GRAĐEVINSKI FAKULTET SVEUČILIŠTA U MOSTARU
FACULTY OF CIVIL ENGINEERING UNIVERSITY OF MOSTAR

Matice hrvatske bb, 88000 Mostar, Bosnia and Herzegovina
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CIVIL ENGINEERING STUDY PROGRAMME

FIRST CYCLE

UNIVERSITY **UNDERGRADUATE** STUDY IN CIVIL ENGINEERING

Mostar, September 2013

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CURRICULUM

University **undergraduate** study in civil engineering

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TABLE OF CONTENTS

Matice hrvatske bb, 88000 Mostar, Bosnia and Herzegovina
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1. INTRODUCTION

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1.1 Historical overview

Mostar is cultural, political, economic and university center of Herzegovina and southern part of Bosnia and Herzegovina. It has been at the crossroads of cultures and civilizations for centuries. The oldest written documents on Mostar date from the first half of the 15th century, and the city was founded by Duke Stjepan Kosača.

The Faculty of Civil Engineering University of Mostar was founded in 1978 as a result of a joint initiative of the region's leading professional and business factors arising from the growing demand for education of university-level professionals in civil engineering and development of scientific research in the field of civil engineering.

It started working on 1 September 1978 and it was officially registered by the Decision of the Business Court in Mostar on 11 May 1979. In a very short time, the Faculty established its reputation and justified its establishment and existence. It became and to this day remained the holder of research activities in the fields of engineering structures, transportation facilities, hydraulic engineering, geotechnics and municipal engineering for the region.

1.2 Tasks of the Faculty

Tasks of the Faculty are:

- organising and carrying out scientific and educational work for education of staff with university qualifications for the needs of business and other public activities in the field of civil engineering with titles:
  Bachelor of Science in Civil Engineering and Master of Science in Civil Engineering
- organising and carrying out scientific and research work for acquisition of the scientific degree of Doctor of Philosophy.
- organising systematic monitoring and use of scientific achievements, and preparing personnel for independent scientific research.
- providing conditions for production of textbooks and manuals for the needs of scientific and teaching process.
- aligning, directly or through other institutions, the needs of the economy with modern scientific and technical development.

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- cooperating with other scientific and research institutions and institutions of higher education in the country and abroad in organising and promoting joint scientific and research projects as well as in the scientific and educational process.

Since the beginning of its operation, the Faculty strives in every respect to become part of the unified European Higher Education System and Area, for which in 2005 it matured and sufficiently aligned its work with the principles of the Bologna Declaration.

1.3 Curriculum 2005 - 2012

The 78th session of the Faculty Council held on 27 September 2005 adopted the Curriculum of the Civil Engineering Study Programme, which is divided into two cycles:

- 1st cycle: University **undergraduate** studies in civil engineering for a period of **three years** or **six semesters** (**180 ECTS** credits) and
- 2nd cycle: University **graduate** studies in civil engineering for a period of **two years** or **four semesters** (**120 ECTS** credits).

This Curriculum was implemented from the academic year 2005/2006.

Within the project ESABIH (European Union standards for accreditation of study programmes on BiH universities), which is primarily aimed at introducing European standards in the procedures of evaluation and accreditation of study programmes at Bosnian and Herzegovinian universities, an expert team, acting as an evaluation board, visited our Faculty in January 2012. The document underlying the visit of the expert team was the Civil Engineering Study Programme Self-Evaluation Report drawn up by a working team of the Faculty in October 2011.

In June 2012, this board drafted *the Quality Evaluation Report of undergraduate and graduate studies of the civil engineering study programme at the Faculty of Civil Engineering, University of Mostar*.

Seven years of implementation of the curriculum and the aforementioned external evaluation of the civil engineering study programme showed that it is generally well conceived and balanced. But also, deficiencies identified during its implementation as well as comments and recommendations from the report of the evaluation board showed that the time was ripe for its amendment.

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1.4 Curriculum 2013

Pursuant to Article 24 of the Statute of the Faculty of Civil Engineering, University of Mostar, the Faculty Council adopted the Decision on appointment of the Commission for amendment of the Curriculum at the Faculty of Civil Engineering, University of Mostar, at its 124th session held on 29 September 2012. In fact, the commission was entrusted with the task of drafting a specific update of the Curriculum, which would start to be implemented from the academic year 2013/2014.

The amendments to the Curriculum of the Faculty of Civil Engineering, University of Mostar, were made in a way that they were incorporated into the full text that was adopted as such at the 134th session of the Scientific and Teaching Council held on 17 September 2013.

Considering the needs of the labour market, the launch of the university undergraduate civil engineering study proved to be very purposeful because in Mostar and the wider region there is a need for personnel with the kind of competences that are acquired at this study.

Namely, in the wider region there are a number of institutions that can employ this type of personnel such as:

- large construction companies engaged in design, construction, supervision or in production and sales of construction materials.
- city, county, entity and state level institutions and agencies.
- small construction companies or private enterprises.

The studies are based on modern scientific findings conveyed by the teachers to the students through lectures, exercises and other forms of teaching activities (seminar and/or programme works, laboratory exercises, study visits, final thesis, etc.). Namely, a significant number of teaching staff are engaged in scientific research, working on a larger number of research projects and a certain number of international projects funded by the European Union or through international bilateral cooperation.

This curriculum of undergraduate studies is very similar to the curriculum at the Faculty of Civil Engineering, Architecture and Geodesy, University of Split, in the Republic of Croatia. Namely, the undergraduate studies at both universities last three years (180 ECTS credits), and the curricula as well as the numbers of credits for each course/modulus, or group of courses/moduli, are very similar.

Therefore, we consider the Faculty of Civil Engineering, Architecture and Geodesy, University of Split, to be our reference faculty.

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In formal and legal terms, the first cycle of the civil engineering study programme is treated by:

- the Statute of the University of Mostar,
- the Rulebook on studies and the study system at the Faculty of Civil Engineering University of Mostar, and
- the Rulebook on organization and operation of the quality assurance and improvement system of the Faculty of Civil Engineering University of Mostar,

web page: www.gfmo.ba/akti_fakulteta.htm.

1.5 Educational goals

The Faculty of Civil Engineering, University of Mostar, has excellence as the guiding principle in its activity, with the primary aim of educating young people. Efforts are made to provide all the necessary conditions in order for them to become high-quality professional and scientific staff, who can properly respond to challenges and demands of the modern civil engineering. Since it was established until now, the Faculty has been building its identity on enviable moral and professional grounds taking account of the criteria important for the civil engineering profession.

The basic determinants in defining educational goals are:

- previous experience in higher education,
- modern requirements of new technologies,
- education system defined through cycles.

The materials that take into account the multidisciplinary nature of engineering problems and their solutions are incorporated in the curriculum of the first cycle. Thus, a unified study cycle (without vocational orientation) is established, which consists of core and elective courses, as well as additional and/or extracurricular activities, classified by groups:

- FUNDAMENTAL: courses of mathematical, information and natural sciences,
- GENERAL: courses of humanities or social sciences,
- THEORETICAL: courses in the field of engineering mechanics,
- PROFESSIONAL: courses in the field of civil engineering (structures, hydraulic engineering, transportation facilities, geotechnics, construction management).
- ARCHITECTURAL: courses in the field of architecture.

In this matter, care was taken to ensure a balanced relation of general engineering courses and specific professional ones.

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In addition to acquiring the necessary professional knowledge, common educational goals for both cycles are also to enable students for:

- continuation of education,
- good team and individual work, which is achieved through various forms of learning and work with students (lectures, auditory, laboratory and design exercises, seminar and/or programme works, consultations and independent student work, fieldwork and professional visits to construction sites of major structures).

1.6 Specific requirements in the field of civil engineering

Objectives of the university undergraduate studies and competences correspond to the European Qualifications Framework to the extent possible. Their international dimension is taken into account and aligned in particular with the neighbouring countries. Considering that this is an area of technical sciences, the field of civil engineering, there is no greater risk of overlapping within courses. In this curriculum too, attention was paid to possible overlapping within individual professional branches, as well as properly set chronological structure of all the courses.

When it is about harmonization of educational goals with the professional regulations, or legislation, local regulations and standards in the field of civil engineering in our country either do not exist or exist in part. Some kind of transitional phase is still in progress, where a chaotic mixture of regulations and standards inherited from the old country applies as regulations.

Therefore, the basic principle is the introduction and application in teaching of the regulations that exist at the European Union level. For example, EUROCODEs are especially important for structures.

1.7 Organizational context

The Faculty management consists of: Dean, Assistant Dean for Science, Assistant Dean for Academic Affairs and Secretary.

The Student Union has a direct communication with the Faculty management and participates in the work of the Scientific and Teaching Council through their representatives.

Students elect their representatives by years of study directly in student elections, after which they independently elect the leadership of the Student Union.

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For the purpose of better organization and coordination of activities of the Faculty, and consideration of issues of common interest for performance of the scientific and teaching work, the following departments operate at the Faculty:

- for Mechanics, Materials and Structures,
- for Hydraulic Engineering and Geotechnics,
- for Transportation Facilities and Construction Management.

The administrative part of the Faculty organization is comprised of: assistant for academic affairs, assistant for international cooperation, student's office, accounting office, library and support staff (doorman, cleaners, custodian, ...).

The Faculty uses the University Information System (UIS) as technical and digital support. Rules of use of UIS, which all teachers and students are obliged to abide by, are adopted by the Faculty Council of the Faculty of Civil Engineering, University of Mostar.

In early 2013, the Faculty initiated the establishment of the Alumni Association, a voluntary association to which all those who have completed some of the studies (VII/1 degree study, university graduate study), earned master's degree or doctorate at the Faculty of Civil Engineering, University of Mostar, should join.

1.8 Student mobility scheme

Already with its first Curriculum in 2005, the civil engineering study programme was declared an international programme, so the openness of the studies and student mobility are targets that maintain the past practice of the Faculty, where dozens of foreign students have successfully completed their studies.

The Faculty is a full member of the "Association of Croatian Faculties of Civil Engineering".

This membership provides the first degree of student mobility by an agreement on mutual alignment and recognition of the curricula of all Croatian civil engineering faculties, while the alignment of programmes in relation to European standards gives a mobility perspective at the European level.

In addition to the alignment of programmes, the mobility is also supported by the possibility of performing a part of the teaching in a foreign language.

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Considering one of the basic principles of the Bologna Process, mobility of students and teaching staff, the Faculty cooperates with faculties of civil engineering in Bosnia and Herzegovina, Republic of Croatia and some faculties in Europe.

Part of the teaching staff of the Faculty is engaged in teaching at other faculties of the University of Mostar, as well as at other universities in Bosnia and Herzegovina.

1.9 Other elements

The practice so far has shown that the need for experts in the field of civil engineering in Bosnia and Herzegovina will constantly grow. The interest shown by the economy and the public sector confirms our belief that this Curriculum offers a foundation of modern education in the field of civil engineering adequate for both high-quality engineering practice and further education at the university graduate studies in civil engineering.

Student workload, assignment of ECTS credits and tasks of ECTS commissioners are regulated by the act "Rulebook on studies and the study system at the Faculty of Civil Engineering, University of Mostar," website: www.gfmo.ba/akti_fakulteta.htm.

At the beginning of an academic year, we guarantee to students:

- full access to all their rights and obligations,
- consistent application of the "Rulebook on studies and the studying system"
- curriculum of each subject
- schedule of examination periods for the entire academic year,

In August 2012, the University of Mostar issued the "Manual for preparation of curricula based on learning outcomes and competences."

Based on of this manual, an annex to the curriculum titled "Learning outcomes and competences of the university undergraduate studies of civil engineering" will be prepared as a separate document, by which the following will actually be integrated in the curriculum:

- General learning outcomes that describe the level of academic achievements that correspond to the Bologna principles, elaborated by *Dublin Descriptors*.
- Specific learning outcomes for the field of civil engineering, which determine achievement of the level of general descriptors through the study programme.
- Specific learning outcomes for the study programme of civil engineering (EUA Tuning project).
- Specific course learning outcomes that also include student performance criteria.

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2. GENERAL INFORMATION

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2.1 General information on the study

Title of the study programme

CIVIL ENGINEERING

Study programme cycle

1st (FIRST)

Title of the study cycle

UNIVERSITY UNDERGRADUATE STUDIES IN CIVIL ENGINEERING

Institution

Proposed by: Faculty of Civil Engineering University of Mostar

Participating institutions: Faculty of Civil Engineering University of Mostar

Study duration

3 (three) YEARS

Number of ECTS credits

180 (one hundred and eighty)

Study admission requirements

- Completed secondary school lasting four (4) years with Mathematics during all four years.
- Fulfilled criteria of the classification procedure.

Study system

Organised and performed by semesters as full-time studies.

Learning outcomes

- The student is able to demonstrate knowledge and understanding that s/he has gained with advanced textbooks in the field of civil engineering, as well as some aspects of modern knowledge in civil engineering.
- The student is able to apply knowledge and understanding in a manner typical of civil engineering and has competences that enable him/her to solve certain problems in civil engineering practice.

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- The student acquires the skills necessary to collect, analyse and interpret relevant data and make conclusions that include moral and ethical principles.
- The student is able to present information, ideas, problems and their solutions to professional and general public.
- The student has developed the skills necessary for lifelong learning, but also for continuation of the studies in the 2nd cycle of the civil engineering study programme.

The acquired competences and skills for which the studies qualify graduates

General (generic) competences

- ability to analyse and exchange information, ideas, problems and solutions with expert and lay persons,
- ability to adapt to changes in technology and working methods within lifelong education,
- ability to effectively cooperate in professional groups and adapt to the demands of working environment,
- ability to understand the influence of civil engineering on the society and environment, and clearly formed moral and ethical attitude in solving professional problems,
- ability to apply the acquired knowledge and practices in further professional and academic education,
- ability to critically evaluate arguments, assumptions and data when making decisions, and solve professional problems in a creative way.

Academic (specific) competences

- ability to apply the acquired knowledge in all groups of study courses and technology in civil engineering,
- ability to prepare and conduct experiments, and analyse and interpret the results,
- ability to detect, identify, describe and solve professional civil engineering problems,
- ability to recognize interactions between design, construction and user requirements,
- ability to use common software tools to create documents, presentations, carry out calculations and simulations,

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- ability to design structures at the basic level,
- ability to lead a small construction work,
- ability to dimension smaller building structures,
- ability to participate as an associate in planning, design, realisation, monitoring and maintenance of larger engineering structures.

Criteria and conditions for transfer of ECTS credits

It is possible to transfer to this study programme from a study programme of the same type at another institution of higher education in Bosnia and Herzegovina, and so before the beginning of classes in the winter semester.

Transfers to this study programme from institutions of higher education outside of Bosnia and Herzegovina are regulated by the Commission for Civil Engineering Studies, or individual agreements with related faculties on student transfers and recognition of qualification procedures.

The number of students transferring to this study programme is limited by the capacity of the study programme.

Students allowed to transfer to this study programme register as full-time students according to their personal needs.

Qualification awarded

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Documents on completed studies

- Diploma certifying the completion of studies or degree awarded
- The additional document or Diploma Supplement of the study programme certifying which exams the student has passed, with what grades, and how many ECTS credits s/he has earned, as well as how many additional ECTS credits s/he has earned through additional and/or extracurricular activities.

