University of Mostar

Faculty of Civil Engineering

UNDERGRADUATE STUDIES PROGRAMME

Civil Engineering

Mostar, September, 2005.

STUDY PROGRAMME

Undergraduate studies: Civil Engineering

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1. Introduction

1.1. General information on the programme

Mostar is cultural, political and financial center of Herzegovina and of southern part of Bosnia and Herzegovina. It has been on the cross-roads of cultures and civilizations through centuries. The oldest written papers about Mostar arise from the first half of 15th century and town was founded by Duke Stjepan Kosača. Mostar is the city with pleasant Mediterranean climate. Today, Mostar is university center of southern part of Bosnia and Herzegovina.

Faculty of Civil Engineering in Mostar was founded in 1978. Its foundation was result of united initiatives by leader professional and economic factors in the region. Those initiatives were arise from progressive needs of the region for higher-education personnel in the sphere of civil engineering and to develop scientific researches in this sphere. Faculty started with work from September 1, 1978. In really short period of time Faculty acquired a reputation and justified the needs for its foundation. Faculty became and remained the holder of research activities in the spheres of civil engineering constructions, hydrotechnics, geotechnics and communal engineering in the region. At this time Faculty educates about 400 students.

According to the mentioned principles the present studies of Civil Engineering should be divided into three levels: undergraduate studies lasting three years (180 ECTS credits), graduate studies lasting two years (120 ECTS credits) and doctorate studies lasting three years (180 ECTS credits). This study programme was accepted by Faculty Council at its 78th session from September 27, 2005.

Consequently, considering: (1) the new legislative; (2) past experience in the studies of Civil Engineering and similar experience obtained in training engineers for engineering practice; (3) the need for such experts in the area of civil engineering in Mostar, Herzegovina and its surroundings, the **undergraduate studies in Civil Engineering** were established as the first level of the higher-education system.

Considering the needs of the labour market, initiating undergraduate studies in Civil Engineering has become an imperative since in the city of Mostar and its wider area there is a growing need for experts in the field of civil engineering. In this region there is a great number of institutions which can employ the students after the completion of their studies such as: (1) large civil engineering firms engaged in design, construction, supervision or in production and sales of engineering material; (2) institutions and local management authorities at the level of the city, the county and the state; (3) small private civil engineering firms.

According to the records of the local Employment Office there are no unemployed civil engineers.

The studies are based on modern scientific findings conveyed by the professors to the students during the lectures, seminars and other forms of teaching activities (laboratory workshops, seminar papers, final thesis)

All the professors are engaged in scientific research working on large number of research projects and international projects funded by the European community or international bilateral cooperation.

This programme of undergraduate studies is very similar to the study programme on the Faculty of Civil Engineering at University of Split (Croatia) and it is comparable to the studies at the faculty on the Delft University of Technology (Netherlands) and ETH Zurich (Switzerland). The undergraduate studies at both universities last three years (180 ECTS credits) and the number of credits for each course/modulus, i.e. set of courses/modulus is similar to this programme.

1.2. Previous experience in the field

From its foundation to the present time, the Faculty of Civil Engineering has been successful since it was based on the combination of three types of activities including scientific research, teaching and engineering practice. All the segments complemented each other and by their interaction, positive impulses and synergy, they contributed to the prosperity of the Faculty.

The Faculty regularly updated the existing curriculum, in accordance with the needs of the engineering profession and modern scientific findings.

The high quality of the studies can be proved by a great number of students who have, after the completion of the studies, continued to work successfully both in Bosnia and Herzegovina and abroad in the fields of research, education and economy.

1.3. Student mobility scheme

Considering student mobility the undergraduate studies of Civil Engineering in Mostar are connected with the Civil Engineering Faculties from Bosnia and Herzegovina and Croatia and also with some Civil Engineering Faculties from Europe with whom we have cooperation in a lot of international projects.

1.4. Other elements

It is evident that the need for experts from the field of civil engineering in Bosnia and Herzegovina will constantly grow. The past interest in this filed on behalf of engineering firms, local authorities and institutes proves that this programmes represent the basis of modern education in the field of civil engineering considering both the engineering practice, scientific research and teaching activities.

The past development of higher-education in the field of civil engineering shows that the Faculty of Civil Engineering, University of Mostar, is among the leading faculties in Bosnia and Herzegovina.

Duration of contact hour at the University of Mostar is 45 minutes. One ECTS credit represents 30 hours of student’s workload.

2. General description

Type of programme	Undergraduate	
Programme title	Civil Engineering	
Institution	**Proposed by**	Faculty of Civil Engineering
	Participating institutions	Faculty of Civil Engineering
Duration	3 years	
ECTS	180 credits	
Admission requirements	Completed secondary school lasting four (4) years with Mathematics during all four years; fulfilled criteria of the access examination	
Learning outcomes and competences	After completing the university undergraduate studies in civil engineering the student acquires basic competences for working at certain tasks in civil engineering and the fundamental knowledge which allow him/her to enroll in graduate studies in civil engineering and various programmes for permanent education. During the course of his/her studies the student develops the competence for identifying and describing various problems in civil engineering and for solving them to a certain level. The student acquires the competence for dimensioning simple engineering structures or parts of complex structure for static loads by using current computational tools for the design and for developing technical documentation in the field of structures, hydrotechnics and roads. The student also acquires the competence for the organization of the construction process and for the supervision phase for certain engineering structures as well as a competence for working as part of a team in planning, implementation, supervision and maintenance of large structures. The student has the competence for working in teams in the administrative services in public firms at the local and national level.	
Access to further studies	Graduate Studies in Civil Engineering	
Qualification awarded	Baccalaureus/Baccalaurea in Civil Engineering	

3. Study/Degree programme

3.1. Programme structure with credits

The undergraduate study programme for Civil Engineering offers both the compulsory and elective courses. Besides compulsory and elective courses the students are entitled to a total of 30 hours of extracurricular activities per semester. The program of extracurricular activities is presented in section 3.2.2.

