. **Nelinearni proračuni armirano betonskih konstrukcija** . Zagreb : Društvo hrvatskih građevinskih konstruktora, 1993. (academic monograph).
Professional and research papers or art works published in the last five years from the field of the course **(max 5 references)**	1. Balić, Ivan; Mihanović, Ante; Trogrlić, Boris. **Ciljano ubrzanje u višemodalnoj metodi naguravanja A/B okvira**. // Građevinar : časopis Hrvatskog saveza građevinskih inženjera. 65 (2013) , 4; 305-318 (scientific article). 2. Kožul, Mladen; Nikolić, Željana; Mihanović, Ante. **Numerički model puzanja armiranih i prednapetih betonskih konstrukcija u ravnini**. // Građevinar : časopis Hrvatskog saveza građevinskih inženjera. 65 (2013) , 1; 11-21 (pre-print, scientific article). 3. Mihanović, Ante; Trogrlić, Boris; Balić, Ivan. **Extreme Modal Combinations for Pushover Analysis of RC Buildings**. // Key Engineering Materials. 553 (2013) ; 117-124 (scientific article). 4. Balić, Ivan; Trogrlić, Boris; Mihanović, Ante. **Simplified multimodal pushover target acceleration method for seismic resistance analysis of medium-rise RC structures**. // KSCE Journal of Civil Engineering. 21 (2017) , 1; 378-388 (scientific article). 5. Balić, Ivan; Mihanović, Ante; Trogrlić, Boris. **Target acceleration method for analysis of RC structures**. // Engineering computations. 32 (2015) , 8; 2235-2258 (scientific article).
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	/
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	/
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	/
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	KOLOS 2017 - Lifetime Achievement Award in Civil Engineering

Title, name and last name	Professor Emeritus Bernardin Peroš, PhD
Title of the course at the proposed study programme	Extreme Actions and Structure Safety Steel and Composite Structures
GENERAL INFORMATION ON COURSE LEADER	
Address	Matice Hrvatske 15, 21 000 Split
Telephone number	021303331
Email address	bernardin.peros@gradst.hr
Personal web page	
Year of birth	
Scientist ID	36305
Research or artistic rank and date of the last appointment	
Scientific-teaching, artistic-teaching or teaching title, and the date of the last appointment	Professor Emeritus, 24 November 2016
Area and field of appointment into research or artistic rank	Area: Engineering Sciences Field: Civil Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution of employment	-
Date of employment	-
Job title (professor, researcher, associate teacher, etc.)	-
Field of research	Extreme Loads on Bearing Structures – Numerical and Experimental Approach
Position in the institution	-
INFORMATION ON EDUCATION - Highest degree achieved	
Degree	Doctor of Engineering Sciences
Institution	University of Zagreb
Place	
Date	
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	/
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (title of course, study programme where it is/was held, and level of study programme)	Reliability of Structures (Graduate University Study of Civil Engineering)
Authorship of university textbooks from the field of the course	Peroš, Bernardin Utjecaj vjetra na konstrukcije, Split: Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije, 2018 (academic monograph)

	Milčić, Vuk; Peroš, Bernardin Uvod u teoriju sigurnosti nosivih konstrukcija, Split: Fakultet građevinarstva, arhitekture i geodezije Sveučilišta u Splitu, 2003 (textbook)
Professional and research papers or art works published in the last five years from the field of the course **(max 5 references)**	1. Đepina, Ivan; Divić, Vladimir; Munjiza, Ante; Peroš, Bernardin, Perfomance-based wind engineering assessment of critical telecommunication infrastructure // Engineering Structures, 236 (2021), 112083, 12 doi:10.1016/j.engstruct.2021.112083 2. Uzelac, Ivana; Smoljanović, Hrvoje; Batinić, Milko; Peroš, Bernardin; Munjiza, Ante, A model for thin shells in the combined finite- discrete element method // Engineering Computations, 35 (2018), 1; 377-394 doi:10.1108/ec-09-2016-0338
Professional and research papers in methodology and quality of teaching published in the last five years **(max 5 references)**	
Professional, research and artistic projects from the field of the course carried out in the last five years **(max 5 references)**	
Within which program and to what extent did the course teacher acquire methodological, psychological, didactic and pedagogical competencies?	
PRIZES AND AWARDS	
Prizes and awards for teaching and research/artistic achievements	

3.4. Optimal number of students

The optimal number of students is determined by the Studies Commission based on the number of applicants and the available supervisory capacities.

3.5. Estimation of costs per student

Based on the analysis of the annual revenues received by the Faculty from the Ministry of Science and Education and the Faculty's revenues from tuition fees and other activities, as well as the direct and indirect costs of doctoral studies (salaries of teachers and administrative staff, salaries of external associates, costs of purchasing laboratory, computer, and other equipment necessary for delivering the study programme, costs of regular maintenance of facilities and equipment, material costs, costs of organizing and conducting laboratory and field teaching, costs of purchasing reading material and publishing books), it is estimated that the cost of full-time study per candidate amounts to HRK 48,000.00 and the cost of part-time study per candidate amounts to HRK 60,000.00.