Access to further studies

UNIVERSITY GRADUATE STUDIES IN CIVIL ENGINEERING

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3. CURRICULUM

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3.1 Programme structure with credits

I. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
1.	PPRI01	Mathematics I	4 + 4	60 + 60	10.0
2.	PPRI02	Physics	2 + 2	30 + 30	5.0
3.	PPRI08	Descriptive geometry	3 + 3	45 + 45	7.0
4.	PGEO01	Fundamentals of geology and petrography	2 + 1	30 + 15	3.5
5.	PINF01	Informatics	1 + 3	15 + 45	3.5
6.	PARH01	Introduction to architecture	2 + 0	30 + 0	2.0
		TOTAL:	**14 + 13**	**210 + 195**	**31.0**
					L = lectures, E = exercises

II. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
7.	PPRI04	Mathematics II	4 + 4	60 + 60	10.0
8.	PPRI05	Probability and statistics	2 + 2	30 + 30	5.0
9.	PINF02	Basics of programming	1 + 2	15 + 30	3.0
10.	PMEH01	Mechanics I	2 + 3	30 + 45	6.0
11.	PPRO01	Geodesy	2 + 2	30 + 30	5.0
		TOTAL:	**11 + 13**	**165 + 195**	**29.0**
					L = lectures, E = exercises

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III. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
12.	PMEH02	Mechanics II	3 + 2	45 + 30	6.0
13.	PMEH03	Strength of materials I	3 + 2	45 + 30	6.0
14.	PMEH04	Engineering statics I	2 + 2	30 + 30	5.0
15.	PMAT01	Building materials I	4 + 2	60 + 30	7.0
16.	PGEO02	Soil mechanics and foundations	3 + 2	45 + 30	6.0
		TOTAL:	**15 + 10**	**225 + 150**	**30.0**

IV. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
17.	PMEH05	Strength of materials II	2 + 2	30 + 30	5.0
18.	PMEH06	Engineering statics II	3 + 2	45 + 30	6.0
19.	PHID01	Hydrology	2 + 2	30 + 30	5.0
20.	PHID02	Hydromechanics	3 + 3	45 + 45	7.0
21.	PARH02	Elements of building construction	2 + 2	30 + 30	5.0
22.		*** E l e c t i v e**	2 + 0	30 + 0	2.0
		TOTAL:	**14 + 11**	**210 + 165**	**30.0**
					L = lectures, E = exercises
		* Elective courses:			
	PDRU01	Principles of business economics	2 + 0	30 + 0	2.0
	PDRU02	Fundamentals of legislation	2 + 0	30 + 0	2.0
	PDRU03	Sociology	2 + 0	30 + 0	2.0
	PSTR01	Foreign language	2 + 0	30 + 0	2.0
					L = lectures, E = exercises

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V. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
23.	PKON01	Basics of concrete structures	4 + 2	60 + 30	7.0
24.	PKON02	Introduction to timber structures	2 + 2	30 + 30	5.0
25.	PORG01	Construction production	2 + 1	30 + 15	4.0
26.	PHID03	Water supply and wastewater management in urban areas	2 + 2	30 + 30	5.0
27.	PORG02	Construction management	3 + 1	45 + 15	5.0
28.	PPRO02	Highways	2 + 2	30 + 30	5.0
		TOTAL:	**15 + 10**	**225 + 150**	**31.0**
					L = lectures, E = exercises

VI. Semester					
Serial number	Course code	Course title	Course structure		ECTS
			Per week L + E	Per semester L + E	
29.	PKON03	Introduction to metal structures	3 + 2	45 + 30	6.0
30.		*** E l e c t i v e**		minimum	18.0
34.	PZAV01	Final work	(0 + 2.5)*		5.0
		TOTAL:		minimum	**29.0**

NOTE: Student shall select at **minimum 4 (four)** elective courses (**min. 18 ECTS**).
Student must register the remaining 4 (four) elective courses in case that s/he continues the studies, or enrolls the university graduate studies in civil engineering (regardless on the selected programme).

* **Elective courses:**				
PHID04	Hydraulic structures	2 + 1	30 + 15	4.0
PKON04	Bridges	2 + 2	30 + 30	5.0
PMEH07	Dynamics of structures and earthquake engineering	2 + 2	30 + 30	5.0
PPRO03	Railway	2 + 1	30 + 15	4.0
PPRI07	Applied mathematics	2 + 2	30 + 30	5.0
PKON05	Concrete structures I	2 + 2	30 + 30	5.0
PHID05	Ports and marine constructions	2 + 2	30 + 30	4.0
PGEO03	Geotechnical engineering	2 + 2	30 + 30	5.0
DMAT01	Building materials II	2 + 2	30 + 30	5.0
DINF01	Computer aided design of structures	2 + 2	30 + 30	5.0
				L = lectures, E = exercises
				*** Lecturer's time spent for each student. Not included in TOTAL.**

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3.2 Course information

The university undergraduate studies in civil engineering include core and elective courses.

In addition to core and elective subjects, students are entitled to perform additional and/or extracurricular activities.

3.2.1 List of core courses

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3.2.2 List of elective courses

3.2.3 Extracurricular activities' information

Total number of courses	**35**	**Share**
Number of core courses	29	83 %
Number of elective courses	5	14 %
Number of extracurricular courses	1	3 %

Shares of core, elective and extracurricular courses

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3.3 DESCRIPTION OF THE CURRICULUM

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3.3.1 DESCRIPTION OF THE CURRICULUM OF CORE COURSES

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Course title	**MATHEMATICS I**	Year of study	**I. (first)**
Course code	**PPRI01**	Semester	**I. (winter)**
Group	Basic	Hours per week	**4L + 4E**
Teaching form	Lectures (L), Exercises (E), Homework	ECTS	**10.0**
Name of lecturer	Branko Červar, PhD, senior lecturer		
Course contents	Vectors, vector algebra. The concept of linear space, vector basis. Coordinate systems. Scalar product of vector. Matrices and determinants second and third order. Scalar and vector products and applications. Straight line and plane in space. Sets, operations with sets, real numbers, mathematical induction, binomial formula, intervals, bounded sets, supremum, infimum, complex numbers. Functions of one variable, composite function, inverse function, elementary functions; implicit functions, second order curves. Limits and continuity of functions. Sequences and series of real numbers, convergence and divergence, tests for convergence and divergence, alternating series. Series of real functions, power series, Weierstrass's theorem. Differential calculus, derivatives, geometrical and physical interpretations, differentiating functions, tangent and normal to a line, differential, derivatives and differentials of higher orders. Theorems of Rolle and Lagrange, Taylor`s series, Taylor`s formula, L'Hospital's rule, asymptotes of curves, monotonically of functions, extreme of functions, convexity and concavity of a curve, points of inflection, curvature of a curve. Integrals, some problems of geometry and mechanics, Newton-Leibniz formula, integration by change of variables and integration by parts, integration of some functions, improper integrals, convergence of integrals, integrals dependent of parameters, Euler's integrals. Matrices and determinants, operations and properties, inverse matrix, rank of matrix. Systems of linear equations, Cramer`s rule, Gauss's method, Kronecker-Capelli theorem. Eigenvalues and eigenvectors of a matrix.		
Recommended reading	(1) Červar, B., Miletić, K.: "Matematika 1" - Radna skripta, Građevinski fakultet Mostar, 2012.; (2) B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke Tehnička knjiga, Zagreb, 2003.; (3) S. Pavasović, T. Radelja, S. Banić i P. Milišić, Matematika - riješeni zadaci, Građevinski fakultet, Split, 1999.		
Supplementary reading	(1) D. Jukić i R. Scitovski, Matematika I, Elektrotehnički fakultet, Osijek, 2000.; (2) P. Javor, Matematička analiza 1, Element, Zagreb, 1995.; (3) N. Elezović, Linearna algebra, Element, Zagreb, 1999.		
Teaching methods	Lectures ex-cathedra supplied with blackboard. Exercises by solving problems using the blackboard. Students do their homework independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Homeworks	Make-up exam
3.0	1st assessment	**2.0**	**1.0**	**6.0**
	2nd assessment	**2.0**		
	3rd assessment	**2.0**		

Course requirements and evaluation methods	Regular attendance of classes carries 3.0 ECTS credits, and homeworks 1.0 ECTS credit. A preliminary exam is passed if it is rated with a minimum of 12 points out of 25 possible points. If a student does not pass a preliminary exam, s/he is required to do a retake at the final exam (1st winter examination period). If a student does not successfully pass all preliminary exams, s/he is required to do a retake (in the 2nd winter examination period). The final grade is established after the 2nd winter examination period. Up to 25 points can be earned by activities in classes, up to 75 at preliminary exams (provided that each of the preliminary exams was evaluated at least 12 points) and the final grade is established in the following way: the best 15% excellent, the next 35% very good, the next 35% good and the last 15% sufficient. Make-up exams are held on the second date of the summer examination period and in the autumn examination period (two dates).
Requirement(s) for admission to the make-up exam	The condition for taking the make-up exam is a minimum of 20 points earned at preliminary exams or final exams. The make-up exam is comprehensive and carries a maximum of 100 points. The grade is determined with reference to the number of points, specifically: 51-59 points sufficient, 60-74 good, 75-89 very good and 90-100 excellent.
Learning outcomes	Description of vector calculus, linear algebra and analytic geometry, differential and integral calculus of functions of one variable with geometrical and physical interpretations. The student is able to apply the acquired knowledge in the natural sciences and engineering.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.

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Course title	**PHYSICS**	Year of study	**I. (first)**
Course code	**PPRI02**	Semester	**I. (winter)**
Group	Basic	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	from the University of Mostar		
Course contents	Measurement. Motion along a straight line. Motion in two and three dimensions. Force and motion. Work and energy. Conservation of energy. Systems of particles. Collisions. Rotation. Torque and angular momentum. Oscillations. Mechanical waves. Temperature. Heat and first law of thermodynamics. The kinetic theory of gases. Entropy and second law of thermodynamics. Electric charge. The electric field. Electric potential. Capacitance. Current and resistance. The magnetic field. Ampere´s law. Faraday´s law. Inductance. Magnetism and matter. Electromagnetic oscillations. Alternating currents. Maxwell´s equations. Electromagnetic waves. Geometrical optics. Optical instruments. Interference. Diffraction. Ideas of quantum physics. Atoms, molecules, solid bodies. Atomistic interpretation of basic material properties. Atomic nucleus.		
Recommended reading	(1) S. Kilić: "Fizika I", Fakultet građevinskih znanosti Sveučilišta u Splitu, Split,1986.; (2) S. Kilić, T. Persi: "Fizika II", Fakultet građevinskih znanosti Sveučilišta u Splitu i Fakultet graditeljskih znanosti Sveučilišta u Rijeci, Split,1988.		
Supplementary reading	(1) N. Cindro: Fizika I, Školska knjiga, Zagreb, 1985.; (2) N. Cindro: Fizika II, Školska knjiga, Zagreb, 1988. (3) M. Pavičić: Zbirka riješenih zadataka iz fizike, Fakultet građevinskih znanosti Sveučilišta u Zagrebu, Zagreb, 1984.; (4) D. Halliday, R. Resnick, J.Walker: Fundamentals of Physics, John Wiley&Sons, New York, 1993.		
Teaching methods	Lectures supported by demonstration experiments and/or computer simulations; exercise course designed for developing student's problem-solving skills.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.5**	Written	**1.5**
1.5	2nd assessment	**1.0**	Oral	**2.0**
	3rd assessment	**1.0**		

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.5 ECTS credits. A student who does not pass the 1st assessment is required to retake the 1st assessment together with the 2nd assessment. 2nd assessment passed, 1.0 ECTS credit. A student who does not pass the 2nd assessment is required to retake the 2nd assessment together with the 3rd assessment. Requirement for taking the 2nd assessment is having passed the 1st assessment. 3rd assessment passed, 1.0 ECTS credit. A student who does not pass the 3rd assessment is required to take the make-up exam. Make-up exams: Written part, 1.5 ECTS credits (requirement for taking the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe and analyse the presented concepts and laws of fundamental physics, and demonstrate the use of the theoretical fundamentals on solving basic practical problems, especially in topics of engineering student interest.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**DESCRIPTIVE GEOMETRY**	Year of study	**I. (first)**
Course code	**PPRI08**	Semester	**I. (winter)**
Group	Basic	Hours per week	**3L + 3E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**7.0**
Name of lecturer	from some of the universities in/outside B&H		
Course contents	Introduction. Planar curves, interpretation from different aspects. Basics of Monge's method of projections onto the pair of planes. Application of Monge's projection method. Axonometric 3D methods of projection. Planar intersections of solids. Planar intersections of surfaces. Spatial polygons, spatial curves. Intersection polygons of angular solids. Spatial arched polygons as intersections of solids and surfaces.. Space curves as intersections of applicative surfaces. Introduction to topographic (orthographic) projection. Solutions for inclined roofs. Topographic surfaces, alignment, examples of basic traffic routes.		
Recommended reading	(1) V. Niče: Deskriptivna geometrija I, II, ŠK Zagreb (1980.); (2) I. Babić, S. Gorjanac, A. Sliepčević, V. Szirovicza: Konstruktivna geometrija-vježbe, IGH Zgb '94. (3) Szirovicza, V. ; Jurkin, E. : Deskriptivna geometrija (CD-ROM), Zagreb, 2005. (4) Babić, I.; Gorjanc, S.; Sliepčević, A. ; Szirovicza ,V. : Nacrtna geometrija - zadaci		
Supplementary reading	(1) H. Brauner, W. Kickinger: Geometrija u graditeljstvu, ŠK Zagreb (1980.); (2) Web-site Hrvatskog društva za konstruktivnu geometriju i kompjutorsku grafiku (HDKGIKG), www.hdgg.hr (elektronički udžbenik u izradi)		
Teaching methods	Lectures and exercises using the blackboard, individual development of programmes. Presentation of interactive educational content with the support of computer graphics is also included. Exercises are organised as auditory and constructional, for the development of independent programmes.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exams	
2.2	1st assessment	**1.0**	**0.8**	Written	**2.0**
	2nd assessment	**1.0**		Oral	**2.0**
	3rd assessment	**1.0**			
	4th assessment	**1.0**			

Course requirements and evaluation methods	Regular attendance of classes, 3.0 ECTS credits. Programme work (consists of several parts): Preparation and defence of the programme work carries 0.8 ECTS credits (requirement for admission to the exam). Assessments: 1st assessment passed, 1.0 ECTS credit (requirement for admission to the 2nd assessment). 2nd assessment passed, 1.0 ECTS credit (requirement for admission to the 3rd assessment). 3rd assessment passed, 1.0 ECTS credit (requirement for admission to the 4th assessment). 4th assessment passed, 1.0 ECTS credit. The student who passes all the assessments, submits and defends the programme work, has fulfilled all obligations of the course. A student who does not pass all assessments is required to take the make-up exam (written and oral part). Make-up exams: Written part, 2.0 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student has command of the entire spatial sense as the basis for presentation of spatial 3D objects on a 2D background, and vice versa. S/he is able to "communicate" between 2D and 3D spaces. S/he acquires the knowledge necessary to analyse the laws existing in the use of particular projection methods.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**FUNDAMENTALS OF GEOLOGY AND PETROGRAPHY**	Year of study	**I. (first)**
Course code	**PGEO01**	Semester	**I. (winter)**
Group	Professional	Hours per week	**2L + 1E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**3.5**
Name of lecturer	Amira Galić, PhD, senior lecturer		
Course contents	Introduction to geology, mineralogy and petrology. Mineralogy: minerals and mineraloids as naturally aggregates in the rocks; crystallography (crystals, crystalline solids and their formation, study and measurement of crystals, crystal classes, imperfection of crystals, twinning, crystals systems); chemistry of minerals (structure of minerals, sizes of ions, isomorphism, polymorphism, noncrystaline minerals); physical properties of minerals (specific gravity, optical properties, tenacity, hardness, magnetic properties, electrical properties, thermal properties, surface properties, radioactivity); genesis of minerals; determinative and descriptive mineralogy (macroscopic identification, physical properties, chemical tests); systematics of mineralogy (classification of mineral species, naming of minerals); descriptions (silicates, oxides and hydroxides, carbonates, sulphates, sulphides, halides, nitrates, borates, phosphates, native elements). Petrography: the major rock types (igneous rock, sedimentary rock, metamorphic rock); rocks as natural construction materials; igneous rocks (types of intrusions, types of extrusions, structures, textures, classification and description of igneous rocks, evolution of magma); sedimentary rocks (types of sedimentary rocks, classification and description, structures, textures, formation of sediments, diagenesis); porphiroclastic rocks (types, classification and description, structures, textures); metamorphic rocks (types of metamorphism, mineral changes during metamorphism, classification and description, structures, textures, metamorphic facies). Geology: history of the earth and solar system; internal heat of the earth, magnetism and gravity; Geotectonics; deformation of the earth crust, fold, faults and other records of rock deformations; global plate tectonics; plutonism, volcanism; seismology and the earth interior; geodynamic; weathering; erosion an landscape; natural water cycle and groundwater; wind, dust and desert; glaciers; interaction of crust, oceans and atmosphere; matter and energy from the earth; Stratigraphy: timing the Earth, fossils, absolute time and the relative geologic time scale; geological structure of Bosnia and Herzegovina, macrostructural characteristics and geological map of Bosnia and Herzegovina.		
Recommended reading	(1) S. Šestanović (2001.): Osnove geologije i petrografije, IV. izdanje 234 pp, Građevinski fakultet Sveučilišta u Splitu.		
Supplementary reading	(1) Herak, M. (1990): Geologija, V, izdanje, Školska knjiga, 433 pp, Zagreb.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, through fieldwork.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**0.5**	Written	**1.0**
1.0	2nd assessment	**1.0**	Oral	**1.0**/1.5
	3rd assessment	**1.0**		