1st Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PPRI01	Mathematics I	60+60	10.0
PPRI02	Physics	45+15	5.0
PPRI03	Descriptive geometry	30+30	5.0
PGEO01	Fundamentals of geology and petrography	30+15	3.5
PINF01	Informatics	15+45	3.5
PARH01	Introduction to architecture	30+0	2.0
TOTAL:		**210+165**	**29**
* LECTURE + EXERCISE			

2nd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PPRI04	Mathematics II	60+60	10.0
PPRI05	Probability and statistics	30+30	5.0
PPRI06	Applied geometry	30+30	5.0
PMEH01	Mechanics I	30+45	6.0
PPRO01	Geodesy	30+30	5.0
TOTAL:		**180+195**	**31**
* LECTURE + EXERCISE			

3rd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PMEH02	Mechanics II	45+30	6.0
PMEH03	Strength of materials I	45+30	6.0
PMEH04	Engineering statics I	30+30	5.0
PMAT01	Building materials	60+30	7.0
PHID01	Hydrology	30+30	5.0
	Elective course		min. 2
TOTAL:		**240+150**	**31**
* LECTURE + EXERCISE			
	Elective courses:		
PDRU01	Principles of Business Economics	30+0	2.0
PDRU02	Fundamentals of legislation	30+0	2.0
PDRU03	Sociology	30+0	2.0
PSTR01	Foreign language	15+15	2.0

4th Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PMEH05	Strength of materials II	30+30	5.0
PMEH06	Engineering statics II	45+30	6.0
PHID02	Hydromechanics	45+45	7.0
PGEO02	Soil mechanics and foundations	45+30	6.0
PARH02	Elements of building construction	30+30	5.0
TOTAL:		**195+165**	**29**
* LECTURE + EXERCISE			

5th Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PKON01	Basics of concrete structures	60+30	7.0
PKON02	Introduction to timber structures	30+30	5.0
PORG01	Construction production	30+15	4.0
PHID03	Water supply and wastewater management in urban areas	30+30	5.0
PORG02	Construction management	45+15	5.0
PPRO02	Highways	30+30	5.0
TOTAL:		**225+150**	**31**
* LECTURE + EXERCISE			

6th Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PKON03	Introduction to metal structures	45+30	6.0
	Elective courses		min. 18
PZAV01	Final work	(0+2.5)**	5.0
TOTAL:			**29**
* LECTURE + EXERCISE ** Lecturer's time spent for each student; Not included in TOTAL.			
	Elective courses:		
PHID04	Hydraulic structures	30+15	4.0
PKON04	Bridges	30+30	5.0
PHID05	Ports and marine constructions	30+30	5.0
PPRO03	Railway	30+15	4.0
PPRI07	Applied mathematics	30+30	5.0
PKON05	Concrete structures I	30+30	5.0
PMEH07	Dynamics of structures and earthquake engineering	30+30	5.0
PGEO03	Geotechnical engineering	30+30	5.0