3.6. Plan of procedures of study programme quality assurance

According to the European standards and guidelines for internal quality assurance in higher education institutions (according to "Standards and guidelines for quality assurance in the European area of higher education"), on the basis of which the University of Split

determines quality management procedures, the proposer of the study program is obliged to draw up a plan of procedures for quality assurance of the study program.
Documentation on which the quality assurance system of the constituent part of the University is based:
• Regulations on the Quality Assurance System of the Faculty of Civil Engineering, Architecture and Geodesy in Split, available here
• Quality Assurance Manual of the Faculty of Civil Engineering, Architecture and Geodesy in Split, available here
Description of procedures for evaluation of the quality of study programme implementation: • for each procedure describe the applied method (most often questionnaires for students or teachers, and self-evaluation questionnaire), identify the body conducting evaluation (constituent, university office), method of processing results and making information available, and timeframe for carrying out evaluation • if a procedure is described in an attached document, name the document and the relevant article

Evaluation of the work of teachers and associates	Student evaluation of teaching work is conducted via student survey (printed forms, as decided by the Faculty). The process is organized and conducted by the Quality Assurance Committee of the Faculty (hereinafter: the Committee). The Committee processes the data collected during the procedure. The procedure is conducted once per academic year in accordance with the Regulations on the Quality Assurance System of the Faculty of Civil Engineering, Architecture and Geodesy, University of Split. Upon receiving the results, the Dean of the Faculty, in collaboration with the Vice Dean for Science, Innovation, and International Relations, holds a discussion with the mentor if any significant deficiencies are noted and/or signs of violations of the ethical code are identified. According to Regulations on assessment of work performance of assistants, postdoctoral students and supervisors, the Faculty Council conducts assessment of the work performance of supervisors at least once every two years, based on the written report prepared by the supervisor and the reports and assessments related to the supervisor's work, provided by the assistants.
Monitoring of grading and harmonization of grading with anticipated learning outcomes	The procedure of student evaluation of teaching work determines the quality level of the study programme. Once per semester, meetings are held between students and the Faculty Management, attended by representatives of the study programme, the Vice Dean for Science, Innovation, and International Relations, and the Dean of the Faculty, with the aim of assessing the level of perceived objectivity in student evaluations.
Evaluation of availability of resources (spatial, human, IT) in the process of	The implementation of the procedures of student evaluation of the entire level of study and the student

learning and instruction	evaluation of administrative and technical services, as well as evaluation of other aspects of student life, is organized by the University of Split and conducted by the Quality Assurance Committee and the Student Office of the Faculty. The processing of collected data is entirely under the jurisdiction of the University of Split. The availability of necessary resources for the learning and teaching process is verified through external evaluations (re-accreditation process conducted by the Agency for Science and Higher Education in five-year cycles) and internal evaluations (internal evaluation of the quality assurance system is conducted by the Commission for internal evaluation of the quality assurance system once every two years). The evaluation of resource availability also includes vulnerable groups and accessibility for students with disabilities. Reports on all conducted evaluations are publicly available, and the measures taken are recorded in regular performance reports of the Quality Assurance Committee of the Faculty of Civil Engineering, Architecture and Geodesy, as well as in other documents published on the Faculty website.
Availability and evaluation of student support (mentorship, tutorship, advising)	Students have access to administrative and professional services to support their work. For postgraduate students, the Faculty Council, on a proposal from the department and/or the SAR logical unit, appoints a supervisor who monitors and guides the student, establishing collaboration with the student in scientific (artistic)-teaching activities. The supervisor provides the student with advice, particularly regarding the selection of extracurricular courses and the preparation of the doctoral thesis. After each academic year, the supervisor submits a report on the student's work to the Vice Dean for Science, Innovation, and International Relations of the Faculty, who presents the report at the next Faculty Council meeting. The Faculty Council issues a decision on accepting or rejecting the report.
Monitoring of student pass/fail rate by course and study programme as a whole	Monitoring of pass rates is conducted at the end of the first research year, as this is the final deadline for completing requirements for all extracurricular courses. The analysis carried out is presented to the Faculty Management.
Student satisfaction with the programme as a whole	Student satisfaction is determined in the formal procedure of student evaluation of the entire level of study, organized by the University of Split and conducted by the Quality Assurance Committee of the Faculty. Furthermore, the Faculty conducts internal surveys of students who have obtained their qualifications at the Faculty.

Procedures for obtaining feedback from external parties (alumni, employers, labour market and other relevant organizations)	The Faculty alumni association is active; however, the association's activities are not formalized, therefore feedback is collected on an individual basis.
Evaluation of student practical education, if applicable (short description of the procedures, assessment and quality assurance)	Student internships are not a mandatory part of the programme.
Other evaluation procedures carried out by the proposer	The procedure of recognizing previously acquired qualifications and periods of study (developed, established), the process of recognizing prior learning, i.e., equivalent knowledge, which includes non-formal/informal learning (under development), and the quality control thereof (conducted by the Postgraduate Studies Commission).
Description of procedures for informing external parties on the study programme (students, employers, alums)	All information is available on the Faculty website http://gradst.unist.hr

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I, Jelena Madunić, court interpreter of English language, as appointed by the Republic of Croatia Ministry of Justice and Public Administration, Class: UP/I-710-02/23-01/233 Ref.No.: 514-03-03-03/01-23-06 of 26 May 2023, do hereby certify that the above translation is a faithful and complete translation of the original document written in Croatian language.

Date: 30 October 2024, cert.no. 48/24