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. Assessments: 1st assessment passed, 0.5 ECTS credits (requirement for admission to the 2nd assessment). A student who does not pass the 1st assessment is required to take the make-up exam. 2nd assessment passed, 1.0 ECTS credit (requirement for admission to the 3rd assessment). A student who does not pass the 2nd assessment is required to take the make-up exam. 3rd assessment passed, 1.0 ECTS credit. A student who does not pass the 3rd assessment is required to take the make-up exam, oral part. Make-up exams: Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.0/1.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe and analyse the structure of the Earth, especially of the lithosphere, identify processes and phenomena on the surface of the lithosphere, describe the origins of earthquakes, volcanoes and orogenic movements. The student will be able to understand the following courses in the field of geosciences.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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<table>
<tr><td>Course title</td><td colspan="3">INFORMATICS</td><td>Year of study</td><td>I. (first)</td></tr>
<tr><td>Course code</td><td colspan="3">PINF01</td><td>Semester</td><td>I. (winter)</td></tr>
<tr><td>Group</td><td colspan="3">Basic</td><td>Hours per week</td><td>1L + 3E</td></tr>
<tr><td>Teaching form</td><td colspan="3">Lectures (L), Exercises (E)</td><td>ECTS</td><td>3.5</td></tr>
<tr><td>Name of lecturer</td><td colspan="5">from some of the universities in/outside B&H</td></tr>
<tr><td>Course contents</td><td colspan="5">Introduction: PC architecture. Assembling the PC. Operating systems. Windows operating system. Windows GUI environment. Security and computer viruses. Text processing: Introduction. Text input and basic formatting. Using tables. Combining text with graphics. Advanced text formatting. Using the Equation Editor. Importing other data formats. Using spreadsheets: Introduction. Data input and basic formatting. Simple formulas. Advanced formulas and functions. Graphical data representation. Using lists and pivot tables. Introduction to programming (information level).
Computer graphics: Introduction. Basic operations with vector graphical elements: drawing, assigning attributes, relations in front / behind, set operations. Advanced techniques: grouping, using guidelines, using layers. Preparation of computer presentations: Introduction. Elements of the presentation, their input and formatting. Inserting tables and graphics into the presentation. Basics of presentation design. Good practices in preparation of the presentation. Use of computer in mathematics: Introduction. Symbolic calculus. Input of expressions. Simplifying of expressions. Solving (in) equations. Finding the limit values. Functions of multiple variables. Finding the derivatives. 2D- and 3D-graphs. Graphical solving of the equations. Vectors. Solving the systems of linear equations. Integration.
Internet: Introduction. Using the e-mail. Information retrieval using the Internet.</td></tr>
<tr><td>Recommended reading</td><td colspan="5">(1) Z. Dovedan, M. Smileski, J.D. Zalokar: "FORTRAN s tehnikama programiranja 77", Zveza organizacij za tehnično kulturo Slovenije, Ljubljana 1987.,
(2) G. Šunjić: "AutoCAD 2D modeliranje", Sveučilište u Mostaru, 2000.,
(3) G. Šunjić, P. Marijanović: "AutoCAD 3D modeliranje", Sveučilište u Mostaru, 2004.</td></tr>
<tr><td>Supplementary reading</td><td colspan="5">(1) Numerous available computer books, according to the student's preferences.</td></tr>
<tr><td>Teaching methods</td><td colspan="5">Lectures, using a projector and blackboard.
Exercises, by work of students directly on computers.</td></tr>
<tr><td colspan="6">Distribution of ECTS credits</td></tr>
<tr><td rowspan="2">Regular attendance of classes</td><td colspan="3">Assessments (preliminary exams)</td><td colspan="2">Make-up exams</td></tr>
<tr><td>Assessment A)</td><td>0.5</td><td>Written</td><td>1.0</td></tr>
<tr><td rowspan="2">1.0</td><td>Assessment B)</td><td>1.0</td><td>Oral</td><td>1.0/1.5</td></tr>
<tr><td>Assessment C)</td><td>1.0</td><td></td><td></td></tr>
<tr><td>Course requirements and evaluation methods</td><td colspan="5">Regular attendance of classes, 1.0 ECTS credit.
<u>Assessments:</u>
Assessment A) passed, 0.5 ECTS credits (requirement for admission to assessment B).
A student who does not pass the assessment A) is required to take the make-up exam.
Assessment B) passed, 1.0 ECTS credit (requirement for admission to assessment C).
A student who does not pass the assessment B) is required to take the make-up exam.
Assessment C) passed, 1.0 ECTS credit.
A student who does not pass the assessment C) is required to take the make-up exam, oral part.
<u>Make-up exams:</u>
Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam).
Oral part, 1.0/1.5 ECTS credits.</td></tr>
<tr><td>Requirement(s) for admission to the make-up exam</td><td colspan="5">Regular attendance of classes.</td></tr>
<tr><td>Learning outcomes</td><td colspan="5">The student is able to describe the theoretical and practical laws of computer science.
S/he is able to create memos, spreadsheets, charts, presentations, drawings, smaller 3D models.
The student acquires the skill of using a computer to the level required for other courses.</td></tr>
<tr><td>Language of instruction</td><td colspan="5">Croatian. English.</td></tr>
<tr><td>Quality assurance methods</td><td colspan="5">(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer</td></tr>
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Course title	**INTRODUCTION TO ARCHITECTURE**	Year of study	**I. (first)**
Course code	**PARH01**	Semester	**I. (winter)**
Group	Architectural	Hours per week	**2L**
Teaching form	Lectures (L)	ECTS	**2.0**
Name of lecturer	Jaroslav Vego, PhD, full professor		
Course contents	Introduction: history of architecture and construction. Pre-history. Mesopotamia. Egypt. Persia. Ancient Greece and Rome. Early Christian architecture. Pre-Romanesque and Romanesque architecture. Gothic architecture. Renaissance. Baroque and rococo. Classicism. Neo-styles; historicism. 19th century architecture. 20th century architecture.		
Recommended reading	(1) Marasović, T.: Kulturna baština 1,2, Split, 2001.		
Supplementary reading			
Teaching methods	Lectures, using a projector and blackboard.		

Distribution of ECTS credits			
Regular attendance of classes	Assessments (preliminary exams)		Make-up exam
	1st assessment	**0.5**	**1.3**
0.7	2nd assessment	**0.8**	

Course requirements and evaluation methods	Regular attendance of classes, 0.7 ECTS credits. Assessments: 1st assessment passed, 0.5 ECTS credits, 2nd assessment passed, 0.8 ECTS credits, The student who passes only the 1st or does not pass any assessment is required to take the make-up exam. Make-up exam: 1.3 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student identifies and is able to describe the main stages of the historical development of architecture and construction.
Language of instruction	Croatian. German.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**MATHEMATICS II**	Year of study	**I. (first)**
Course code	**PPRI04**	Semester	**II. (summer)**
Group	Basic	Hours per week	**4L + 4E**
Teaching form	Lectures (L), Exercises (E), Homework	ECTS	**10.0**
Name of lecturer	Branko Červar, PhD, senior lecturer		
Course contents	Functions of several variables, n-dimensional Euclidean space, continuity and limit of function, partial derivatives and differentials, derivative of a composite function, Taylor`s expansion for functions of two variables, maxima and minima, existence theorem for an implicit function, transformation of variables, Jacobian. Multiple integrals, change of variables, some applications in geometry and mechanics. Ordinary differential equations, first order differential equations, initial value problem, separation variables, homogeneous equations, exact equations, linear equations, Bernoulli's equation, Riccati's equation, envelopes and trajectories. Equations of higher degree, harmonic oscillator, linear differential equations of order n, Wronskian. Systems of differential equations. Vector functions, space curves, tangent and normal line to curve, curvature, torsion, Frenet's basis. Scalar and vector fields, gradient, divergence and curl operator, geometrical and physical interpretations, surfaces in space, tangent plane and normal line to surface. Mass of a curve and line integral of the first kind, work accomplished along a curve and line integral of the second kind, Green's theorem, potential fields. Mass of a surface and surface integral of the first kind, flux of a vector field and surface integral of the second kind, Gauss and Stokes theorems and applications.		
Recommended reading	(1) Červar, B., Miletić, K.: "Matematika 2" - Radna skripta, Građevinski fakultet Mostar, 2012.; (2) V. Cigić, Matematika II, Građevinski fakultet Sveučilišta u Mostaru, Mostar, 2001.; (3) B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 2003.		
Supplementary reading	(1) P. Javor, Matematička analiza 2, Element, Zagreb, 2000.;		
Teaching methods	Lectures ex-cathedra supplied with blackboard. Exercises by solving problems using the blackboard. Students do their homework independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Homeworks	Make-up exam
3.0	1st assessment	**2.0**	**1.0**	**6.0**
	2nd assessment	**2.0**		
	3rd assessment	**2.0**		

Course requirements and evaluation methods	Regular attendance of classes carries 3.0 ECTS credits, and homeworks 1.0 ECTS credit. A preliminary exam is passed if it is rated with a minimum of 12 points out of 25 possible points. If a student does not pass a preliminary exam, s/he is required to do a retake at the final exam (1st summer examination period). If a student does not successfully pass all preliminary exams, s/he is required to do a retake (in the 2nd summer examination period). The final grade is established after the 2nd summer examination period. Up to 25 points can be earned by activities in classes, up to 75 at preliminary exams (provided that each of the preliminary exams was evaluated at least 12 points) and the final grade is established in the following way: the best 15% excellent, the next 35% very good, the next 35% good and the last 15% sufficient. Make-up exams are held on the second date of the summer examination period and in the autumn examination period (two dates).
Requirement(s) for admission to the make-up exam	The condition for taking the make-up exam is a minimum of 20 points earned at preliminary exams or final exams. The make-up exam is comprehensive and carries a maximum of 100 points. The grade is determined with reference to the number of points, specifically: 51-59 points sufficient, 60-74 good, 75-89 very good and 90-100 excellent.
Learning outcomes	Describing differential and integral calculus of functions of several variables, ordinary differential equations, scalar and vector fields, line and surface integrals with geometrical and physical interpretations. The student is able to apply the acquired knowledge in the natural sciences and engineering.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**PROBABILITY AND STATISTICS**	Year of study	**I. (first)**
Course code	**PPRI05**	Semester	**II. (summer)**
Group	Basic	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Roko Andričević, PhD, full professor		
Course contents	Combinatorics. Events and algebra of events, probability of an event, independence of several events, basic rules of probability. Random variables, probability distributions, probability density function and distribution function, characteristic values of random variable. Binomial, Poisson and geometric distributions. Moivre-Laplace's theorem, Laplace's function. Normal, uniform, exponential and lognormal distributions. Two-dimensional random variables and distributions, marginal and conditional distributions, functions of random variables, correlation and independence, regression. Laws of large numbers, central limit theorem. Population, random sample and statistics, sampling distributions; t, chi-square and F distributions; point and interval estimation of parameters and hypothesis testing; chi-square test, Kolmogorov-Smirnov test. Introduction to theory of stochastic processes, Markov chains, stationary process.		
Recommended reading	(1) Ž. Pauše, Vjerojatnost, Školska knjiga, Zagreb, 1988.; (2) Ž. Pauše, Uvod u matematičku statistiku, Školska knjiga, Zagreb, 1993.		
Supplementary reading	(1) I. Pavlić, Statistička teorija i primjena, Tehnička knjiga, Zagreb, 1977.; (2) M. Ilijašević i Ž. Pauše, Riješeni primjeri i zadaci iz vjerojatnosti i statistike, "Zagreb", Zagreb, 1990.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, by solving problems on the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.5**	Written	**1.5**
1.5	2nd assessment	**2.0**	Oral	**2.0**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.5 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.0 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 1.5 ECTS credits (requirement for taking the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student identifies and is able to describe the basic techniques of statistical surveys, with particular attention focused on those concepts, methods and procedures that are necessary to solve problems in the profession. S/he is able to: - describe appropriate methodological approaches of descriptive statistics and probabilistic analysis, - differentiate the methods for assessment of errors, testing of hypotheses, etc. in the field of civil engineering practice.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.

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Course title	**BASICS OF PROGRAMMING**	Year of study	**I. (first)**
Course code	**PINF02**	Semester	**II. (summer)**
Group	Basic	Hours per week	**1L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**3.0**
Name of lecturer	Alen Harapin, PhD, full professor		
Course contents	Introduction to programming. Programming languages. The history of programming in Fortran. Flowchart. Programme structures. The programming environment in Microsoft Studio (creating a Project). Coding, editing, compiling, linking, debugging and running a program. Declaration and types of variables. Working with files (OPEN; CLOSE). Input-output commands (READ; WRITE; FORMAT). Structural and control commands (DO-END DO, WHILE, IF-THEN, CASE, CYCLE, EXIT, STOP). Arrays and their properties. Function subprogram (FUNCTION). General subprogram (SUBROUTINE). Module subprogram (MODULE). Pointers. Dynamic memory allocation. Using the IMSL Numerical Library. Graphic processing - the WINTERACTER library. Parallel programming.		
Recommended reading	(1) Petar Sarajčev: Primjena Fortrana u inženjerskim problemima, FESB-Split, 2004.; (2) Alen Harapin; Kratke osnove rada s programskim jezikom Fortran, interna skripta, FGAG-Split, 2009.		
Supplementary reading	(1) Chivers, I.D., Sleightholme, J..: Introduction to Programming with Fortran, Springer, 2006.		
Teaching methods	Lectures using a blackboard, projector and computer. Exercises using a blackboard, projector and computer. As part of exercises, students independently create computer programs.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exam	
	1st assessment	**1.0**	Written	**2.0**
1.0	2nd assessment	**1.0**		

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. Assessments: 1st assessment passed, 1.0 ECTS credit (requirement for admission to the 2nd assessment). 2nd assessment passed, 1.0 ECTS credit. A student who passes all the assessments has fulfilled all obligations of the course. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able independently to create programming solutions to mathematical problems in Fortran.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**MECHANICS I**	Year of study	**I. (first)**
Course code	**PMEH01**	Semester	**II. (summer)**
Group	Theoretical	Hours per week	**2L + 3E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**6.0**
Name of lecturer	Ivo Čolak, PhD, full professor		
Course contents	Introduction to mechanics: aim of mechanics, fundamental laws of mechanics. Basic statics: definitions of forces and moments, forces classification. Degrees of freedom and connections of rigid body, supports. Equilibrium of rigid bodies: equivalence of force system, resultant of force system, equilibrium, graphics procedures for plane forces. Coplanar and noncoplanar equilibrium analysis of composite bodies. Centre of gravity. Sliding friction, belt friction. Statics of line structures: characteristics of structure, internal forces of plane bar element, plane trusses, plane beams, internal forces of space bar element, space beams. Cable structures. Principle of virtual work. Principle of potential energy.		
Recommended reading	(1) A. Kiričenko: Tehnička mehanika (Statika), Građevinski institut Zagreb, 1990., (2) Ž. Nikolić: Mehanika I, Građevinsko-arhitektonski fakultet Split, 2009., (3) V. Andrejev: Mehanika I (Statika), Tehnička knjiga Zagreb, 1969., (4) D. Bazjanac: Tehnička mehanika, I. dio,Statika, Tehnička knjiga Zagreb, 1976.		
Supplementary reading	(1) A. Pytel, J. Kiusalaas: Engineering Mechanics (Statics), Thompson Learning, 2001., (2) F. P. Beer, E. R. Johnston: Vector Mechanics for Engineers, McGraw-Hill, 1988.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, by presentation of solved problems using a projector and explanation using the blackboard.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**0.8**	Written	**1.4**/2.2
1.8	2nd assessment	**1.6**	Oral	**1.8**/2.0
	3rd assessment	**1.8**		

Course requirements and evaluation methods	Regular attendance of classes, 1.8 ECTS credits. Assessments: 1st assessment passed, 0.8 ECTS credits (requirement for admission to the 2nd assessment). A student who does not pass the 1st assessment is required to take the make-up exam. 2nd assessment passed, 1.6 ECTS credits (requirement for admission to the 3rd assessment). A student who does not pass the 2nd assessment is required to take the make-up exam. 3rd assessment passed, 1.8 ECTS credits. A student who does not pass the 3rd assessment is required to take the make-up exam, oral part. Make-up exams: Written part, 1.4/2.2 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 1.8/2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	Identifying and analyzing fundamental theoretical laws of statics as a part of mechanics. The student is able analytically to analyse and define various forces of statically determinate structures.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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<table>
<tr><td>Course title</td><td colspan="3">GEODESY</td><td>Year of study</td><td colspan="2">I. (first)</td></tr>
<tr><td>Course code</td><td colspan="3">PPRO01</td><td>Semester</td><td colspan="2">II. (summer)</td></tr>
<tr><td>Group</td><td colspan="3">Professional</td><td>Hours per week</td><td colspan="2">2L + 2E</td></tr>
<tr><td>Teaching form</td><td colspan="3">Lectures (L), Exercises (E), Programme work</td><td>ECTS</td><td colspan="2">5.0</td></tr>
<tr><td>Name of lecturer</td><td colspan="6">from some of the universities in/outside B&H</td></tr>
<tr><td>Course contents</td><td colspan="6">Figure and dimension of the earth. Mapping earth on the plane. Geodetic network of permanently marked points. Basic principles permanent marking of triangulation, the traverse and linear net determination. Levelling net and bench marks. Error measurement. Adjustment chaining. Geodetic instruments. Measuring methods of angles and determining difference in level. Hydrographic level surface. Measurement lengths. Calculation point-coordinates in the traverse net. Survey detail. Survey bearing and distance. Survey in rectangular coordinates. Levelling. Detail levelling. Survey photogrammetric (possibilities and application). Making planimmetric map. Determining area of the parcels. Cartographic reproduction. Horizontal and marking out level. Geodetic works in civil engineering. Determining shifts and deformations of construction objects. Survey underground installations and objects. Geodetic works at the regularisation and levelling housing project. Agrarian operations. Use of the topographic maps. Development of new technology and technique of measurement.</td></tr>
<tr><td>Recommended reading</td><td colspan="6">(1) S. Macarol: Praktična geodezija, Tehnička knjiga, Zagreb, 1985.</td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(1) M. Janković: Inženjerska geodezija prvi dio, Tehnička knjiga, Zagreb, 1968;
(2) M. Janković: Inženjerska geodezija drugi dio, Tehnička knjiga, Zagreb, 1966;
(3) M. Janković: Inženjerska geodezija III, SNL, Zagreb, 1980.</td></tr>
<tr><td>Teaching methods</td><td colspan="6">Lectures, using a projector and blackboard. Exercises, practical and field exercises, using surveying instruments. Individual preparation of a study with supervisor. Students perform the programme work independently, with consultations.</td></tr>
<tr><td colspan="7">Distribution of ECTS credits</td></tr>
<tr><td rowspan="2">Regular attendance of classes</td><td colspan="2">Assessments (preliminary exams)</td><td>Programme works</td><td colspan="2">Make-up exams</td><td></td></tr>
<tr><td>assessment</td><td>0.5</td><td rowspan="2">2.0</td><td>Written</td><td>0.5</td></tr>
<tr><td>1.5</td><td colspan="2"></td><td>Oral</td><td>1.0</td></tr>
<tr><td>Course requirements and evaluation methods</td><td colspan="6">Regular attendance of classes, 1.5 ECTS credits.
<u>Programme works (totally 4):</u>
Preparation and defence of programme works, 4 x 0.5 = 2.0 ECTS credits (requirement for admission to the assessment and make-up exam).
<u>Assessments:</u>
Assessment passed, 0.5 ECTS credits.
A student who passes the assessment is required to take the make-up exam (oral part).
A student who does not pass the assessment is required to take the make-up exam (written and oral part).
<u>Make-up exams:</u>
Written part, 0.5 ECTS credits (requirement for admission to the oral part of the exam).
Oral part, 1.0 ECTS credit.</td></tr>
<tr><td>Requirement(s) for admission to the make-up exam</td><td colspan="6">Regular attendance of classes. Preparation and defence of all programme works.</td></tr>
<tr><td>Learning outcomes</td><td colspan="6">The student is able to identify and use plans and maps, and perform basic geodetic works, such as measuring angles and detailed levelling.</td></tr>
<tr><td>Language of instruction</td><td colspan="6">Croatian.</td></tr>
<tr><td>Quality assurance methods</td><td colspan="6">(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer</td></tr>
</table>