3.2. Course information

3.2.1. Compulsory and elective courses' informations

3.2.2. Extracurricular activities' informations

3.2.1. Compulsory and elective courses' informations

Course title	MATHEMATICS I		
Course code	PPRI01		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	10,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (60 hrs lecture + 60 hrs exercise) = 3.0 ECTS; Individual work and learning = 7.0 ECTS		
Name of lecturer	Branko Červar, PhD, Assistant Professor		
Learning outcomes and competences	Knowledge of basic vector calculus, linear algebra and analytic geometry, differential and integral calculus of functions of one variable with geometrical and physical interpretations.		
Prerequisites	Elementary mathematics.		
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) D. Jukić i R. Scitovski, Matematika I, Elektrotehnički fakultet, Osijek, 2000.; (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) P. Javor, Matematička analiza 1, Element, Zagreb, 1995.; (2) N. Elezović, Linearna algebra, Element, Zagreb, 1999.; (3) V. P. Minorski, Zbirka zadataka iz više Matematike, Tehnička knjiga, Zagreb , 1972.		
Teaching methods	Teaching process is accomplished by lectures, exercises and consultations. The exercises are realized in class and include three mid-part exams which are required for passing grades.		
Assessment methods	Oral examination, written examination, oral presentation, test, continuous assessment.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	PHYSICS		
Course code	PPRI02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Jozo Ljubić, MSc, Senior Lecturer		
Learning outcomes and competences	The student is expected to be able to describe and explain the presented concepts and laws of fundamental physics. Furthermore, s/he should be able to demonstrate the use of the theoretical fundamentals on solving basic practical problems, especially in topics of engineering student interest.		
Prerequisites	Basic knowledge of mathematics and physics.		
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. 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.		
Assessment methods	Oral examination, written examination.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	DESCRIPTIVE GEOMETRY		
Course code	PPRI03		
Type of course	Lecture, exercise course, constructive exercise course, construction of individual programs.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Karmela Miletić, MSc, Senior Lecturer		
Learning outcomes and competences	At the end of the course the learner is expected to meet and to know a graphical communication between 3-dimensional space objects and their presentation on 2-dim spaces (and vice versa). Those competences are learned across the different methods of projections which are used in civil engineering. The basic quality of this knowledge is in use of laws which are valid in some methods of projection.		
Prerequisites	No prerequisites.		
Course contents	The basic geometrical curves and their construction. Orthogonal projections onto the pair of planes (G. Monge's projections), the laws of the projections. The basic geometrical elements: the point, line, plane and their relationships. The projection of 2-dim (planar) contents, the general and special relationships (the parallelism and orthogonality) between them, the metrics. The additional projections, the rotation of plane, the valid laws, the projections of 2-dim (planar) objects. The basic 3-dim relationships, the problems in space, the projections of 3-dim objects. The general parallel projection, the valid laws. The axonometric (3-D) projections of objects. The planar intersections of some surfaces, the normal of surfaces, the tangent of intersection-curve, the valid laws (the perspective affinity and collineation). The use of computer support graphics is included in all sequences.		
Recommended reading	(1) Vilko Niče: *Deskriptivna geometrija I, II*, Školska knjiga Zagreb; (2) I. Babić, S. Gorjanc, A. Sliepčević, V. Szirovizca: *Konstruktivna geometrija - vježbe*, HDKGIKG Zagreb.		
Supplementary reading	(1) H. Brauner, W. Kickinger: *Geometrija u graditeljstvu*, Školska knjiga Zagreb; and every other of *many books* in all world's languages; (2) web-sites: www.hdgg.hr; www.grad.hr/nastava/geometrija/.		
Teaching methods	This basic level course is necessary for graphical communications in civil engineering. All teaching methods are in this sense: Lecture, exercise course, constructive exercise course, construction of individual programs. The computer support is included in all sequences.		
Assessment methods	The continuous colloquial assessment, written examination (eliminating), oral examination. For the students who successfully pass the colloquia written exam is not required.		
Language of instruction	Croatian with the possibility of English, French or German.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	FUNDAMENTALS OF GEOLOGY AND PETROGRAPHY		
Course code	PGEO01		
Type of course	Lecture, exercise course, fieldwork.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	3,5 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.4 ECTS		
Name of lecturer	Amira Galić, PhD, Assistant Professor		
Learning outcomes and competences	- fundamental knowledge of Earth, especially of Lithosphere, - understanding and identification of weathering processes, - understanding origin of earthquakes, volcanism and orogenic movements, - competence for understanding following courses in the field of geosciences.		
Prerequisites	No prerequisites.		
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).		
Recommended reading	S. Šestanović (2001.): Osnove geologije i petrografije, IV. izdanje 234 pp, GF Split.		
Supplementary reading	Herak, M. (1990.): Geologija, V, izdanje, Školska knjiga, 433 pp, Zagreb.		
Teaching methods	Lecture: Oral presentation and power point presentation. Exercise course: understanding of geological map and profiles. Fieldwork: understanding of geological structures (fold, fault and joint); geomorphologic phenomena in Karst; Flysch as specifically sediment in Dalmatia.		
Assessment methods	Oral examination, written examination. For the students who successfully pass the written exam, an oral exam is not required.		
Language of instruction	Croatian, possibly English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	INFORMATICS		
Course code	PINF01		
Type of course	Lecture, practical.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	3,5 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (15 hrs lecture + 45 hrs exercise) = 1.0 ECTS; Individual work and learning = 2.5 ECTS		
Name of lecturer	Goran Šunjić, MSc, Lecturer		
Learning outcomes and competences	At the end of the course, the student is expected to master the use of the computer, with the emphasis given to the "engineering approach". The student should be capable to apply the gained skills in other forthcoming courses.		
Prerequisites	None.		
Course contents	***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. ***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.		
Recommended reading	Lecture notes.		
Supplementary reading	Numerous available computer books, according to the student's preferences.		
Teaching methods	Lectures, practical work (exercises at the computer).		
Assessment methods	Review of group projects, testing the capability to solve tasks using the computer.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	INTRODUCTION TO ARCHITECTURE		
Course code	PARH01		
Type of course	Lecture.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	2,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture) = 0.75 ECTS; Individual work and learning = 1.25 ECTS		
Name of lecturer	Jaroslav Vego, , PhD, Full Professor		
Learning outcomes and competences	Upon the completion of the course the students are expected to have acquired basic knowledge relating to historical stages of architecture and construction evolution.		
Prerequisites	None.		
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. Baroque and rococo. Classicism. Neo-styles; historicism. 19th century architecture. 20th century architecture.		
Recommended reading	Marasović, T.: Kulturna baština 1, 2, Split, 2001.		
Supplementary reading			
Teaching methods	Frontal lectures using overhead projector and transparencies.		
Assessment methods	Written colloquium / written assignment.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	MATHEMATICS II		
Course code	PPRI04		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	II
ECTS (Number of credits allocated)	10,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (60 hrs lecture + 60 hrs exercise) = 3.0 ECTS; Individual work and learning = 7.0 ECTS		
Name of lecturer	Branko Červar, PhD, Assistant Professor		
Learning outcomes and competences	Knowledge of 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.		
Prerequisites	None.		
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) V. Cigić, Matematika II, Građevinski fakultet Sveučilišta u Mostaru, Mostar, 2001.; (2) P. Javor, Matematička analiza 2, Element, Zagreb, 2000.; (3) S.Kurepa, Matematička Analiza I, II i III, Tehnička Knjiga , Zagreb, 1990.; (4) B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 2003.		
Supplementary reading	(1) D. Blanuša, Viša matematika II, Tehnička knjiga, Zagreb, 1964.; (2) V. P. Minorski, Zbirka zadataka iz više matematike, Tehnička knjiga, Zagreb, 1972.		
Teaching methods	Teaching process is accomplished by lectures, exercises and consultations. The exercises are realized in class and include three mid-part exams which are required for passing grades.		
Assessment methods	Oral examination, written examination, oral presentation, test, continuous assessment.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	PROBABILITY AND STATISTICS		
Course code	PPRI05		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	II
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Roko Andričević, PhD, Full Professor		
Learning outcomes and competences	Knowledge of basic probability theory, mathematical statistics and basic methods for verification of stochastic models.		
Prerequisites	None.		
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	Teaching process is accomplished by lectures, exercises and consultations. The exercises are realized in class and include two mid-part exams which are required for passing grades.		
Assessment methods	Oral examination, written examination, oral presentation, test, continuous assessment.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	APPLIED GEOMETRY		
Course code	PPRI06		
Type of course	Lecture, exercise course, constructive exercise course, construction of individual programs.		
Level of course	Basic level course		
Year of study	I	**Semester**	II
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Zdravka Božikov, PhD, Associate Professor		
Learning outcomes and competences	At the end of the course, which is continuation of Descriptive geometry, the learner is expected to meet and to know graphical communication between 3-dimensional space objects and their engineer's presentation on 2-dim plane. Those competences are learned across the different methods of projections which are used in contemporary engineer's branch. The basic quality of the knowledge is in use of laws which are valid in some methods of projection.		
Prerequisites	None.		
Course contents	The basic space surfaces, introduction, characteristics, normal, intersection with line. Constructions of intersections of surfaces in all combinations with and without removing intersect. The use of computer support, static and dynamic surfaces in interrelations**.** The introduction to topographic (orthographic) projection, the valid laws, the basic problems. The application of method in civil engineering. The roof surfaces solving (in two projections) using plane of the same or different incline, precipitation drainage considering the barriers. The topographic surfaces, the profile, the planar intersection, water lining, the principles of alignment. The vertical alignment, the mass balance, the volume of excavation. Solving the problems of earthworks using the contour lines method, the basic types of alignment, crossings, profiles. Introduction to central projection (perspective). The existing valid laws, choice of decretive elements, eye perception, deformation of the picture. Construction of perspective picture of objects with most used methods, applications on the roads. The use of computer support. Graphical tools are included in presentations and solving educational examples in all sequences.		