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<table>
<tr><td>Course title</td><td colspan="3">MECHANICS II</td><td>Year of study</td><td>II. (second)</td></tr>
<tr><td>Course code</td><td colspan="3">PMEH02</td><td>Semester</td><td>III. (winter)</td></tr>
<tr><td>Group</td><td colspan="3">Theoretical</td><td>Hours per week</td><td>3L + 2E</td></tr>
<tr><td>Teaching form</td><td colspan="3">Lectures (L), Exercises (E)</td><td>ECTS</td><td>6.0</td></tr>
<tr><td>Name of lecturer</td><td colspan="5">Mladen Kožul, PhD, senior lecturer</td></tr>
<tr><td>Course contents</td><td colspan="5">Kinematics: Kinematics of particles with basic definitions of motion. Motion of a particle in plane and space. Relative motion of two particles and composite motion of point. Kinematics of rigid body. Degrees of freedom of motion and determining the rigid body position in space. Definition of absolute and relative motion of rigid body. Mechanisms. Obtaining mechanisms from statically determinate structures. Application of displacement scheme and principle of virtual work in statical analysis of structures.
Dynamics: Introduction. Purpose and division of dynamics. Mechanical work. Field of forces. Differential equations of motion of particles. Dynamics of particle - principal laws. Constrained and relative motion of particle. Dynamics of system and rigid body. Principal laws. Law of motion of system mass centre or rigid body. Impact. Equations of basic motions of rigid body. Oscillatory motion of system with one degree of freedom. Response of realistic system with one degree of freedom to initial conditions and/or various external excitements (harmonic, periodical or general force, displacements of the base etc.) Numerical solution of problems described by a system of ordinary differential equations (Runge-Kutta method up to fourth and higher orders).</td></tr>
<tr><td>Recommended reading</td><td colspan="5">(1) A. Kiričenko: Tehnička mehanika II dio (kinematika) i III dio (dinamika), pbi d.o.o. ZAGREB, 1997.;
(2) B. Gotovac, V. Kozulić: Zbirka riješenih zadataka iz Mehanike II (za internu uporabu)</td></tr>
<tr><td>Supplementary reading</td><td colspan="5">(1) Ferdinand P. Beer , E. Russell Johnston, Jr.: Vector Mehanics for Engineers (Statics and Dynamics), Fifth Edition, Mc Graw-Hill, Inc., 1988.</td></tr>
<tr><td>Teaching methods</td><td colspan="5">Lectures, using a projector and blackboard.
Exercises by solving problems using the blackboard.</td></tr>
<tr><td colspan="6">Distribution of ECTS credits</td></tr>
<tr><td rowspan="2">Regular attendance of classes</td><td colspan="2">Assessments (preliminary exams)</td><td colspan="2">Make-up exams</td><td></td></tr>
<tr><td>1st assessment</td><td>2.0</td><td>Written</td><td>1.8</td><td rowspan="2">1.8</td></tr>
<tr><td>1.8</td><td>2nd assessment</td><td>2.2</td><td>Oral</td><td>2.4</td></tr>
<tr><td>Course requirements and evaluation methods</td><td colspan="5">Regular attendance of classes, 1.8 ECTS credits.
Assessments:
1st assessment passed, 2.0 ECTS credits (requirement for admission to the 2nd assessment).
2nd assessment passed, 2.2 ECTS credits.
A student who does not pass both assessments is required to take the make-up exam.
Make-up exams:
Written part, 1.8 ECTS credits (requirement for admission to the oral part of the exam).
Oral part, 2.4 ECTS credits.</td></tr>
<tr><td>Requirement(s) for admission to the make-up exam</td><td colspan="5">Regular attendance of classes.</td></tr>
<tr><td>Learning outcomes</td><td colspan="5">The student is able to describe and analyse the theoretical laws in the fields of kinematics and dynamics of particle and rigid body, and basic concepts of the theory of oscillations of systems with one degree of freedom. S/he is able to define kinematic properties of motion of particle and rigid body, the forces acting on particle and rigid body, and response of a one-degree system on excitements of the oscillatory type.</td></tr>
<tr><td>Language of instruction</td><td colspan="5">Croatian.</td></tr>
<tr><td>Quality assurance methods</td><td colspan="5">(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.</td></tr>
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Course title	**STRENGTH OF MATERIALS I**	Year of study	**II. (second)**
Course code	**PMEH03**	Semester	**III. (winter)**
Group	Theoretical	Hours per week	**3L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**6.0**
Name of lecturer	Ivo Čolak, PhD, full professor		
Course contents	General assumptions, definitions, ideas and basic calculation methods in Strength of Materials. Outer and inner forces. Stress analysis. Stress tensor. Differential equations of equilibrium. Transformation equations. Principal stresses. Deformation analysis. Deformations and strains. Deformation tensor. Principal deformations. Continuity equations. Deformable characteristics of solids - physical equations. Hooke's law. Elastic material constants. Principle of superposition. Saint Venant principle. Safety factor. Axially loaded bars - tension and compression. Stress concentration. Impact stresses. Membrane stress state. Rings. Statically undetermined bar systems. Temperature and initial stresses. Membrane stress state. Shearing stresses. Joints and connections. Torsion of straight bars of circular and non-circular cross-sections. Prandtl membrane analogy. Bending of straight beams. Pure bending. Geometric characteristics of straight cross-sections - moments of inertia. Bending with transversal forces. Normal and shear stress calculation during bending. Bending of assembled and composite beams. Skew bending.		
Recommended reading	(1) V. Šimić: Strength of Materials I, Školska knjiga, Zagreb, 1992 (in Croatian); 2nd edition 2001 (in Croatian); (2) P. Marović: Solved Examples in Strength of Materials I, Faculty of civil engineering, Split, 1993 (1986., 1987.) (in Croatian)		
Supplementary reading	(1) I. Alfirević: Strength of Materials I, Tehnička knjiga, Zagreb, 1989 (in Croatian); (2) Z. Kostrenčić: Theory of Elasticity, Školska knjiga, Zagreb, 1992 (in Croatian); (3) S. P. Timošenko: Strength of Materials I, Građevinska knjiga, Beograd, 1964		
Teaching methods	Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises by solving problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**2.1**	Written	**1.7**
1.8	2nd assessment	**2.1**	Oral	**2.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.8 ECTS credits. Assessments: 1st assessment passed, 2.1 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.1 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 1.7 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 2.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe and analyse the theory of stress, strength and stability of engineering structures. S/he acquires the skills of calculating and dimensioning simple statically determinate and statically indeterminate structures. S/he is able to solve various problems of mechanics of solid deformable body.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**ENGINEERING STATICS I**	Year of study	**II. (second)**
Course code	**PMEH04**	Semester	**III. (winter)**
Group	Theoretical	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Vlaho Akmadžić, PhD, senior lecturer		
Course contents	The tasks of civil engineering static. Types of structures. Loads. Systems of structures. Kinematics and static stability. Strain and deformations. Static equations. Principles of virtual work, potential energy, superposition, symmetry and anti symmetry. Truss structures in plane and space. Types of structures and calculation methods for statically determinate and indeterminate truss structures. Static modelling of truss structures using FEM. Moving load, envelope and influential lines. Beams, frames and arches in plane. Proof of kinematical stability, methods of calculations of static determined bearing partitions. Affine shapes. Straight and Gerber bearers. Triple hinge frames. Triple hinge frames with braces and hangers. Triple hinge arches. Triple hinge arches with braces and hangers. Strengthened beams. Langer beam. Supported beams. Hanged beams.		
Recommended reading	(1) Mihanović A.: Građevna statika, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu, (zapisi s predavanja); (2) Simović V.: Građevna statika I., Građevinski institut, Zagreb, 1988.		
Supplementary reading	(1) Timoshenko S.P. and D.H. Young, Theory of Structures, McGraw-Hill, New York, 1988.		
Teaching methods	Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises by solving problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.0**	Written	**1.5**
1.5	2nd assessment	**1.0**	Oral	**2.0**
	3rd assessment	**1.5**		

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.0 ECTS credit (requirement for admission to the 2nd assessment). 2nd assessment passed, 1.0 ECTS credit (requirement for admission to the 3rd assessment). 3rd assessment passed, 1.5 ECTS credits. A student who does not pass all three assessments is required to take the make-up exam. Make-up exams: Written part, 1.5 ECTS credits (requirement for taking the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe geometrical and kinematic stability of linear structures. S/he is able to describe and analyse statically determinate linear structures.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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<table>
<tr><td>Course title</td><td colspan="3">BUILDING MATERIALS I</td><td>Year of study</td><td colspan="2">II. (second)</td></tr>
<tr><td>Course code</td><td colspan="3">PMAT01</td><td>Semester</td><td colspan="2">III. (winter)</td></tr>
<tr><td>Group</td><td colspan="3">Professional</td><td>Hours per week</td><td colspan="2">4L + 2E</td></tr>
<tr><td>Teaching form</td><td colspan="3">Lectures (L), Exercises (E)</td><td>ECTS</td><td colspan="2">7.0</td></tr>
<tr><td>Name of lecturer</td><td colspan="6">Mladen Glibić, PhD, associate professor</td></tr>
<tr><td>Course contents</td><td colspan="6">Origin of materials. Chemical and physical aspects and appearances. Rules, norms and standards. Stone. Products made from unbaked and baked clay. Fire resistant products. Glass. Mineral binders and cements. Concrete as polyphase composite. Aggregates. Water. Additives. Fresh concrete. Hardened concrete. Volumetric deformations of concrete. Durability of concrete. Design of concrete with prescribed properties. Aggregate and concrete production. Special concretes and procedures. Concrete repair.</td></tr>
<tr><td>Recommended reading</td><td colspan="6">(1) P. Krstulović: Properties and Technology of Concrete, Faculty of Civil Engineering University of Split, Split, 2000. (in Croatian)</td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(1) V. Ukrainczyk: Concrete - Structure, Properties, Technology, Alcor, Zagreb, 1994 (in Croatian)
(2) D. Bjegović et al.: Demonstrative Exercises, Practicum, Active Education, Faculty of Civil Engineering University of Zagreb, Zagreb, 1994. (in Croatian)</td></tr>
<tr><td>Teaching methods</td><td colspan="6">Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises using a projector, blackboard and in laboratory.</td></tr>
<tr><td colspan="7">Distribution of ECTS credits</td></tr>
<tr><td rowspan="2">Regular attendance of classes</td><td colspan="3">Assessments (preliminary exams)</td><td colspan="2">Make-up exams</td><td></td></tr>
<tr><td>1st assessment</td><td>1.6</td><td>Written</td><td>2.4</td><td></td></tr>
<tr><td rowspan="2">2.2</td><td>2nd assessment</td><td>1.6</td><td>Oral</td><td>2.4</td><td></td></tr>
<tr><td>3rd assessment</td><td>1.6</td><td colspan="2"></td><td></td></tr>
<tr><td>Course requirements and evaluation methods</td><td colspan="6">Regular attendance of classes, 2.2 ECTS credits.
<u>Assessments:</u>
1st assessment passed, 1.6 ECTS credits (requirement for admission to the 2nd assessment).
2nd assessment passed, 1.6 ECTS credits (requirement for admission to the 3rd assessment).
3rd assessment passed, 1.6 ECTS credits.
A student who does not pass all three assessments is required to take the make-up exam.
<u>Make-up exams:</u>
Written part, 2.4 ECTS credits (requirement for admission to the oral part of the exam).
Oral part, 2.4 ECTS credits.</td></tr>
<tr><td>Requirement(s) for admission to the make-up exam</td><td colspan="6">Regular attendance of classes.</td></tr>
<tr><td>Learning outcomes</td><td colspan="6">The student is able to perform tests of building materials, especially of concrete and concrete products for (separate and/or site) laboratory needs.</td></tr>
<tr><td>Language of instruction</td><td colspan="6">Croatian.</td></tr>
<tr><td>Quality assurance methods</td><td colspan="6">(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer</td></tr>
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Course title	**SOIL MECHANICS AND FOUNDATIONS**	Year of study	**II. (second)**
Course code	**PGEO02**	Semester	**III. (winter)**
Group	Professional	Hours per week	**3L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**6.0**
Name of lecturer	Maja Prskalo, PhD, associate professor		
Course contents	Evolution of the soil. Properties of a soil: structure, texture, grain size, properties of particles. Porosity, density, index properties. Classification of the soil. Geotechnical exploration and observation in design of the geotechnical constructions. In situ investigations (static and dynamic penetrometer, vane shear test, pressiometer, dilatometer). Laboratory investigations. Boring log and geotechnical profiles. Water in the soil. Permeability and capillarity. Seepage. Effective stress principle, total load, pore water pressure. Consolidation. Stresses due to surface load. Mechanical properties of the soil: Mohr's circle, stress path, deformability and strength. Application of soil mechanics in geotechnical engineering: bearing capacity of foundation, forecast of foundation settlement (types of settlements), active and passive earth pressures, slope stability. Retaining structures (types and design). Sheet piles (types and design). Foundations (types). Stresses under rigid shallow foundation. Design of the shallow foundation. Deep foundations. Piles (types). Design of vertically loaded pile. Construction pits (design, stability, drainage). Geosynthetic: types and application.		
Recommended reading	(1) "Mehanika tla", T. Roje Bonacci, Građevinski fakultet Split, 2003.; (2) "Potporne građevine i građevne jame", T. Roje Bonacci, Građevinski fakultet Split, 2005.; (3) "Zbirka riješenih zadataka s primjenom EC 7", M. Prskalo, 2012. - skripta; (4) "Temeljenje", T. Roje Bonacci, P. Mišćević, Građevinski fakultet Split, 1997. (5) "Mehanika tla i temeljenje građevina", E. Nonveiller, Školska knjiga Zagreb, 1979.; (6) "Zbirka riješenih zadataka iz mehanike tla", P. Mišćević, Građevinski fakultet Split, 1999.; (7) "Kliženje i stabilizacija kosina", E. Nonveiller, Školska knjiga Zagreb, 1987.		
Supplementary reading	(1) EUROCODE 7 - prijevod prijedloga na hrvatski; (2) "Geosintetici u graditeljstvu", B. Babić, HDGI, Zagreb, 1995.; (3) "Foundation engineering handbook", H. Fang, Chapman&Hall, 1991.		
Teaching methods	Lectures, using a projector and blackboard. Exercises: by solving problems using the blackboard, in the field, laboratory. Students perform the programme work independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exams	
	1st assessment	**1.0**	**1.0**	Written	**1.6**
1.8	2nd assessment	**1.1**		Oral	**1.6**
	3rd assessment	**1.1**			

Course requirements and evaluation methods	Regular attendance of classes, 1.8 ECTS credits. Assessments: 1st assessment passed, 1.0 ECTS credit. 2nd assessment passed, 1.1 ECTS credits. 3rd assessment passed, 1.1 ECTS credits. Requirement for admission to the 3rd assessment is having passed the 1st or 2nd assessment. If a student does not pass all three assessments during classes, s/he is required to take the make-up exam. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the make-up exam). Make-up exams: Written part, 1.6 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 1.6 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to describe properties of soil necessary for calculation, carry out the calculations of bearing capacity of foundation, settlements, consolidation, slope stability, lateral earth pressure on retaining constructions, and dimension less complex foundations, retaining structures, construction pits and embankments.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**STRENGTH OF MATERIALS II**	Year of study	**II. (second)**
Course code	**PMEH05**	Semester	**IV. (summer)**
Group	Theoretical	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Ivo Čolak, PhD, full professor		
Course contents	Differential equations of beam elastic line and methods of solving: analytical, grapho-analytical and graphical. Simple undetermined systems. Beams on the elastic base. Combined stresses on straight beams. Core of cross-section. Equivalent stresses according to some strength theories. Potential energy. Clapeyron's and Castigliano's theorems. Betti's and Maxwell's theorems. Principle of potential energy minimum. Curved bars. Thin-walled cross-sections. Shear centre. Buckling. Euler's and energetic critical force. Buckling in post-elastic region. Structures calculations due to theory of plasticity. Plastification of cross-section under torsion. Plastification of cross-section under bending. Statical and kinematical theorems.		
Recommended reading	(1) V. Šimić: Strength of Materials II, Školska knjiga, Zagreb, 1995 (in Croatian); 2nd edition 2002 (in Croatian)		
Supplementary reading	(1) Z. Kostrenčić: Theory of Elasticity, Školska knjiga, Zagreb, 1992 (in Croatian); (2) P. Marović: Solved Examples in Strength of Materials II, Faculty of Civil Engineering, Split, 1988 (1986) (in Croatian); (3) S. P. Timošenko: Strength of Materials II, Građevinska knjiga, Belgrade, 1965		
Teaching methods	Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises by solving practical problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.7**	Written	**1.5**
1.5	2nd assessment	**1.8**	Oral	**2.0**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.7 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 1.8 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 1.5 ECTS credits (requirement for taking the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able completely to describe and analyse the theory of stress, strength and stability of engineering structures. S/he is able to make a calculation and dimension simple statically determinate and statically indeterminate structures.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.