Recommended reading	(1) Vilko Niče: *Deskriptivna geometrija I, II*, Školska knjiga Zagreb; (2) I.Babić, S.Gorjanc, A. Sliepčević, V. Szirovicza: *Konstruktivna geometrija - vježbe*, HDKGIKG Zagreb.		
Supplementary reading	(1) H. Brauner, W. Kickinger: *Geometrija u graditeljstvu*, Školska knjiga Zagreb; every other of *many books* in all world's languages; (2) web-sites: www.hdgg.hr; www.grad.hr/nastava/geometrija		
Teaching methods	This basic level course is necessary for graphical communications in engineering using constructed or free-hand drawings as a ground in engineer's communication. All teaching methods are in this sense: lecture, exercise course, constructive exercise course, construction of individual programs. The computer support is included in all sequences.		
Assessment methods	The continuous colloquial assessment, written examination (eliminating), oral examination. For the students who successfully pass the colloquia written exam is not required.		
Language of instruction	Croatian with the possibility of English, French or German.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	MECHANICS I		
Course code	PMEH01		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	II
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 45 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Ivo Čolak, PhD, Full Professor		
Learning outcomes and competences	At the end of the course the learner is expected to acquire a clear understanding of the principles in mechanics and an ability to calculate simple statically determinate structures.		
Prerequisites	None.		
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: Zapisi s predavanja iz Mehanike I, Građevinsko-arhitektonski fakultet Split, 2004., (3) V. Andrejev: Mehanika I (Statika), Tehnička knjiga Zagreb, 1969.		
Supplementary reading	(1) A. Pytel, J. Kiusalaas: Engineering Mechanics (Statics), Thompson Learning, London, 2001.; (2) F. P. Beer, E. R. Johnston: Vector Mechanics for Engineers, McGraw-Hill, 1988.		
Teaching methods	Lectures ex-cathedra supplied with blackboard, overhead projector (overhead transparencies) and PC (ppt). Exercises by calculating different examples from lectured courses. Seminar by solving examples of statically determinate structures independently.		
Assessment methods	Oral examination, written examination. The student can pass the exam without written and oral examination if he/she collect enough number of points based on tests through semester.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	GEODESY		
Course code	PPRO01		
Type of course	Lecture, exercise course, practical, guided personal study, fieldwork.		
Level of course	Basic level course		
Year of study	I	**Semester**	II
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Petar Cerovac, MSc, Senior Lecturer		
Learning outcomes and competences	After the course had been completed, it is expected from the student to be able to make use of planes and the maps, measuring angles, detail levelling with previously gained knowledge.		
Prerequisites	Basic knowledge from mathematics and physics.		
Course contents	Figure and dimension of the earth. Mapping earth on the plane. Geodetic network the 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. In the frame coaching students oneself master of programmes from next fields: using planes and the maps, measuring of horizontal and vertical angles, levelling and detail levelling, computation co-ordinates of a tie traverse.		
Recommended reading	S. Macarol: Praktična geodezija, Tehnička knjiga, Zagreb, 1985.		
Supplementary reading	(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.		
Teaching methods	Lectures with the use of geodetic instruments. Exercise course: practical introduction to geodetic instruments, demonstrations of the photogram metric instruments and GPS.		
Assessment methods	Oral examination, written examination. For the students who successfully pass the colloquia written exam is not required.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	MECHANICS II		
Course code	PMEH02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	6,0 Exposition: Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Mladen Kožul, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course unit the learner is expected to be able to determine the displacement scheme on arbitrary mechanism with one degree of freedom; mathematically describe the main types of motion of material point, system of material points and rigid body; determine analytically and numerically the response of system with one degree of freedom for various types of excitement of oscillating motion.		
Prerequisites	Physics, Mathematics I and II, Mechanics I.		
Course contents	**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).		
Recommended reading	(1) A. Kiričenko: Technical Mechanics, part II (kinematics) and part III (dynamics), pbi d.o.o. ZAGREB, 1997.; (2) B. Gotovac, V. Kozulić: Collected solved problems – Mechanics II (for internal use).		
Supplementary reading	Ferdinand P. Beer, E. Russell Johnston, Jr.: Vector Mechanics for Engineers (Statics and Dynamics), Fifth Edition, Mc Graw-Hill, Inc., 1988.		
Teaching methods	Use of blackboard, projector and computer in teaching and exercises. During exercises students prepare one programme on their own (determining the strain scheme of mechanism with one degree of freedom), and one seminar (oscillatory motion of system with one degree of freedom), with examples previously prepared by the assistant lecturer.		
Assessment methods	Oral examination, written examination, continuous assessment.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	STRENGTH OF MATERIALS I		
Course code	PMEH03		
Type of course	Lecture, exercise course, laboratory work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04; and (2) lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Ivo Čolak, PhD, Full Professor		
Learning outcomes and competences	The student should obtain knowledge of theoretical fundamentals and practical methods from the field of strength of materials for calculating simple statically determined and undetermined line and plane structures including stress and strain analysis.		
Prerequisites	Physics, Mechanics I, Mathematics I and II.		
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. Timoshenko, Strength of Materials, Građevinska knjiga, Beograd, 1964.		
Teaching methods	Lectures ex-cathedra supplied with blackboard, overhead projector (overhead transparencies) and PC (ppt). Exercises by calculating different examples from lectured courses.		
Assessment methods	Oral examination, written examination, three tests through semester by individually working different lectured examples. The student can pass the exam without written and oral examination if he/she collect enough number of points based on tests through semester.		
Language of instruction	Croatian and possibility in English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	ENGINEERING STATICS I		
Course code	PMEH04		
Type of course	Lecture, exercise course, practical, laboratory work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Vlaho Akmadžić, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand geometrical and kinematical stability of linear structures. Acquired knowledge of static determined linear structures.		
Prerequisites	Mechanics I.		
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 determined and non determined 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 archer 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	Timoshenko S.P. and D.H. Young, Theory of Structures, McGraw-Hill, New York, 1988.		
Teaching methods	Lecture, exercise course, practical, laboratory work and work on computers.		
Assessment methods	Oral examination, written examination and test.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	BUILDING MATERIALS I		
Course code	PMAT01		
Type of course	Lecture, exercise course, laboratory work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	7,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (60 hrs lecture + 30 hrs exercise) = 3.0 ECTS; Individual work and learning = 4.0 ECTS		
Name of lecturer	Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	After the completed course one should expect from student to be capable to perform tests of building materials especially of concrete and concrete products for laboratory needs.		
Prerequisites	Probability and statistics, Mechanics I.		
Course contents	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.		
Recommended reading	P. Krstulović: Properties and Technology of Concrete, Faculty of Civil Engineering University of Split, Split, 2000. (in Croatian)		
Supplementary reading	(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)		
Teaching methods	Lectures ex-cathedra, two demonstrative and six constructive exercises. At demonstrative exercises characteristic problem are solved. Afterwards, the students get problems which they have to solve by themselves up to next laboratory exercises. For laboratory exercises groups of up to ten students are formed. At laboratory exercises students actively participate in performing tests and afterward they analyse the obtained results.		
Assessment methods	Oral examination, written examination, continuous examination through the semester.		
Language of instruction	Croatian and possibly in English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	HYDROLOGY		
Course code	PHID01		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Gordan Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	The overall objective of this course is to familiarize students with the basic concepts of hydrologic processes and analyses. Students are expected to gain an understanding of fundamental components of hydrologic cycle and to develop the capability to apply statistic methods, frequency analysis, unit hydrograph to solve related engineering problems and projects. Students will be able to participate in the activities including collection, compilation and interpretation of data from field and labs experiments.		
Prerequisites	Probability and statistics.		
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. Course exercises include individual solving of the tasks associated with streamflow measurements, discharge curves, frequency-duration curve and distribution curves. Students will participate in a number of field activities consisted of various types of measurements concerning meteorological and hydrometric data (measuring velocities with a propellor type current meter, measuring discharges using acoustic Doppler velocimetry) including the interpretation of fieldwork. Laboratory works will involve experiments that will be completed during the allotted lab time. Experiments wil be conducted by groups of student. Individual report is required for each experiment. Excursion to Crveno and Modro jezero and Ričica dam. Excursion to Crveno and Modro jezero and Ričica dam.		
Recommended reading	(1) O.Bonacci: Oborine-glavna ulazna veličina u hidrološki ciklus, Geing, Split, 1994.; (2) O. Bonacci: Meteorološke i hidrološke podloge, Priručnik za hidrotehničke melioracije, I kolo; (3) O. Bonacci: Odvodnjavanje, Knjiga Podloge, Društvo za odvodnjavanje i navodnjavanje Hrvatske, Zagreb, 1984., 39-130.; (4) S. Jovanović, O. Bonacci, M. Anđelić: Hidrometrija, Građevinski fakultet, Beograd, 1986.; (5) O. Bonacci: Hidrometrija, Tehnička enciklopedija 6, Zagreb, 1979.		