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Course title	**ENGINEERING STATICS II**	Year of study	**II. (second)**
Course code	**PMEH06**	Semester	**IV. (summer)**
Group	Theoretical	Hours per week	**3L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**6.0**
Name of lecturer	Vlaho Akmadžić, PhD, senior lecturer		
Course contents	Types of deformability of linear sticks, longitudinal, shear, bending and twisting. Static non determined beam bearers, frames, grids and arches. Displacement theory on deep beams in plane. Use of FEM, stiffness matrix and full wedged force. Influence of temperature effect. Introduction of Forces Theory. Simple beams and continuous beams bearers. Frames in plane with stiff crossbars. General plane frames. Arch bearers in plane. Space frames with stiff crossbars. General space frames. Grids. Space arches. Modelling of linear structures with FEM, edge conditions and internal releases. Internal forces, displacements and deformation curves. Scheme of loading, envelope and influential lines. Iterative methods. Bending basics of thin plates. Use of FEM. Continuous plates with simple edge conditions. Load schemes. Bearer and plate on elastic surface. Basics of walls and deep beams. Use of FEM. Independent wall and deep beams. Walls with openings. Walls modelling with linear elements. Modelling of complex plates. Roof structures with straight surfaces. Complex structures of buildings with columns, plates and bearing walls. Stiffness centre of the floor. Load schemes. Numerical models. Failures of static modelling and computer use.		
Recommended reading	(1) Mihanović A: Građevna statika, Građevinsko-arhitektonski fakultet sveučilišta u Splitu, (zapisi s predavanja); (2) Anđelić M.: Statika neodređenih štapnih konstrukcija, Društvo hrvatskih građevinskih konstruktora, Zagreb, 1993.		
Supplementary reading	(1) Timoshenko S.P. and D.H. Young, Theory of Structures, McGraw-Hill, New York, 1988.		
Teaching methods	Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises by solving problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**2.0**	Written	**2.0**
1.8	2nd assessment	**2.2**	Oral	**2.2**

Course requirements and evaluation methods	Regular attendance of classes, 1.8 ECTS credits. Assessments: 1st assessment passed, 2.0 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.2 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 2.0 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 2.2 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to define, analyse, and calculate the statics of linear and plate structures, as well as walls and deep beams.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**HYDROLOGY**	Year of study	**II. (second)**
Course code	**PHID01**	Semester	**IV. (summer)**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Gordan Prskalo, PhD, senior lecturer		
Course contents	History and definition of hydrology. Meteorology and climatology. The definition and components of atmosphere. Water vapor. Wind. Evapotranspiration. Precipitations. The definitions of precipitations and the precipitations forming. Measuring of precipitations. Intensity of precipitations. Frequency-intensity-duration curves. The average precipitation on catchment. Precipitation data analysis for engineering purposes. Hydrometry. Water level. Water depth. Velocity. Discharge measurements. Turbulence in the open channel flow and its impact on accuracy of the velocity measurements. Modern methods for discharge measurement. The definition of discharge curve. Extrapolation of discharge curve. Statistic methods in hydrology. Frequency and duration curve. Regression and correlation analysis in hydrology. Parametric hydrology and runoff. Watershed and its characteristics. Rainfall-runoff transformation. Principles of hydrological budget. High flow. Genetic algorithm and the Rational method. Isochrones. The unit hydrograph. Frequency curve and its application in hydrology. Extreme value series and peak over threshold data. Testing of fit of distribution functions to empirical distributions.		
Recommended reading	(1) O. Bonacci: Oborine-glavna ulazna veličina u hidrološki ciklus, Geing, Split, 1994.; (2) H. Hrelja: Inženjerska hidrologija, Univerzitetski udžbenik, Sarajevo, 2007. (3) R. Žugaj: Hidrologija; Sveučilišni udžbenik, Sveučilište u Zagrebu, Zagreb, 2000.		
Supplementary reading	(1) O. Bonacci, Karst Hydrology, Springer Verlag, Heidelberg, 1987.; (2) O. Bonacci: Meteorološke i hidrološke podloge, Priručnik za hidrotehničke melioracije, I kolo.		
Teaching methods	Lectures, using a projector and blackboard. Exercises by solving problems using the blackboard. Students perform the programme work independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exams	
	1st assessment	**0.5**	**1.0**	Written	**1.0**
1.5	2nd assessment	**1.0**		Oral	**1.0**
	3rd assessment	**1.0**			**1.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 0.5 ECTS credits. A student who does not pass the 1st assessment is required to take the make-up exam. 2nd assessment passed, 1.0 ECTS credit (requirement for admission to the 3rd assessment). A student who does not pass the 2nd assessment is required to take the make-up exam. 3rd assessment passed, 1.0 ECTS credit. A student who does not pass the 3rd assessment is required to take the make-up exam, oral part. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the 2nd assessment and the written part of the make-up exam). Make-up exams: Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.0/1.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to describe and analyse components of the hydrological cycle, apply mathematical and statistical methods to solve engineering and hydrological problems, perform elementary hydrological calculations in hydraulic engineering.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**HYDROMECHANICS**	Year of study	**II. (second)**
Course code	**PHID02**	Semester	**IV. (summer)**
Group	Theoretical	Hours per week	**3L + 3E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**7.0**
Name of lecturer	Zoran Milašinović, PhD, full professor		
Course contents	Properties of matter and fluids. Hydrostatics in gravity field of earth. Kinematics of fluids. Dynamics of ideal fluid: change of momentum, Bernoulli equation of steady flow, power of flow. Dynamics of real fluid: laminar flow / Hagen-Poisseuile law, Reynolds experiments, turbulent flow, power of real flow, Coriolis number, hydrodynamic resistance in laminar, turbulent and transition flow, boundary layer, roughness influence on resistance, boundary layer separation, hydrodynamic force on bodies in stream of fluid, loads on structures in stream of fluid, Karman force, Darcy-Weissbach expression for energy losses, Moody diagram, Bernoulli equation of steady flow of real fluid in pipes. Potential flow: irrotational flow, velocity potential, stream function, flow net, Equation of potential flow. Methods of solution: Numerical modelling of potential flow, finite element method. Loads on hydromechanics' structures. Hydrodynamics of sharp edge overflows and outflows. Steady flow in open channels: uniform flow, Chezy and Manning formula, discharge curves, normal depth, specific energy of cross section, Froude number, critical depth and critical slope. Non-uniform flow, classification of flow profiles in prismatic channels, computation of flow profiles. Basics of sediment transport. Steady flow of ground water, aquifers, Darcy low, filtration coefficient, Dupuit assumption, homogenous and anisotropic layers. Linearization for free surface flow – Girinski potential, galleries, confined and unconfined wells, group of wells. Determination of filtration coefficients.		
Recommended reading	(1) V. Jović: Osnove hidromehanike, Sveučilište u Splitu, Element, Zagreb, 2006.; (2) H. Rouse: Fluid mechanics for hydraulic engineers, Dover Pub. Inc, New York; (3) P. Kesić: Osnove mehanike fluida, Svjetlost, Sarajevo, 1985. (4) I. Demirdžić: Mehanika fluida - skripta		
Supplementary reading	(1) H. Rouse: Tehnička hidraulika, Građevinska knjiga, Beograd, 1969. (2) Z. Janežić, T. Kupusović: Zbirka riješenih problema iz Hidraulike sa zadacima za vježbu, Građevinski fakultet Sarajevo, Sarajevo, 1980.		
Teaching methods	Lectures ex-cathedra supplied with projector, overhead projector and blackboard. Exercises by solving problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	2.0/4.8	Written	**2.0**
2.2	2nd assessment		Oral	**2.8**

Course requirements and evaluation methods	Regular attendance of classes, 2.2 ECTS credits. Assessments: The two assessments are worth 100 points each, 200 in total. Requirement for admission to the 2nd assessment is at least 50 points earned at the 1st assessment. A student who earns up to 100 points at both assessments is required to take the make-up exam (written and oral part). A student who earns 100-140 points at both assessments is required to take the make-up exam (oral part). A student who earns 140-160 points at both assessments is assessed with the grade GOOD (3), 160-180 points with the grade VERY GOOD (4) and 180-200 points with the grade EXCELLENT (5). Make-up exams: Written part, 2.0 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 2.8 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe the steady flow of fluids, hydraulics in channels and groundwater flows. S/he is able to perform minor engineering computations of flows in pipelines, channels and water intakes.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**ELEMENTS OF BUILDING CONSTRUCTION**	Year of study	**II. (second)**
Course code	**PARH02**	Semester	**IV. (summer)**
Group	Architectural	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Jaroslav Vego, PhD, full professor		
Course contents	Introduction: division of building elements. Supporting and non-supporting elements, finishing works, installations. Modular co-ordination. Brick walls. Concrete and reinforced concrete walls. Masonry / stone walls, baked clay and concrete block walls. Pillars / columns. Foundations. Horizontal inter-floor supporting structures. Roofs. Staircases. Lifts. Dividing walls. Chimneys. Ventilation systems. Basic concepts of construction physics. Thermal protection and insulation. Diffusion protection. Protection against noise and vibrations. Insulation works. Roof covering works. Inclined and flat roofs. Façades. Compact and ventilated systems. Floors. Wall openings: doors and windows made of various materials. Glass façades. Curtain walls. Typical construction details; working drawings.		
Recommended reading	(1) Tušek, D.: Elementi visokogradnje / Poglavlje 1: Konstruktivni elementi zgrade (skripta), Split, 2001; (2) Tušek, D.: Elementi visokogradnje / Poglavlje 2: Fizika zgrade (skripta), Split, 2001; (3) Perković, Z.: Elementi visokogradnje / Poglavlje 3: Završni radovi (skripta), Split, 2001; (4) Peulić, Đ..: Konstruktivni elementi zgrada I, II, Zagreb, 1980.		
Supplementary reading	(1) Vrkljan, Z., Kordiš, I.: Oprema građevinskih nacrta, Zagreb, 1980; (2) Šimetin, V.: Građevinska fizika, Zagreb, 1983.		
Teaching methods	Lectures and exercises using a projector and blackboard. Fieldwork. Students perform the programme work independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exam
	1st assessment	**0.5**	**1.0**	**1.0**/2.5
1.5	2nd assessment	**0.5**		
	3rd assessment	**0.5**		

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 0.5 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 0.5 ECTS credits (requirement for admission to the 3rd assessment). 3rd assessment passed, 0.5 ECTS credits. A student who does not pass all three assessments is required to take the make-up exam. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the make-up exam). The student who passes all three assessments, and submits and defends the programme work, is required to take the make-up exam. Make-up exams: 1.0/2.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to properly analyse and make parts of the preliminary design, final design and working drawings of a simple building.
Language of instruction	Croatian. German.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**BASICS OF CONCRETE STRUCTURES**	Year of study	**III. (third)**
Course code	**PKON01**	Semester	**V. (winter)**
Group	Professional	Hours per week	**4L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**7.0**
Name of lecturer	Mladen Glibić, PhD, associate professor		
Course contents	Conventional reinforced concrete theory: Physical-mechanical properties of concrete (structure; strength and deformation under uniaxial and multi-axial, static, dynamic, short-term and long-term load; volume deformation of concrete; impact of high temperature). Physical-mechanical properties of reinforcement steel (types of steel; stress-strain diagrams under different loads; impact of high temperature; steel corrosion). Conditions for simultaneous „work" of concrete and reinforcement (adhesion; reinforcement jointing and anchoring; reinforcement shaping; reinforcement protective layer; concrete cracks). Regulations. Dimensioning of reinforced concrete cross-sections and elements: Limit impacts (safety factors; load combinations). Limit state – bearing capacity (basic assumptions; pure bending; centric and eccentric compression and tension; slander compression elements; hooped columns; transverse forces; puncture, torsion, complex stress states). Limit state - exploitation (cracks, deflection, stress). Structural details: Details or slab, beam and column reinforcement. Regulations. Field visits to concrete structures and buildings under construction.		
Recommended reading	(1) Tomičić I.: Betonske konstrukcije (Concrete structures), Školska knjiga, Zagreb 1988; (2) Tomičić I.: Betonske konstrukcije - odabrana poglavlja (Concrete structures - selected chapters), DHGK, Zagreb 1993; (3) Eurocode 2.; Eurocode 8.		
Supplementary reading	(1) Leonhardt, V.: Vorlesungen über Massivbau, Füntter Feil, Springer – Verlag, 1979.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, using a projector, by directly solving problems on the blackboard, through fieldwork.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**2.4**	Written	**2.8**
2.2	2nd assessment	**2.4**	Oral	**2.0**

Course requirements and evaluation methods	Regular attendance of classes, 2.2 ECTS credits. Assessments: 1st assessment passed, 2.4 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.4 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written, 2.8 ECTS credits (requirement for admission to the oral part of the exam). Oral, 2.0 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	The student is able to describe the basic theoretical concepts of conventionally reinforced concrete. S/he is able to dimension cross sections and structural elements (beams and load-carrying slabs) to bending and shear.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.

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<table>
<tr><td>Course title</td><td colspan="3">INTRODUCTION TO TIMBER STRUCTURES</td><td>Year of study</td><td colspan="2">III. (third)</td></tr>
<tr><td>Course code</td><td colspan="3">PKON02</td><td>Semester</td><td colspan="2">V. (winter)</td></tr>
<tr><td>Group</td><td colspan="3">Professional</td><td>Hours per week</td><td colspan="2">2L + 2E</td></tr>
<tr><td>Teaching form</td><td colspan="3">Lectures (L), Exercises (E)</td><td>ECTS</td><td colspan="2">5.0</td></tr>
<tr><td>Name of lecturer</td><td colspan="6">Mladen Glibić, PhD, associate professor</td></tr>
<tr><td>Course contents</td><td colspan="6">General remarks on timber structures. Historical review. Present state. Developmental trends. Materials of timber structures. Timber properties. Types of stresses and methods for their computation, methodology. Current standards. Fasteners and their properties. Characteristic properties of the fasteners and the computation of the bearing capacity. Computation of the elements of timber structures. Structural joints and joining by fasteners. Liability. Spaced and lattice columns. Indirect and direct transfer of forces. Specific features of the computations for timber structures. Formation and computations of details. Eurocode 5 – main principles. Roof structures. Main principles in the construction of timber structures. Timber bridges. Structures under specific conditions, reconstruction of timber structures. Scaffolds and formworks. Durability and fire protection.</td></tr>
<tr><td>Recommended reading</td><td colspan="6">(1) Z. Žagar: Proračun građevinskih konstrukcija računalom (osnove drvenih konstrukcija i modeliranje), Školska knjiga, Zagreb, 1993.;
(2) Z. Žagar: Spajala i spojevi u drvenim konstrukcijama, G.F. Zagreb, 1993.;
(3) Z. Žagar: Drvene konstrukcije: Podatljivost, stabilnost, prostornost., GF Zagreb, 1994.;
(4) Z. Žagar: Drvene konstrukcije: Drveni mostovi, skele., GF Zagreb, 1993.;
(5) M. Gojković i ostali: Drvene konstrukcije, Čigoja Beograd, 2001.</td></tr>
<tr><td>Supplementary reading</td><td colspan="6">(1) M. Gojković, B. Stevanović: Drveni mostovi, Naučna knjiga Beograd, 1985.;
(2) Lehman-Stolse: Ingenieurholzban, Teubner, Stuttgart, 1972.;
(3) Tehnologija drvenih građevina, priručnik za projektiranje i nadzor, Mozaik knjiga d.o.o., Zagreb, 2000.;
(4) Eurocode 5.</td></tr>
<tr><td>Teaching methods</td><td colspan="6">Lectures, using a projector and blackboard. Exercises, using a projector, by directly solving problems on the blackboard.</td></tr>
<tr><td colspan="7">Distribution of ECTS credits</td></tr>
<tr><td rowspan="2">Regular attendance of classes</td><td colspan="3">Assessments (preliminary exams)</td><td colspan="2">Make-up exams</td><td></td></tr>
<tr><td colspan="2">1st assessment</td><td>1.5</td><td>Written</td><td>2.0</td></tr>
<tr><td>1.5</td><td colspan="2">2nd assessment</td><td>2.0</td><td>Oral</td><td>1.5</td></tr>
<tr><td>Course requirements and evaluation methods</td><td colspan="6">Regular attendance of classes, 1.5 ECTS credits.
<u>Assessments:</u>
1st assessment passed, 1.5 ECTS credits (requirement for admission to the 2nd assessment).
2nd assessment passed, 2.0 ECTS credits.
A student who does not pass both assessments is required to take the make-up exam.
<u>Make-up exams:</u>
Written, 2.0 ECTS credits (requirement for admission to the oral part of the exam).
Oral, 1.5 ECTS credits.</td></tr>
<tr><td>Requirement(s) for admission to the exam</td><td colspan="6">Regular attendance of classes.</td></tr>
<tr><td>Learning outcomes</td><td colspan="6">The student is able to describe the basic theoretical concepts of timber structures.
S/he is able to dimension sections and joints and extensions of simple timber structures.</td></tr>
<tr><td>Language of instruction</td><td colspan="6">Croatian.</td></tr>
<tr><td>Quality assurance methods</td><td colspan="6">(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer</td></tr>
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Course title	**CONSTRUCTION PRODUCTION**	Year of study	**III. (third)**
Course code	**PORG01**	Semester	**V. (winter)**
Group	Professional	Hours per week	**2L + 1E**
Teaching form	Lectures (L), Exercises (E), Prog. and sem. work	ECTS	**4.0**
Name of lecturer	Ivana Domljan, PhD, senior lecturer		
Course contents	Basics of production. Nature of construction production. Types of construction operations. Nature of construction processes: characteristics, models, schemas. LOB models. Measuring, prediction and improvement of productivity. Norms and production. Technology and its role in construction production. Precasting. Construction equipment: production, costs, documentation. Productivity balance of equipment units. Construction equipment classification. Basic characteristics of the particular construction equipment. Basic construction production systems: concrete production, asphalt production, queries, etc. Formworks. Construction sites and plants visits.		
Recommended reading	(1) Lončarić, R.: Organizacija izvedbe graditeljskih projekata, HDGI, 1995.; (2) E. Slunjski: Građevinski strojevi, HDGI, 1995.; (3) G. Bučar: Normativi i cijene u graditeljstvu, ICG d.o.o. i Građ. fakultet u Rijeci, 2003.		
Supplementary reading	(1) R.L. Peurifoy, W.B. Ledbetter, C.J. Schexnayder: Construction Planning, Equipment, and Methods, The McGraw-Hill Companies, 1996.; (2) D. W. Halpin, L.S. Riggs: Planning and Analysis of Construction Operations, John Wiley & Sons, 1992.		
Teaching methods	Lectures, using a projector. Exercises: auditory, constructive and field exercises. Students perform the programme and seminar work independently with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Seminar paper	Make-up exams	
1.0	1st assessment	**0.6**	**0.4**	**0.4**	Written	**1.2**
	2nd assessment	**0.6**			Oral	**1.0**
	3rd assessment	**1.0**				

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. Assessments: 1st and 2nd assessment passed, 2 x 0.6 = 1.2 ECTS credits. 3rd assessment passed, 1.0 ECTS credit. In order to earn 2.2 credits through assessments, the student must pass all three of them. Otherwise, s/he is considered not to have earned a single ECTS credit and is required to take the make-up exam. Programme and seminar work: Preparation and defence of the programme and seminar work, 2 x 0.4 = 0.8 ECTS credits. Make-up exams: Written part, 1.2 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 1.0 ECTS credit.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme and seminar work.
Learning outcomes	The student generally acquires the awareness of the ethics of the profession, occupational safety, and builds on the ability of written/spoken communication and presentation of ideas and viewpoints. The student will be able to: analyse and comment on the specifics of construction production and use of technology in the construction process, plan efficient management of construction production (performance), analyse and organise the use of particular types of machines and formwork systems in construction processes, organise and plan the production in the manufacturing facilities that are used in construction, organise efficient and cost-effective use of groups of different machines in construction processes.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**WATER SUPPLY AND WASTEWATER MANAGEMENT IN URBAN AREAS**	Year of study	**III. (third)**
Course code	**PHID03**	Semester	**V. (winter)**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Željko Rozić, PhD, senior lecturer		
Course contents	Urban water system (UWS): purpose, elements, processes, environment, planning data. Water supply: planning, design and construction of the system, sources of water, storage, distribution systems, pipes, pump stations. Wastewater management: planning, design and construction of wastewater system, collection, conveyance, disposal, channels, pump stations. Drainage of rainwater: planning, design and construction of drainage system, collection, conveyance, storm water basins, disposal. Integral management of UWS: planning, operation and maintenance, organization, financing, legislation and regulations.		
Recommended reading	(1) J. Margeta: Wastewater management in urban areas, FCE Split, 1998 (in Croatian); (2) I. Gulić: Water supply in urban areas, FCE, 2000 (in Croatian); (3) J. Margeta: Water supply, part I., FCE, 1986 (in Croatian)		
Supplementary reading	(1) Z. Krušić: Wastewater evacuation, conditioning and disposal, FCE Rijeka, 1981 (in Croatian)		
Teaching methods	Lectures, using a projector and blackboard. Exercises by solving problems using the blackboard. Students perform programme works independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme works	Make-up exams	
	1st assessment	**1.5**	**1.0**	Written	**1.0**
1.5	2nd assessment	**1.0**		Oral	**1.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.5 ECTS credits (requirement for admission to the 2nd assessment). A student who does not pass the 1st assessment is required to take the make-up exam. 2nd assessment passed, 1.0 ECTS credit. A student who does not pass the 2nd assessment is required to take the make-up exam. Programme works: Preparation and defence of programme works: The 1st programme work (0.5 ECTS credits) is the requirement for admission to the 1st assessment. The 2nd programme work (0.5 ECTS credits) is the requirement for admission to the 2nd assessment. Make-up exams: Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of programme works.
Learning outcomes	The student is able to describe and analyse the functions of water supply and sewerage systems and their elements; participate in the process of planning, design, construction and management of water supply and sewage systems and their functional elements.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**CONSTRUCTION MANAGEMENT**	Year of study	**III. (third)**
Course code	**PORG02**	Semester	**V. (winter)**
Group	Professional	Hours per week	**3L + 1E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Vlado Majstorović, PhD, full professor		
Course contents	Project: concept, classifications, phases. System analysis and project management. Construction organisation: bid and award project of construction organisation. Project management: planning, optimisation, control. Construction risks. Planning methods (CPM, PDM, Gantt-charts, orthogonal plans, cyclograms). Project/activity duration. Project/activity resources. Project/activity costs. PERT. Construction bid/award costs estimating. Organisation of construction operations: characteristics, principles, models, cyclograms of production. Optimisation. Construction management. Interruptions and delays during construction. Law, regulations, contracts (construction and safety practice). Construction sites visits.		
Recommended reading	(1) R. Lončarić: Organizacija izvedbe graditeljskih projekata, HDGI, 1995.; (2) E. Slunjski: Građevinski strojevi, Građevinar, HDGI, 1995. (3) G. Bučar: Normativi i cijene u graditeljstvu, ICG d.o.o. i Građevinski fakultet u Rijeci, 2003.		
Supplementary reading	(1) D. W. Halpin, R. W. Woodhead: Construction Management, John Wiley & Sons, 1998.; (2) H. N. Ahuja, S. P. Dozzi, S. M. Abourizk: Project management – Techniques in Planning and Controlling Construction Projects, John Wiley & Sons, 1994.		
Teaching methods	Lectures, using a projector and blackboard. Exercises by solving problems using the blackboard. Students perform the programme work independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exams	
	1st assessment	**1.0**	**1.0**	Written	**1.0**
1.5	2nd assessment	**1.5**		Oral	**1.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to assessments). Assessments: 1st assessment passed, 1.0 ECTS credit (requirement for admission to the 2nd assessment is a minimum of 30 points earned). 2nd assessment passed, 1.5 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to describe and explain the basic principles and methods of organization, planning and management of construction projects. S/he becomes familiar with legislation accompanying the performance and contracting of construction projects. The student is able to develop and implement a construction management project and plan in practice.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**HIGHWAYS**	Year of study	**III. (third)**
Course code	**PPRO02**	Semester	**V. (winter)**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Ivan Lovrić, PhD, associate professor		
Course contents	History of road building. Some fundamental definitions and the functional classification of highways. Kinematical characteristics of vehicles affecting the design of roads. Driver characteristics. Stopping sight distance. Passing sight distance. Traffic flow measures of effectiveness. Horizontal alignment. Straight. Minimum radius. Spiral curve. Serpentines. Sight distance on horizontal curves. Vertical alignment. Grades. Vertical curves. Combination of horizontal and vertical alignment. Cross sections. Horizontal and vertical clearance. Turning paths of design vehicles. Drainage. Pavements. Intersections, interchanges. Traffic areas. Urban road design. Signing and markings. Elements of preliminary and final highway design.		
Recommended reading	(1) Ž. Korlaet: *Uvod u projektiranje i građenje cesta*, Udžbenici Sveučilišta u Zagrebu, Zagreb, 1995.; (2) *Pravilnik o osnovnim uvjetima koje javne ceste, njihovi elementi i objekti na njima moraju ispunjavati s aspekta sigurnosti prometa* ("Službeni glasnik BiH", broj 6/06); (3) Katanić, J., Anđus, V., Maletin, M.: *Projektovanje puteva*, Građevinska knjiga, Beograd, 1983.		
Supplementary reading	(1) AASHTO: *A Policy on Geometric Design of Highways and Streets*, 2001.; (2) B. Mazić, I. Lovrić: *Ceste,* Sarajevo 2010.; (3) I. Lovrić: *Materijali s predavanja*, *separati*; (4) *Smjernice za projektiranje, građenje, održavanje i nadzor na cestama,* Sarajevo/Banja Luka, 2005.		
Teaching methods	Lectures, using a projector and blackboard. Exercises: auditory + design. Programme work: design exercises + independent work + defence of work.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exam
	1st assessment	**1.0**	**1.0**	**0.5**/2.5
1.5	2nd assessment	**1.0**		

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the 2nd assessment and make-up exam) Assessments: 1st assessment passed, 1.0 ECTS credit (requirement for admission to the 2nd assessment). 2nd assessment passed, 1.0 ECTS credit. A student who passes both assessments is required to take a short make-up exam in order for his/her final grade to be determined, and a student who does not pass both assessment is required to take a make-up exam of a longer duration with the scope of questions at the teacher's discretion. Make-up exam: Oral, 0.5/2.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to make a rural or suburban highway design up to the level of preliminary design, with full understanding of the conditions for the selection of optimal elements (geometry, alignment).
Language of instruction	Croatian. Italian
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**INTRODUCTION TO METAL STRUCTURES**	Year of study	**III. (third)**
Course code	**PKON03**	Semester	**VI. (summer)**
Group	Professional	Hours per week	**3L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**6.0**
Name of lecturer	Vlaho Akmadžić, PhD, senior lecturer		
Course contents	General remarks on metal structures – historical review of the development of steel structures. Types of structural steel, mechanical properties. Analysis of material fatigue. Protection from corrosion and fire action. Concept of safety of metal structures – analysis of actions and the limit state of structure resistance. Dimensioning – classification, resistance of cross-sections and structural elements. Tensile and compressive elements. Dimensioning of centrically compressed element according to method, real members. Elements subjected simultaneously to bending and tensile longitudinal forces. Lateral torsion. Frame systems. Design of joints. Influence exerted by joints upon the frame stability. Welded and riveted joints. Structural formation – method for design of elements and their joints. Composite structure – basic computational concept. Basic principles in the design of halls and multi-storey buildings with special emphasis on the transfer of forces and spatial stabilization of the structure. Production and assembly of steel structures.		
Recommended reading	(1) B. Androić, D. Dujmović, I. Džeba: Metalne konstrukcije I, II i III, IGH, Zagreb, 1994., 1995., 1998.		
Supplementary reading	(1) V. Milčić, B. Peroš: Uvod u teoriju sigurnosti nosivih konstrukcija, GF Split, 2003.; (2) Mihanović: Stabilnost konstrukcija, DHGK, Zagreb, 1993.; (3) A. Vukov: Uvod u metalne konstrukcije, GF, Split, 1988.; (4) Stahal im Hochbau, 15 Auflage; EUROCODE 3		
Teaching methods	Lectures, using a projector and blackboard. Exercises by solving problems using the blackboard. Students perform programme works independently, with consultations.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exams	
	1st assessment	**1.6**	**1.0**	Written	**1.6**
1.8	2nd assessment	**1.6**		Oral	**1.6**

Course requirements and evaluation methods	Regular attendance of classes, 1.8 ECTS credits. <u>Programme work:</u> Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the make-up exam). <u>Assessments:</u> 1st assessment passed, 1.6 ECTS credits. 2nd assessment passed, 1.6 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. <u>Make-up exams:</u> Written part, 1.6 ECTS credits (requirement for admission to the oral part of the exam). Oral part, 1.6 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to describe and analyse the basic theoretical concepts of metal structures and is capable of dimensioning sections of simple metal structures.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**F I N A L W O R K**	Year of study	**III. (third)**
Course code	**PZAV01**	Semester	**VI. (summer)**
Group	Professional	Hours per week	**0L + 2.5E**
Teaching form	Independent work	ECTS	**5.0**
Name of lecturer	Lecturer from the selected subject.		
Course contents	The student selects the subject of the final work according to the previously defined subjects determined by the Scientific Teaching Council for each academic year. The student performs individual and independent research in the subject selected in collaboration with the lecturer/mentor. The student prepares her/his final work in written and/or in digital form.		
Recommended reading	According to the subject lecturer recommendation.		
Supplementary reading	According to the subject lecturer recommendation.		
Teaching methods	Consultations with selected subject lecturer/mentor and individual research work, as well as preparation of the final work in a defined form.		
Course requirements and evaluation methods	With the beginning of the VI. (summer) semester, student is assigned a subject in which to prepare his/her final work, as well as a mentor of the final work. During the VI. semester, the student develops the final work in consultation with the subject lecturer/mentor. After the student passes all subjects of the university undergraduate studies in civil engineering, s/he proceeds with the defence of the final work.		
Requirement(s) for admission to the defence of the final work	Successfully passed all courses of the university undergraduate studies in civil engineering.		
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.		

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3.3.2 CURRICULUM OF ELECTIVE COURSES

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Course title	**PRINCIPLES OF BUSINESS ECONOMICS**	Year of study	**II. (second)**
Course code	**PDRU01**	Semester	**IV. (summer)**
Group	General	Hours per week	**2L**
Teaching form	Lectures (L), Seminar paper	ECTS	**2.0**
Name of lecturer	from the University of Mostar		
Course contents	Civil engineering business environment; market (concept, structure); supply and demand (what is demand, demand elasticity, customers needs, what is supply, prices determination); enterprise, enterprising and enterpriser (enterprise concept and function, enterprising and enterpriser concepts, classification and definition of enterprise means); production (concept of production in technical context, production, manufacturing in civil engineering), costs (definition, principles, calculation, prices, costs in civil engineering context); business results and business efficiently determination; work processes economics.		
Recommended reading	(1) Dragana Grubišić, Poslovna ekonomija, Ekonomski fakultet Sveučilišta u Splitu, Split 2004.		
Supplementary reading	(1) J.E. Manser, Economics – A Foundation Course for the Built Environment, E&FN Spon, London, UK 1995		
Teaching methods	Lectures, using a projector and blackboard. Students perform the seminar paper independently, with consultations.		