Supplementary reading	(1) O. Bonacci, Karst Hydrology, Springer Verlag, Heidelberg, 1987.; (2) O. Bonacci, Ekohidrologija, Građevinski fakultet Split, 2003.		
Teaching methods	Teaching methods: lectures and exercises with using appropriate teaching spaces complemented with the use of up to date computers. Field activities and labs experiments using sophisticated equipments.		
Assessment methods	Oral examination, written examination.		
Language of instruction	Croatian (English).		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	PRINCIPLES OF BUSINESS ECONOMICS		
Course code	PDRU01		
Type of course	Lecture.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	2,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture) = 0.7 ECTS; Individual work and learning = 1.3 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	At the end of the course the learner is expected to be able to describe and explain principles of business environment, market, supply and demand, enterprise, enterprising and enterpriser. Lerner is also expected to describe and explain basics of costs, production, business results and business efficiently determination.		
Prerequisites	No prerequisites.		
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	Dragana Grubišić, Poslovna ekonomija, Ekonomski fakultet sveučilišta u Splitu, Split 2004.		
Supplementary reading	J.E. Manser, Economics – foundadtion course for the built environment, E&FN Spon, London, UK 1995		
Teaching methods	Frontal lectures. Preparing an assignment during exercises.		
Assessment methods	Oral presentation of an assignment.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	FUNDAMENTALS OF LEGISLATION		
Course code	PDRU02		
Type of course	Lecture.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	2,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture) = 0.7 ECTS; Individual work and learning = 1.3 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	After the completed course the students will be familiar with the fundamental facts considering the legal system of the Bosnia and Herzegovina and the main institues in the field of legislation they will need in the course of their future work. In addition to B&H legislation the students will also be acquainted with the fundamentals of the legal system of the European Union.		
Prerequisites	No prerequisites.		
Course contents	Main institutes, sources and hierarchy of legal regulations. Constitution of the 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	Legal, sub-legal acts and respective textbooks or teacher-generated material.		
Supplementary reading			
Teaching methods	Frontal lectures.		
Assessment methods	Oral examination. For the students who successfully present the seminar an oral exam is not required.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	SOCIOLOGY		
Course code	PDRU03		
Type of course	Lecture.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	2,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture) = 0.7 ECTS; Individual work and learning = 1.3 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	At the end of the course unit the learner is expected to be able to understand basic phenomena and problems from the field sociology in civil engineering profession.		
Prerequisites	No prerequisites.		
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	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	Frontal lectures.		
Assessment methods	Oral examination. For the students who successfully present the seminars an oral exam is not required.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	FOREIGN LANGUAGE (ENGLISH AND GERMAN)		
Course code	PSTR01		
Type of course	Practical.		
Level of course	Basic level course		
Year of study	I, II or III	**Semester**	I, II, III, IV, V or VI
ECTS (Number of credits allocated)	1,5 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (15 hrs lecture + 15 hrs exercise) = 0.7 ECTS; Individual work and learning = 0.8 ECTS		
Name of lecturer	Anka Pehar, Lecturer; Željka Žulj, Lecturer		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand English used in civil engineering profession as well as to communicate at professional and general level.		
Prerequisites	Students who completed basics of English or German in primary and secondary schools.		
Course contents	During the course students are educated to be able to: communicate in foreign language closely related to professional programs and demands according to the selected curriculum, self-educate and follow scientific and technological achievements, accept legacy of world culture and enrich their knowledge.		
Recommended reading	Čulić, Z.: English in Civil Engineering I, II - skripta, GF Split.		
Supplementary reading	Texts covering various fields of science selected by lecturers.		
Teaching methods	Lectures are taught in English. Texts from recommended teacher generated material as well as selected texts are read, translated and summarized.		
Assessment methods	Oral exam.		
Language of instruction	English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	STRENGTH OF MATERIALS II		
Course code	PMEH05		
Type of course	Lecture, exercise course, laboratory work.		
Level of course	Basic level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Ivo Čolak, PhD, Full Professor		
Learning outcomes and competences	The student should obtain knowledge of theoretical fundamentals and practical methods from the field of strength of materials for calculating simple statically determined and undetermined line and plane structures including stress and strain analysis.		
Prerequisites	Physics, Mechanics I, Mathematics II.		
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); (2) P. Marović: Solved Examples in Strength of Materials II, Faculty of Civil Engineering, Split, 1988. (1986.) (in Croatian).		
Supplementary reading	(1) Z. Kostrenčić: Theory of Elasticity, Školska knjiga, Zagreb, 1992. (in Croatian); (2) S. P. Timoshenko: Strength of Materials, Građevinska knjiga, Beograd, 1965.		
Teaching methods	Lectures ex-cathedra supplied with blackboard, overhead projector (overhead transparencies) and PC (ppt). Exercises by calculating different examples from lectured courses.		
Assessment methods	Oral examination, written examination, three tests through semester by individually working different lectured examples. The student can pass the exam without written and oral examination if he/she collect enough number of points based on tests through semester.		
Language of instruction	Croatian and possibly in English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	ENGINEERING STATICS II		
Course code	PMEH06		
Type of course	Lecture, exercise course, practical, laboratory work.		
Level of course	Basic level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Vlaho Akmadžić, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand the creation and perform static calculations of linear structural, plates, walls and deep beams.		
Prerequisites	Mechanics I, Mathematics II.		
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 structural 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	Timoshenko S.P. and D.H. Young, Theory of Structures, McGraw-Hill, New York, 1988.		
Teaching methods	Lecture, exercise course, practical, laboratory work and work on computers.		
Assessment methods	Oral examination, written examination and test.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	HYDROMECHANICS		
Course code	PHID02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	7,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (45 hrs lecture + 45 hrs exercise) = 3.0 ECTS; Individual work and learning = 4.0 ECTS		
Name of lecturer	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	At the end of the lectures and exercises the learner is expected to get basic knowledge of steady flow of fluids, basic knowledge of hydraulics in channels and groundwater flows. The candidate should be able to perform computations of small engineering problems in pipe, channel and groundwater flow.		
Prerequisites	Mathematics II, Mechanics I.		
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) H. Rouse: Fluid mechanics for hydraulic engineers, Dover Pub. Inc, New York; (2) V. L. Streeter: Fluid mechanics, McGraw-Hill Book Co. Inc, New York; (3) V. T. Chow: Open channel hydraulics, McGraw-Hill Book Co. Inc, New York; (4) H. Rouse: Tehnička hidraulika, Građevinska knjiga, Beograd 1969.		
Supplementary reading	(1) H.R. Vallentine: Applied hydrodynamics, Butterworths, London; (2) R.V. Giles: Fluid mechanics and hydraulics, Shaums Outline Series, McGraw-Hill Book Co.		
Teaching methods	Lectures, exercises, seminars, experimental exercises.		
Assessment methods	Written and oral examination, continuous assessment.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	SOIL MECHANICS AND FOUNDATIONS		
Course code	PGEO02		
Type of course	Lecture, exercise course, laboratory work, fieldwork.		
Level of course	Basic level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	The learner is expected to acquire basic knowledge about properties of soil, and use that knowledge for calculation of: bearing capacity of shallow foundation, settlements, consolidation, slope stability, lateral earth pressure on retaining constructions; construction of less complex foundations, retaining structures, construction pits and embankments.		
Prerequisites	Mechanics I, Mathematics II.		
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, presiometer, 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) "Temeljenje", T. Roje Bonacci, P. Miščević, Građevinski fakultet Split, 1997. (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.; (5) "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	Teaching with use of the overhead and a video projector with PC, exercises (students are supposed to make two examples during exercises; presentations), laboratory presentations, fieldwork.		
Assessment methods	Oral examination, written examination.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	ELEMENTS OF BUILDING CONSTRUCTION		
Course code	PARH02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Jaroslav Vego, PhD, Full Professor		
Learning outcomes and competences	Upon the completion of the course the students are expected to be able to properly and accurately interpret and make parts of the preliminary design, final design and working drawings of a simple building.		
Prerequisites	None.		
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. 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	Frontal lectures, audio and constructive exercises – construction of the elements of the architectural project of simple building.		
Assessment methods	Oral and written exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	BASICS OF CONCRETE STRUCTURES		
Course code	PKON01		
Type of course	Lecture, practice.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	7,0 ECTS points were calculated based on: (1) the poll among students in academic year 2003/04 and (2) lecturer's assessment. Teaching (60 hrs lecture + 30 hrs exercise) = 2.2 ECTS; Individual work and learning = 4.8 ECTS		
Name of lecturer	Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	A student shall comprehend basics of conventional reinforced concrete, dimensioning of cross-sections and elements to bending, shear and torsion		
Prerequisites	Engineering statics II, Strength of materials II, Building materials I.		
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	Leonhardt, V.: Vorlesungen über Massivbau, Fünter Feil, Springer – Verlag, 1979.		
Teaching methods	Lectures using the blackboard, projector and computer. Practice using the blackboard, projector and computer. During practice, students will elaborate several simple tasks (cross-section dimensioning to pure bending, eccentric compression and tension, shear, torsion and puncture; calculation and reinforcement of slabs and beams), based on previously elaborated examples by the assistant lecturer.		
Assessment methods	Written exam, oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer.		

Course title	INTRODUCTION TO TIMBER STRUCTURES		
Course code	PKON02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	5,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	The student is able to understand the basic principles of the theory of timber structures, technology for the industrial production of beams/girders and dimensioning of simple timber structures.		
Prerequisites	Mechanics II, Engineering statics II, Strength of materials II, Building materials I.		
Course contents	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 & formworks. Durability and fire protection.		
Recommended reading	(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.		
Supplementary reading	(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.		
Teaching methods	Lectures with the use of blackboard, overhead transparencies and ppt. Exercise courses include solutions of tasks and development of programs.		
Assessment methods	Written exam, oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Assurance Committee (3) Lecturer's level.		

Course title	CONSTRUCTION PRODUCTION		
Course code	PORG01		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Vlado Majstorović, PhD, Full Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to describe and explain specifics of construction production, as well as using of technology as a concept, in order to efficiently manage production (construction). Learner is also expected to describe and explain basics of construction equipment and specific manufacturing in construction, as well as to apply them in practice.		
Prerequisites	None.		
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 Građevinski 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.; (3) D. W. Halpin, L.S. Riggs: Planning and Analysis of Construction Operations, John Wiley & Sons, 1992.		
Teaching methods	Frontal lectures. Exercises in groups. Solving individual assignments by using PC and available software.		
Assessment methods	Oral examination, written examination. For the students who successfully solve individual assignments written exam is not required.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	WATER SUPPLY AND WASTEWATER MANAGEMENT IN URBAN AREAS		
Course code	PHID03		
Type of course	Lecture, research seminar, exercise course, laboratory work, guided personal study, fieldwork.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	5,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Željko Rozić, PhD, Assistant Professor		
Learning outcomes and competences	Student will be educated for problem solving in the field of urban water system, including assessment, planning, design and construction of the water supply, wastewater and drainage systems.		
Prerequisites	Hydrology, Hydromechanics.		
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, G.F. Split, 1998.; (2) I. Gulić: Water supply in urban areas, G.F., 2000.		
Supplementary reading	UNEP/PAP: Integrated urban water system management in coastal areas, Split 2005.		
Teaching methods	Lecturing, examples presentation, individual work, homework and projects, laboratory work and field work.		
Assessment methods	Oral examination, written examination, test, paper, continuous assessment, etc.		
Language of instruction	Croatian and English.		
Quality assurance methods	Assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	CONSTRUCTION MANAGEMENT		
Course code	PORG02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	5,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.50 ECTS		
Name of lecturer	Vlado Majstorović, PhD, Full Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to describe and explain the basic principles and methods of organisation, planning and managing of construction projects, projects of construction organisation and plans, as well as to apply them in practice. The learner is also expected to be able to understand law and regulations regarding construction and safety practice.		
Prerequisites	Mathematics II, Probability and statistics.		
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	Frontal lectures. Exercises in groups. Solving individual assignments by using PC and available software.		
Assessment methods	Oral examination, written examination. For the students who successfully solve individual assignments written exam is not required.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	HIGHWAYS		
Course code	PPRO02		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Basic level course		
Year of study	III	**Semester**	V
ECTS (Number of credits allocated)	5,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Ivan Lovrić, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course unit the learner is expected to understand all factors (centrifugal forces, rate of increase of lateral acceleration, super elevation, visibility...) which influence highway design as well as to be able to make a preliminary design of rural and suburban highway.		
Prerequisites	Mathematics II, Geodesy, Fundamentals of geology and petrography.		
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 kojima javne ceste izvan naselja i njihovi elementi moraju udovoljiti sa stanovišta sigurnosti prometa*. NN 110/01.		
Supplementary reading	AASHTO: *A Policy on Geometric Design of Highways and Streets*, 2001.		
Teaching methods	Class lectures using modern technology and methods, guided personal study, fieldwork. Presentation and demonstration of highway design software packages.		
Assessment methods	Oral examination, written examination, continuous assessment.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	INTRODUCTION TO METAL STRUCTURES		
Course code	PKON03		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	6,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Vlaho Akmadžić, PhD, Assistant Professor		
Learning outcomes and competences	After completing the course the student is able to understand the basic principles of the theory of metal structures and dimensioning of simple metal structures		
Prerequisites	Mechanics II, Engineering statics II, Strength of materials II.		
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 χ 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	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, G-AF, 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 with the use of blackboard, overhead transparencies and LCD projector. One section of the lectures is based on the European Steel Design Education Programme (ESDEP). One part of the lectures is effected in the laboratory – mechanical properties of steel. Exercises include solutions of the tasks and the development of the programme. Fieldwork/training.		
Assessment methods	Written exam, oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level, by the Quality Assurance Committee (3) Lecturer's level		