Distribution of ECTS credits			
Regular attendance of classes	Assessments (preliminary exams)	Seminar paper	Examination
		1.25	
0.75			
Course requirements and evaluation methods	Regular attendance of classes, 0.75 ECTS credits. Submission and defence of the seminar paper, 1.25 ECTS credits.		
Requirement(s) for admission to the exam	Regular attendance of classes.		
Learning outcomes	The student is able to describe and define: market principles, laws of supply and demand, the economic organization of enterprises, entrepreneurship. S/he is able to identify costs, analyse business results in production and determine the criteria of business success.		
Language of instruction	Croatian.		
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer		

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Course title	**FUNDAMENTALS OF LEGISLATION**	Year of study	**II. (second)**
Course code	**PDRU02**	Semester	**IV. (summer)**
Group	General	Hours per week	**2L**
Teaching form	Lectures (L)	ECTS	**2.0**
Name of lecturer	from the University of Mostar		
Course contents	Main institutes, sources and hierarchy of legal regulations. Constitution of the Republic of Bosnia and Herzegovina. Respective chapters from the statutary law. Respective chapters of the law of obligations with the compensation/indemnity of damage and respective contracts from the field of civil engineering. Related chapters of the proprietary law. Respective chapters of the labour law and tax regulations. Chapters from the company law and commercial law. Main issues of standardization.		
Recommended reading	Laws, bylaws and adequate textbooks of the university teacher		
Supplementary reading			
Teaching methods	Lectures, using a projector and blackboard.		

Distribution of ECTS credits			
Regular attendance of classes	Assessments (preliminary exams)	Seminar paper	Examination
0.75			**1.25**

Course requirements and evaluation methods	Regular attendance of classes, 0.75 ECTS credits. Oral exam, 1.25 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	The student is able to describe: the legal system of Bosnia and Herzegovina, institutes in the field of legislation that the student will need in professional work, the legal system of the European Union. The student is able to identify the legal institution that s/he will need at a given moment during his/her professional activities.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**SOCIOLOGY**	Year of study	**II. (second)**
Course code	**PDRU03**	Semester	**IV. (summer)**
Group	General	Hours per week	**2L**
Teaching form	Lectures (L)	ECTS	**2.0**
Name of lecturer	from the University of Mostar		
Course contents	Development of working tools and technology. Epochal technological revolutions. Handcraft, manufacture, industry. Industrial revolution. Science and technical revolution (micro-electronic, informatics) revolution, automatisation, robotics. Specific features of technology and technological development in civil engineering. Influence of technological process on socio-technical development of civil engineering. Changes in qualification and professional labour structure. Working groups and working roles. Labour classification and its technological, economic and social limits and consequences. Particulars of labour and organisation in civil engineering. Profile and position of construction worker. Social aspect of construction company. Actual organisational concept in civil engineering. Civil engineering as specific socio-technical system. Technical civilisation, life standard, bureaucracy and technocracy, culture and techno-culture, humanisation of labour.		
Recommended reading	(1) Haladin, S.: Tehnologija i organizacija, udžbenik, Društvo za organizaciju građenja, Zagreb, 1993.		
Supplementary reading	(1) Eggebrecht, A: Povijest rada. GHZ, Zagreb, 1987.; (2) Mumford, l.: Mit o mašini I i II, Zagreb, 1986.		
Teaching methods	Lectures, using a projector and blackboard.		

Distribution of ECTS credits			
Regular attendance of classes	Assessments (preliminary exams)	Seminar paper	Examination
0.75			**1.25**

Course requirements and evaluation methods	Regular attendance of classes, 0.75 ECTS credits. Oral exam, 1.25 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	The student is able to describe basic phenomena and problems from the field of sociology in civil engineering profession.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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Course title	**FOREIGN LANGUAGE**	ENGLISH	GERMAN	Year of study	**II. (second)**
Course code	**PSTR01**			Semester	**IV. (summer)**
Group	General			Hours per week	**2L**
Teaching form	Lectures (L)			ECTS	**2.0**
Name of lecturer	ENGLISH: Željka Žulj, lecturer GERMAN: Anka Pehar, lecturer				
Course contents	Improving the general communication in the foreign language. Foreign language grammar. Communicating in the foreign language in the field of civil engineering.				
Recommended reading	ENGLISH: (1) Čulić, Z.: English in Civil Engineering I, II - skripta, GF Split GERMAN: (1) Lese und Übungsbuch aus der modernen Technik und Naturwissenschaften, gewählte Texte aus Architektur und Bauwesen, Max Hueber Verlag, 2003, Ismaning				
Supplementary reading	Texts covering various fields of language grammar, civil engineering profession and science.				
Teaching methods	Lectures, oral and using the blackboard.				
Distribution of ECTS credits					
Regular attendance of classes	Assessments (preliminary exams)				Examination
0.7	For both languages the course lecturer specifies the number of preliminary exams for each academic year through the curriculum				**1.3**
Course requirements and evaluation methods	Regular attendance of classes, 0.7 ECTS credits. Oral exam, 1.3 ECTS credits.				
Requirement(s) for admission to the exam	Regular attendance of classes.				
Learning outcomes	The student is able to use the foreign language in his/her profession and communicate in the foreign language at the general and professional level.				
Language of instruction	English/German, Croatian.				
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer				

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**HYDRAULIC STRUCTURES**	Year of study	**III. UGS or I. GS**
Course code	**PHID04**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 1E**
Teaching form	Lectures (L), Exercises (E), Programme works	ECTS	**4.0**
Name of lecturer	Zoran Milašinović, PhD, full professor		
Course contents	Subsurface exploration works: geological, hydrogeological, seismic, and geophysical. Hydraulic structures in the subsurface: boreholes, wells, collectors. Design, construction and maintenance of wells, boreholes, collectors. Testing and monitoring methods in the wells and boreholes. Dams: division and classification, design and construction principles, historical and statistical data. Design and construction characteristics of concrete dams, earth dams and arch dams. Hydraulic structures on dams: bottom outlet, spillway, diversion tunnel and channel, penstock and turbines. Analysis of key hydrodynamic processes and how they could influence the design. Structures for waste disposal. Design and construction principles, drainage and leachate collection network. Monitoring principles required. Few basic principles of risk assessment in hydraulic structures with uncertainty analysis.		
Recommended reading	(1) R. Andričević: Hydraulic structures and surrounding processes, Class notes, FCEA Split, 1999 (in Croatian); (2) Petar Stojić, Hydraulic Structures, book III, FCEA Split, 1999 (in Croatian)		
Supplementary reading	(1) Fuat Senturk, Hydraulics of dams and reservoirs, Water Resources Publication, 1994; (2) U.S. Dep. of Int. Design of Small Dams, Water Resources Technical Publication, 1987.		
Teaching methods	Lectures and exercises, using a projector and blackboard.		

Distribution of ECTS credits			
Regular attendance of classes	Programme works	Examinations	
	1.0	Written	**1.0**
1.0		Oral	**1.0**

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. <u>Programme works (minimum 3):</u> Preparation and defence of programme works, 1.0 ECTS credit (requirement for admission to the make-up exam). <u>Examinations:</u> Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.0 ECTS credit.
Requirement(s) for admission to the exam	Regular attendance of classes. Submission and defence of programme works.
Learning outcomes	The student is able to describe and analyse the key functions of hydraulic structures, basic surrounding processes and to use basic methods in the design and construction of hydraulic structures.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**BRIDGES**	Year of study	**III. UGS or I. GS**
Course code	**PKON04**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**5.0**
Name of lecturer	Alen Harapin, PhD, full professor		
Course contents	History of bridge construction (stone, wooden, metal, reinforced concrete and prestressed concrete bridges). Bridge definition; bridge significance; general definitions; names of bridge elements. Bridge materials. Bridge types. Requirements for bridges: preliminary works in bridge construction, selection of the site and position, foundation conditions, span size; total bridge length; bridge gradient selection; longitudinal and cross falls; bridge clearance. Types of bridge load-bearing structures: girder bridges, frame bridges, vaulted and arch bridges, cable-stayed bridges, suspension bridges. Calculation concepts and basics. Load-bearing metal bridge superstructure. Pavement structure (railway and road bridges), principal girders (solid and truss girders), composite girders, bracings. Cross-sections of girder bridges, dimension and span selection; calculation basics. Cross-sections of arch bridges, dimension and span selection; calculation basics. Columns, abutments and wing walls of girder and arch bridges - types and calculations. Bridge loads. Dynamic impacts. Deformation limits. Load-bearing structure safety. Cornice and railing details. Pavements. Drainage. Vertical and horizontal insulation. Bearings. Expansion joints. Transition devices. Construction procedures for girder and arch bridges. Bridge aesthetic design. Generation of bridge design. Bridge value assessment. Bridge management - durability and maintenance. Field visits to bridges under construction and some already constructed ones.		
Recommended reading	(1) A. Harapin, G. Šunjić, M. Jurišić, "Mostovi - radni materijali za praćenje predavanja", Interna skripta (Bridges, Course materials), Građevinski fakultet Sveučilišta u Mostaru, (2) J. Radić, Mostovi (Bridges), Dom i svijet, Zagreb, 2002, (3) K. Tonković, Mostovi (Bridges), SNL, Zagreb, 1981., (4) K. Tonković, Masivni mostovi - opća poglavlja (Massive bridges - general chapters), Školska knjiga, Zagreb, 1977., (5) K. Tonković, Masivni mostovi - građenje (Massive bridges-construction), Školska knjiga, Zagreb, 1979., (6) D. Horvatić i Z. Šavor, Metalni mostovi (Metal bridges), HDGK, Zagreb, 1988., (7) S.Šram, Građenje mostova (Bridge construction), Golden marketing, Zagreb, 2002.		
Supplementary reading	(1) K. Tonković, Oblikovanje mostova (Bridge aesthetic design), Tehnička knjiga, Zagreb, 1985; (2) K. Tonković, Mostovi u izvanrednim okolnostima (Brides in emergency conditions), Školska knjiga, Zagreb, 1979;		
Teaching methods	Lectures, using a projector and blackboard. Exercises, using a projector and by direct students' work on computers. Students perform the programme work independently, with consultations.		

Distribution of ECTS credits		
Regular attendance of classes	Programme work	Examination
1.5	**1.0**	**2.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Submission and defence of the programme work, 1.0 ECTS credit (requirement for admission to the exam). Examination: Oral, 2.5 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes. Submission and defence of the programme work.
Learning outcomes	When designing bridges, the student is able to position a bridge over an obstacle in disposition, draw all its major parts, perform partial dimensioning of a section. S/he is able to identify different technological processes of bridge construction.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**DYNAMICS OF STRUCTURES AND**	Year of study	**III. UGS or I. GS**
Course code	**PMEH07** **EARTHQUAKE ENGINEERING**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Mladen Kožul, PhD, senior lecturer		
Course contents	Introduction to structural dynamics. Types of dynamic loads. Response of single-degree-of-freedom system in time and frequency domain. Introduction to response analysis based on numerical techniques. Free vibrations of multiple-degree-of-freedom system, eigenfrequences and modes. Compulsory vibrations by spectral analysis. Response to base excitation. Introduction to dynamic and seismic modelling of civil engineering structures. Structure response to random excitation. Power spectral density of white noise. Earthquake characteristics. Seismograph and accelerograph. Seismicity. Response spectra. Deterministic and stochastic formulation of seismic loads. Base assumptions of design and building of seismic resistant structures. Introduction to European Standards for design and building in seismic regions.		
Recommended reading	(1) A. Mihanović: Dinamika konstrukcija, Građevinski fakultet Sveučilišta u Splitu, 1995.; (2) J.L. Humar: Dynamic of structures, Prentice Hall, New Jersey, 1990.; (3) D. Aničić, P. Fajfar, B. Petrović, A. Szavits-Nossan, M. Tomažević: Zemljotresno inženjerstvo, Građevinska knjiga, Beograd, 1990.; (4) Eurocode 8 - Design provisions for earthquake resistance of structures.		
Supplementary reading	(1) A. K. Chopra: Dynamic of structures - Theory and Applications to Earthquake Engineering, Prentice Hall, New Jersey, 1995.; (2) P. Fajfar: Dinamika gradbenih konstrukcij, Fakultet za arhitekturo, gradbeništvo in geodezijo, Ljubljana, 1984.; (3) M. Čaušević: Potresno inženjerstvo (odabrana poglavlja), Školska knjiga, Zagreb, 2001.		
Teaching methods	Lectures, using a projector and blackboard. Exercises by solving problems using the blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.5**	Written	**1.5**
1.5	2nd assessment	**2.0**	Oral	**2.0**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.5 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.0 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written part, 1.5 ECTS credits (requirement for taking the oral part of the exam). Oral part, 2.0 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes.
Learning outcomes	The student is able to describe dynamic properties of structures and perform dynamic analysis of simple structures according to the applicable Regulations for building construction in seismic areas. S/he is able to participate in the development of dynamic calculations of simple structures.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**RAILWAY**	Year of study	**III. UGS or I. GS**
Course code	**PPRO03**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 1E**
Teaching form	Lectures (L), Exercises (E), Programme work	ECTS	**4.0**
Name of lecturer	Ivan Lovrić, PhD, associate professor		
Course contents	The railway characteristics in general. Types of railway vehicles; types of brakes. Estimation of tracking: forces that attack on train; track resistant; track force and locomotive track characteristics; estimation of a train weight; differential equation of train motion; gradient-speed diagram; analytical and graphics method for train speed determination; construction for diagram of running train; breaking forces, braking distance. Capacity and caring capacity of a line. Components of railway line: lay-out and longitudinal section; track formation; number of tracks; structure and loading gauge; track geometry in plane and profile; lessening of gradient in the curves and tunnels. Railway line design: influence of geography, geology and morphology; slope determination; railway station allocation; railway tunnels, viaducts and bridges. Phases of railway line design. Evaluation of alternatives; exploitation costs. Estimation of a line capacity. Railway line reconstruction: possibility for increase of capacity; selection of elements for line reconstruction; basic principles of railway line reconstruction. Design of second track: basic principles of second track construction; allocation of a second track according to existing tunnels, viaduct or bridges; cross section design. Permanent way elements: rails, sleepers, rail fastening, ballast; turnouts. Substructure of the track. Special construction on the track: turnouts, travelling platform, turntable. Maintenance of tracks. Construction site visit.		
Recommended reading	(1) Marušić, D: *Projektiranje i građenje željezničkih pruga*, Građevinski fakultet Sveučilišta u Splitu, 1994.		
Supplementary reading	(1) Marušić, D: *Željeznički kolodvori*, Građevinski fakultet Sveučilišta u Splitu. Split, 2003.; (2) Marušić, D.: *Ranžirni kolodvori*, Građevni godišnjak '96. [urednik: Veselin Simović], Zagreb: Hrvatsko društvo građevinskih inženjera. Zagreb, 1995. str. 471-527.; (3) Marušić, D.; Čatlak, Z.: *Izbor radijusa horizontalnih krivina pri rekonstrukciji pruga*, Građevinar 43 (1991.);		
Teaching methods	Lectures, using a projector and blackboard. Exercises: auditory + design. Programme work: design exercises + independent work + defence of work.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exam
	1st assessment	**1.0**	**0.5**	**0.5**/2.5
1.0	2nd assessment	**1.0**		

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. Programme work: Preparation and defence of the programme work, 0.5 ECTS credits (requirement for admission to the make-up exam). Assessments: 1st assessment passed, 1.0 ECTS credit. 2nd assessment passed, 1.0 ECTS credit. A student who passes both assessments is required to take a short make-up exam in order for his/her final grade to be determined, and a student who does not pass both assessment is required to take a make-up exam of a longer duration with the scope of questions at the teacher's discretion. Make-up exam: Oral, 0.5/2.5 ECTS credits.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the programme work.
Learning outcomes	The student is able to describe, analyse and argument the railway line design and construction procedures. S/he distinguishes the main elements of railway lines, as well as planning, design and maintenance methods.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**APPLIED MATHEMATICS**	Year of study	**III. UGS or I. GS**
Course code	**PPRI07**	Semester	**VI. UGS or I. GS**
Group	Basic	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Bojan Crnković, PhD, senior lecturer		
Course contents	Orthogonal systems: Orthogonal sets of functions, Fourier series, Dirichlet theorem, series expansions and approximations of functions. Boundary value problems for ordinary differential equations: Eigenvalue boundary value problems, stretched string problem, Sturm-Liouville problem. Partial differential equations and boundary value problems: First order partial differential equations, first order linear and quasi-linear equation, trajectories and surfaces. High-order equations, classification and equation transforming. Wave, Laplace and diffusion equation, initial and boundary value problems for string and membrane, free and forced oscillations. D'Alambert formula, Fourier separation method, Dirichlet and Neumann problem. Numerical analysis: Approximate numbers and errors, approximate function value and argument errors. Solving nonlinear equations. Solving systems of linear equations, iteration methods. Least square method. Approximations of functions, finite differences, interpolation polynomials, empirical formulas. Numerical integration, trapezoidal and Simpson method, geometric integration. Solving initial and boundary value problems for ordinary and partial differential equations. Euler and Runge-Kutta methods, finite difference method, collocation method, least square method and Galerkin method.		
Recommended reading	(1) S.Kurepa, Matematička analiza III,Tehnička Knjiga, Zagreb, 1990.; (2) I. Aganović, Jednadžbe matematičke fizike, Školska knjiga, Zagreb, 1985.; (3) R. Scitovski, Numerička matematika, Sveučilište J.J. Strossmayera u Osijeku, Osijek, 2002.		
Supplementary reading	(1) I. Aganović, Linearne diferencijalne jednadžbe, PMF, Zagreb, 1992.; (2) B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1996.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, using a projector, by directly solving problems on the blackboard.		
Distribution of ECTS credits			
Regular attendance of classes	Assessments (preliminary exams)		Make-up exam
	1st assessment	**1.5**	**3.5**
1.5	2nd assessment	**2.0**	
Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed (consisting of 3 tests), 1.5 ECTS credits. 2nd assessment passed (consisting of 3 tests), 2.0 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exam: Oral, 3.5 ECTS credits.		
Requirement(s) for admission to the exam	Regular attendance of classes.		
Learning outcomes	The student is able to describe and analyse the basic theoretical concepts of numerical mathematics, and use some standard commercial software packages in carrying out the tasks in the domain of numerical mathematics. S/he is able to identify adequate numerical methods for prepared simpler mathematical formulations of engineering problems, properly define the fundamental idea of a specific numerical method and advantages and disadvantages of each of them, apply ready-made and make simple computer programmes for particular numerical methods, and analyse the results of numerical methods.		
Language of instruction	Croatian.		
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer		

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**CONCRETE STRUCTURES I**	Year of study	**III. UGS or I. GS**
Course code	**PKON05**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**5.0**
Name of lecturer	Mladen Glibić, PhD, associate professor		
Course contents	Reinforced concrete structures: Internal forces basics (theory of elasticity, theory of elasticity with redistribution, theory of plasticity, general non-linear analysis). Impact of construction on internal forces and reinforced concrete structures calculations. Building loads. Structural details. Reinforcement positioning and details. Construction, maintenance and inspection of structures. Basics of concrete structure's durability. Hinges. Short elements. One-way reinforced slabs. Two-way reinforced slabs. Column supported slabs. Wall girders. Floor structures. Crane girders. Linear frame and curved (arch) structures. Latticed structures. Prefabricated structures. Foundations. Retaining walls. Shells. Large halls. Bunkers. Silo. Shore structures. Dams. Basic concepts of building design and calculations in regard to earthquake. Remediation of reinforced concrete structures. Basics of masonry structures. Regulations.		
Recommended reading	(1) Tomičić I.: Betonske konstrukcije (Concrete structures), Školska knjiga, Zagreb 1988; (2) Tomičić I.: Betonske konstrukcije - odabrana poglavlja (Concrete structures – selected chapters), DHGK, Zagreb 1993; (3) Eurocode 2.; (4) Eurocode 4.; (5) Eurocode 6.; (6) Eurocode 8.		
Supplementary reading	(1) Bresler B.: Reinforced concrete engineering, John Wiley and Sons, 1974; (2) Nawy E.G.: Reinforced concrete, Prentice-Hall, 1985.		
Teaching methods	Lectures, using a projector and blackboard. Exercises, using a projector, by directly solving problems on the blackboard, through fieldwork.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.5**	Written	**2.0**
1.5	2nd assessment	**2.0**	Oral	**1.5**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.5 ECTS credits (requirement for admission to the 2nd assessment). 2nd assessment passed, 2.0 ECTS credits. A student who does not pass both assessments is required to take the make-up exam. Make-up exams: Written, 2.0 ECTS credits (requirement for admission to the oral part of the exam). Oral, 1.5 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	The student acquires a more detailed knowledge of conventional reinforced concrete structures. S/he is able to dimension cross sections subjected to bending, shear and torsion, slender compression elements, two-way load-carrying slabs, point supported slabs. S/he is able to prove the state of cracks in cross-sections in a state of usability.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer.

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**PORTS AND MARINE CONSTRUCTIONS**	Year of study	**III. UGS or I. GS**
Course code	**PHID05**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E)	ECTS	**4.0**
Name of lecturer	Mijo Vranješ, PhD, associate professor		
Course contents	General consideration about the sea, basic characteristics, physical and chemical properties. Basic wave theories. Wind, action on the sea and objects. Sea water levels, springtide-ebbtide, seiche, sea currents. Ship (boat), ship types. Navigational way. Navigation and manoeuvre. Port as traffic, economic and developmental element. Planning and design (layout) of ports, feasibility study. Ports classified (bulk cargo, cargo general, container cargo, travelling, car ferry, sport, fishing, special). Marinas, capacity design, berth equipment. Breakwaters, piers, quays, type constructions. Berthing and mooring. Port traffic infrastructure, road, rail. Dredging technology. Ecological criteria in the ports and waterway. Visit some ports and marinas.		
Recommended reading	(1) Vranješ, M.: Luke i pomorske građevine, autorizirana predavanja 2001.; (2) Kirinčić, J.: Luke i terminali, Školska knjiga Zagreb, 1991.; (3) Babić, L.: Primjena betona kod radova u moru, Epoha, Beograd, 1968.; (4) Donald, W. A : Marinas, The Architectural press Ltd., London, 1984.; (5) Brun, P.: Port Engineering, Gulf Publishing Company, Huston, Texas, 1976.		
Supplementary reading	(1) Prikril, B., Božičević, D.: Mehanizacija pretovara i skladištenja, skripta fakulteta prometnih znanosti Zagreb, 1987.; (2) Press, H.: Seewasserstrasen und Seehafen, Verlag von Wilhelm Ernst&Sohn, Berlin-Munchen, 1962.; (3) Kampus, J. W.: Itroduction to Coastal Engineering and Management, World Scientific; (4) Shore Protection Manual CERC Coastal Engineering Resesarch Center, US Government Printing Office, Washington DC 1984.		
Teaching methods	Lectures and exercises, using a projector and blackboard.		

Distribution of ECTS credits				
Regular attendance of classes	Assessments (preliminary exams)		Make-up exams	
	1st assessment	**1.5**	Written	**1.0**
1.0	2nd assessment	**1.0**	Oral	**0.5**/2.0

Course requirements and evaluation methods	Regular attendance of classes, 1.0 ECTS credit. Assessments: 1st assessment passed, 1.5 ECTS credits. 2nd assessment passed, 1.0 ECTS credit. A student who does not pass both assessments is required to take the make-up exam. A student who passes one of the assessments or both is required to take the make-up exam (oral part). Make-up exams: Written, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral, 0.5/2.0 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	The student is able to describe and analyse the basic information on the function, planning and dimensioning of ports and appropriate constructions. S/he is able to successfully get involved in solving problems of construction of marinas and ports.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**GEOTECHNICAL ENGINEERING**	Year of study	**III. UGS or I. GS**
Course code	**PGEO03**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Prog. and sem. work	ECTS	**5.0**
Name of lecturer	Maja Prskalo, PhD, associate professor		
Course contents	The design geotechnical profile. Ground anchors (types and design). Type of the drainage and protection from underground erosion. Complex geotechnical constructions (underpinning, complex construction pits). Shallow foundation: elastic footings. Foundation beam on the one parametric soil model. Foundations in tension. Deep foundations. Piles: types, design of horizontally loaded piles. Caissons and wells. Methods and criterions for selection of foundations type and depth. Beams on the one parametric soil model. Improvement of the foundation soil. Procedures of settlement homogenisation for rigid spread footing. Reinforcement of the soil. Causes of the landslides and methods of their improvement. Earth constructions: types, design, methods of construction. Control of the quality of embankments. Construction of embankments near rigid objects. Drainage and erosion control of earth construction.		
Recommended reading	(1) "Temeljenje", T. Roje Bonacci, P. Miščević Građevinski fakultet Split, 1997.; (2) "Zbirka riješenih zadataka s primjenom EC 7", M. Prskalo, 2012. - skripta; (3) "Mehanika tla i temeljenje građevina", E. Nonveiller, Školska knjiga Zagreb, 1979.; (4) "Zbirka riješenih zadataka iz mehanike tla", P. Miščević, Građevinski fakultet Split, 1999.		
Supplementary reading	(1) Programski paketi FLAC 3.05 i Z_SOIL 2001.; (2) "Geosintetici u graditeljstvu", B.Babić, HDGI, Zagreb, 1995.; (3) EUROCODE 7- translation in Croatian (4) “Foundation engineering handbook”, H. Fang, Chapman&Hall, 1991.		
Teaching methods	Lectures using a projector and blackboard. Exercises using the blackboard. Fieldwork, one field visit. Laboratory work, visiting a relevant institute or in the faculty laboratory.		

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Seminar paper	Programme work	Make-up exams	
	1st assessment	**1.0**	**0.5**	**1.0**	Written	**1.0**
1.5	2nd assessment	**1.0**			Oral	**1.0**

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.0 ECTS credit. 2nd assessment passed, 1.0 ECTS credit. If a student does not pass both assessments during classes, s/he is required to take the make-up exam. Seminar paper: Preparation and defence of the seminar paper, 0.5 ECTS credits (requirement for admission to the make-up exam). Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the make-up exam). Make-up exams: Written part, 1.0 ECTS credit (requirement for admission to the oral part of the exam). Oral part, 1.0 ECTS credit.
Requirement(s) for admission to the make-up exam	Regular attendance of classes. Preparation and defence of the seminar and programme work.
Learning outcomes	The student is able to describe basic concepts of calculation of loads and dimensioning of geotechnical structures (retaining walls, sheet-pile walls, construction pits, excavations and embankments). S/he is able to design shallow and deep foundations.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**BUILDING MATERIALS II**	Year of study	**III. UGS or I. GS**
Course code	**DMAT01**	Semester	**VI. UGS or I. GS**
Group	Professional	Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Seminar paper	ECTS	**5.0**
Name of lecturer	Mladen Glibić, PhD, associate professor		
Course contents	Non-ferrous metals. Polymers. Glues. Paints and coatings. Carbohydrate binders, properties and products. Coatings and waterproofing. Asphalt-concrete, characteristics of aggregate, design of structure. Lightweight concrete, fibre reinforced concrete, hydrotechnical concrete, massive concrete, roller-compacted concrete and heavyweight concrete. High performance concrete and concrete for prestressing. Decorative concrete. Floors. Clay-concrete. Preplaced-aggregate concrete. Pumped concrete. Grouting. Splashed concrete. Structural design and technology of special concretes.		
Recommended reading	(1) P. Krstulović: Concrete properties and technology, Faculty of Civil Engineering University of Split, Split, 2000 (in Croatian); (2) Ukrainczyk, V.: Concrete - Structure, Properties, Technology, Alcor, Zagreb, 1994 (in Croatian)		
Supplementary reading	(1) Orchard, D.F.: Concrete Tehnology, Vol 1-3, Applied Science Publishers, Essex, England, 1979.		
Teaching methods	Lectures and exercises, using a projector and blackboard. Laboratory exercises.		
Distribution of ECTS credits			
Regular attendance of classes	Seminar paper	Examination	
1.5	**2.0**	**1.5**	
Course requirements and evaluation methods	Seminar paper: Preparation and defence of the seminar paper, 2.0 ECTS credits (requirement for admission to the make-up exam). Examination: Oral, 1.5 ECTS credits.		
Requirement(s) for admission to the exam	Regular attendance of classes. Preparation and defence of the seminar paper		
Learning outcomes	The student is able to design the structure and technology of special types of concrete.		
Language of instruction	Croatian.		
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer		

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** UGS - University Undergraduate Studies in Civil Engineering, GS - University Graduate Studies in Civil Engineering*

Course title	**COMPUTER AIDED DESIGN**		Year of study	**III. UGS or I. GS**
Course code	**DINF01**	**OF STRUCTURES**	Semester	**VI. UGS or I. GS**
Group	Professional		Hours per week	**2L + 2E**
Teaching form	Lectures (L), Exercises (E), Programme work		ECTS	**5.0**
Name of lecturer	Alen Harapin, PhD, full professor			
Course contents	Architecture of CAD. Definitions and field of applications. Computer geometric modelling. Coordinate systems and transformations. Computer aided drafting: Basis of 2D graphics primitives and transformations. 3D geometric modelling: wire frame model, surface model, solid model. Parametric solid modelling. Feature based design. Shading, photorealistic model, animation (software applications). Automated drafting based on output results. Computer aided engineering: Basis in application of numerical methods in structural design and computations. Preparing of computations models of trusses, frames, plates, and complex structures. Basis of AUTO-LISP programming language. Creating of DXF-files.			
Recommended reading	(1) Trogrlić B., Harapin A., Multimedia lectures - Basis of CAD with application in drafting and design of structures (in Croatian); (2) Jović V., Introduction to Engineering Numerical Modelling, Aquarius Engineering, Split, 1993 (in Croatian); (3) Mihanović A., Marović P. and Dvornik J., Nonlinear Computations of Reinforced Concrete Structures, Society of Croatian Structural Engineers, 1993 (in Croatian)			
Supplementary reading	(1) Manuals of computer programmes NEMETSCHEK (in English), FEAT (in English), ASPHALATHOS (in Croatian), EMRC-NISA (in English), PRONEL (in Croatian).			
Teaching methods	Lectures and exercises, using a projector and practical work on computers.			

Distribution of ECTS credits

Regular attendance of classes	Assessments (preliminary exams)		Programme work	Make-up exam
	1st assessment	**1.0**	**1.0**	**2.5**
1.5	2nd assessment	**1.5**		

Course requirements and evaluation methods	Regular attendance of classes, 1.5 ECTS credits. Assessments: 1st assessment passed, 1.0 ECTS credit. 2nd assessment passed, 1.5 ECTS credits. If a student does not pass both assessments during classes, s/he is required to take the make-up exam. Programme work: Preparation and defence of the programme work, 1.0 ECTS credit (requirement for admission to the make-up exam). Make-up exam: Oral (on computer), 2.5 ECTS credits.
Requirement(s) for admission to the exam	Regular attendance of classes. Submission and defence of the programme work.
Learning outcomes	The student is able to make practical use of computers in the design and calculation of structures.
Language of instruction	Croatian. English.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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3.3.3 INFORMATION ON THE CURRICULUM OF EXTRACURRICULAR COURSES

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Course title	**EXERCISE AND HEALTH PROMOTION**	Year of study	**I. (first)**
Course code	**PVAN01**	Semester	**I. and II.**
Group	General	Hours total	**5L + 25E**
Teaching form	Lectures (L) + Exercises (E) + practicum	ECTS	**1.0**
Name of lecturer	from the University of Mostar		
Course contents	Main motives for practicing exercise and health course: health, self-confidence, company, fun, raising someone's abilities. Basic plans: - inquiry about student interests - election of the student in charge for particular sections. Kinesiological activities in the living surrounding. Sport games: regular exercise, competition leagues and organisation of occasional tournaments, participation at both University and inter-universities contests, theoretical topics (rules and organisation of contests), connection with sport unions and judges tests; Fitness centres and sports clubs (fitness, aerobic, fighting skills, pilates, social dances); Water sports (swimming, sailing and rowing); Tennis; Table tennis. Kinesiology in nature and outside of living surrounding: Exercise in nature: walking, running, integrated training; In the mountain: walking in nature, tours, alpine skiing and Nordic skiing; Water sports: rafting, cycling, kayaking (sea and rivers). Making connections with sport clubs: Mountaineering club (climbing section – alpinists, speleological section, mountaineering recreation section); Chess club; Dance clubs.		
Recommended reading			
Supplementary reading			
Teaching methods	Frontal lectures and interactive lectures. Exercises.		

Distribution of ECTS credits		
Regular attendance of classes	Assessments (preliminary exams)	Examination
0.75		**0.25**

Course requirements and evaluation methods	According to the rules of the sports unions.
Requirement(s) for admission to the exam	Regular attendance of classes.
Learning outcomes	General improvement of student's physical fitness and health. Developed inclination to be involved in sports, recreation and socialization.
Language of instruction	Croatian.
Quality assurance methods	(1) University; (2) Faculty by Quality Control Committee; (3) Lecturer

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3.3.4 LIST OF ADDITIONAL AND/OR EXTRACURRICULAR ACTIVITIES

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Serial number	TITLE OF THE ADDITIONAL/EXTRACURRICULAR ACTIVITY	Number of ECTS credits
1.	President of the Student Union	2.0
2.	Editor of the student journal "(Ne)stabilnost"	2.0
3.	Student assistant in a course**	2.0
4.	Vice President of the Student Union	1.5
5.	Elected representative of the study year	1.0
6.	Organiser of sports events*	1.0
7.	Organiser of cultural events*	1.0
8.	Organiser of humanitarian events*	1.0
9.	Blood donor more than once during the study	1.0
10.	Founder of international student organizations at the Faculty	1.0
11.	Head of international student organizations at the Faculty	1.0
12.	Representative of the Faculty in domestic and international symposia, competitions, fora, round tables etc.	1.0

** Pursuant to the "Rulebook on the appointment of student assistants of the Faculty of Civil Engineering University of Mostar", a course teacher may engage student(s) assistant(s),

* Five-a-side football contests, evening film parties, blood donation campaigns, humanitarian aid collection campaigns, regional civil engineering students' gatherings etc.

NOTE: *ECTS credits earned for additional and/or extracurricular activities shall be verified by the ECTS commissioner. These ECTS credits are registered separately in the diploma supplement, as additional credits. Additional credits for activities that are not in this list may be awarded exclusively by the ECTS commissioner, subject to prior consultation with the Dean and/or Vice Dean for Academic Affairs.*