Course title	HYDRAULIC STRUCTURES		
Course code	PHID04		
Type of course	Lectures, audio exercises.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	Student is expected to be able to understand and be proficient in explaining the key functions of hydraulic structures, to understand and be able to describe all surrounding processes and be capable of performing the basic design during the designing process of the hydraulic structures.		
Prerequisites	Hydromechanics, Hydrology.		
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 hw 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, GAF Split 1999; (2) Petar Stojić, Hydraulic Structures, book III, GAF Split, 1999.		
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	Lecturing is done through: lectures and audio exercises. Besides homework, the student is required to turn a seminar paper which includes simple design of one auxiliary hydraulic structure on the dam.		
Assessment methods	Written and oral exam		
Language of instruction	Croatian language with capability to read some auxiliary material on English.		
Quality assurance methods	Quality and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer.		

Course title	BRIDGES		
Course code	PKON04		
Type of course	Lectures, practice.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	5,0 ECTS points were calculated based on: (1) the poll among students in academic year 2003/04 and (2) lecturer's assessment. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Alen Harapin, PhD, Full Professor		
Learning outcomes and competences	A student shall comprehend basics of bridge design and construction.		
Prerequisites	Engineering statics II, Strength of materials II, Soil mechanics.		
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) J. Radić, Mostovi (Bridges), Dom i svijet, Zagreb, 2002; (2) K. Tonković, Mostovi, (Bridges) SNL, Zagreb, 1981.; (3) K. Tonković, Masivni mostovi-opća poglavlja (Massive bridges - general chapters) , Školska knjiga, Zagreb, 1977.; (4) K. Tonković, Masivni mostovi-građenje (Massive bridges - construction), Školska knjiga, Zagreb, 1979.; (5) D. Horvatić i Z. Šavor, Metalni mostovi (Metal bridges) , HDGK, Zagreb, 1988.; (6) 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 (Bridges in emergency conditions), Školska knjiga, Zagreb, 1979.		
Teaching methods	Lectures using the blackboard, overhead transparencies and computer. During practice, with the help of the assistant lecturer and preliminary solution of similar tasks, students will elaborate preliminary design of a bridge.		
Assessment methods	Oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer		

Course title	PORTS AND MARINE CONSTRUCTIONS		
Course code	PHID05		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	5,0 ECTS points were calculated based on: (1) the poll among students in academic year 2003/04 and (2) lecturer's assessment. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Mijo Vranješ, PhD, Full Professor		
Learning outcomes and competences	Based on information on the function, planning and dimensioning of ports and appropriate constructions students are expected to be able to continue their education and to successfully involve in solving problems to construction of marinas and ports.		
Prerequisites	Hydromechanics, Fundamentals of geology and petrography, Soil mechanics.		
Course contents	General consideration about of 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 2002.; (4) Shore Protection Manual CERC Coastal Engineering Resesarch Center, US Government Printing Office, Washington DC 1984.		
Teaching methods	Lectures, exercises in theory and practice with special practical exercises in solving the problems of marinas with appropriate constructions. Visiting ports and marinas, both completed and under construction.		
Assessment methods	Practical exercises, written and oral examination.		
Language of instruction	Croatian, possibly English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer’s level.		

Course title	RAILWAY		
Course code	PPRO03		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	4,0 ECTS points were calculated based on: (1) the poll among students in academic year 2003/04 and (2) lecturer's assessment. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Dušan Marušić, PhD, Full Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand basic elements of a railway line as well as to plan, design, build and maintain a railway track.		
Prerequisites	The basic knowledge from physics, geology and geodesy are necessary.		
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	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.); (4) Prister, G.; Polak, B.: Željeznički gornji stroj. Zagreb: Građevinski fakultet Zagreb, 1982.; (5) Zavada, J.: Željeznička vozila i vuča vlakova. Zagreb: Fakultet prometnih znanosti sveučilišta u Zagrebu, 1991.		
Teaching methods	Lecture with help of modern teaching methods. Practical contains the individual task estimation and field work.		
Assessment methods	Oral examination, written examination. For the students who successfully pass the seminars the written and oral exam is not required.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer’s level.		

Course title	APPLIED MATHEMATICS		
Course code	PPRI07		
Type of course	Lecture, seminar, exercise course.		
Level of course	Basic level course		
Year of study	III	Semester	VI
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Anton Vrdoljak, MSc, Lecturer		
Learning outcomes and competences	Knowledge of basic concepts of Fourier analysis, partial differential equations, boundary value problems with physical interpretations, numerical analysis.		
Prerequisites	Mathematics II.		
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 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, 2003.		
Teaching methods	Lectures, in-class exercises, seminar assignment, mid-term exams, consultations.		
Assessment methods	Oral examination, written examination, oral presentation, test, paper, continuous assessment.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	CONCRETE STRUCTURES I		
Course code	PKON05		
Type of course	Lectures, practice.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	A student shall comprehend basics of conventional reinforced concrete structures and prestressed concrete.		
Prerequisites	Basics of concrete structures.		
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. Prestressed concrete basics: Purpose of concrete prestressing. Prestressing types and levels. Prestressing steel. Concrete. Tensioning and anchoring systems. Prestressing force losses. Sizing to bending and shear. Prestressing force edge. Cable plan. Cable grouting. Regulations. Field visits to structures under construction and already constructed ones.		
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 4.; Eurocode 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 the blackboard, projector and computer. Practice using the blackboard, projector and computer. During practice, students will elaborate structural design of a simple reinforced concrete structure, complete with necessary calculations and reinforcement plans, based on previously elaborated examples by the assistant lecturer.		
Assessment methods	Written exam, oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer.		

Course title	DYNAMICS OF STRUCTURES AND EARTHQUAKE ENGINEERING		
Course code	PMEH07		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Mladen Kožul, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to perform dynamics analysis of simple structures (buildings, etc.).		
Prerequisites	Engineering statics II, Strength of materials II.		
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, Split, 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 by using computers. Movies showing earthquake influence on structures. Guided studies with the use of knowledge and skills about dynamic modelling and available computer programs for dynamics analysis of structures.		
Assessment methods	Test, oral presentation, paper.		
Language of instruction	Croatian, English.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

Course title	GEOTECHNICAL ENGINEERING		
Course code	PGEO03		
Type of course	Lecture, exercise course, laboratory work, fieldwork.		
Level of course	Basic level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	5,0 The number of ECTS credits has been computed according: (1) questionnaire among the students in the academic year 2003/04 and (2) estimation of the course lecturer. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	The learner is expected to acquire basic knowledge about calculation of earth pressure and design of geotechnical constructions (retaining structures, construction pits, excavations and embankments). Acquire basic knowledge about design of the shallow and deep foundations.		
Prerequisites	Soil mechanics.		
Course contents	The design geotechnical profile. Ground anchors (types and design). Type of the drainage and protection from a 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 a 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) "Mehanika tla i temeljenje građevina", E. Nonveiller, Školska knjiga Zagreb, 1979.; (3) "Zbirka riješenih zadataka iz mehanike tla", P. Miščević, Građevinski fakultet Split, 1999.		
Supplementary reading	(1) Programmes: FLAC 3.05 and Z_SOIL 2001; (2) "Geosintetici u graditeljstvu", B.Babić, HDGI, Zagreb, 1995.; (3) EUROCODE 7-translation on the Croatian; (4) “Foundation engineering handbook”, H. Fang, Chapman&Hall, 1991.		
Teaching methods	Teaching with use of the overhead and a video projector with PC, practical (students are suppose to make four examples during practical; presentations - examples of numerical models of geotechnical constructions), laboratory presentations, fieldwork.		
Assessment methods	Oral examination, written examination.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer’s level.		

Course title	FINAL WORK		
Course code	PZAV01		
Type of course	Guided personal study.		
Level of course	Advanced level course		
Year of study	III	**Semester**	VI
ECTS (Number of credits allocated)	5,0 Number of allocated credits is based on estimation showing that the student needs 145 hours for the research and preparation of the study as well as 5 hours for the preparation and oral presentation. (150 / 30 = 5 ECTS)		
Name of lecturer	Lecturer from the selected subject.		
Learning outcomes and competences	After the Final work is completed the learner is expected to acquire knowledge she/he evaluated in collaboration with the mentor within the selected subject.		
Prerequisites	Completed all courses of I, II, III and IV semesters of Bachelor degree cycle.		
Course contents	The student selects the subject of the Final work according to the previously defined subjects determined by the Faculty Council for each academic year. The student performs individual and independent research in the subject selected in collaboration with the lecturer/mentor. The student accomplishes her/his Final work in written or in any other suitable form.		
Recommended reading	According to the subject lecturer recommendation.		
Supplementary reading	According to the subject lecturer recommendation.		
Teaching methods	Consultations with selected subject lecturer and individual research work, as well as accomplishment of the Final work in a defined form.		
Assessment methods	Oral presentation of the Final work in front of the lecturer.		
Language of instruction	Croatian or other EU language depending on the subject lecturer.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		

3.2.2. Extracurricular activities' informations

Course title	EXERCISE AND HEALTH PROMOTION		
Course code	PVAN02		
Type of course	Lecture, exercise course, practical.		
Level of course	Basic level course		
Year of study	I, II or III	**Semester**	I, II, III, IV, V or VI
ECTS (Number of credits allocated)	1,0 Number of allocated credits is based on: (1) inquiry among students in the academic year 2003/04 and (2) lecturer's estimation. Teaching (5 hrs lecture + 25 hrs exercise) = 0.7 ECTS; Individual work and learning = 0.3 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	At the end of the course the learner is expected to acquire knowledge and competences for kinesiology recreation both within and apart of the living surrounding, knowledge and skills necessary for permanent health care in wider sense, as well as needed motorical and biotical knowledge required in urgent situations.		
Prerequisites	No prerequisites.		
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, water polo, diving, 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 and interactive lectures. Exercises.		
Assessment methods	According to the rules of the sport unions.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance will be performed at three levels: (1) University level; (2) Faculty level by Quality Control Committee; (3) Lecturer's level.		