University of Mostar

Faculty of Civil Engineering

GRADUATE STUDIES PROGRAMME

Civil Engineering

Mostar, September, 2005.

STUDY PROGRAMME

Graduate studies: Civil Engineering

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1. Introduction

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 Kosaca. 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 **graduate studies in Civil Engineering** were established as the second 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 graduate 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 graduate studies at both universities last two years (120 ECTS credits) and the number of credits for each course/modulus, i.e. set of courses/modulus is similar to this programme.

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.

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.

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	Graduate	
Programme title	Civil Engineering	
Institution	**Proposed by**	Faculty of Civil Engineering
	Participating institutions	Faculty of Civil Engineering
Duration	2 years	
ECTS	120	
Admission requirements	Completed undergraduate university studies in civil engineering at the Faculty of Civil Engineering, University in Mostar or undergraduate university studies in civil engineering at other universities in Bosnia and Herzegovina and abroad. Completed professional studies in civil engineering at institutions which have those curricula in Bosnia and Herzegovina or abroad after passing the required exams. Completed undergraduate university studies from the field of related engineering disciplines in Bosnia and Herzegovina or abroad, after passing the required exams.	
Learning outcomes and competences	After completing the university graduate studies in civil engineering the student acquires the basic competences for comprehensive identification, understanding and analysis of general phenomena and problems in civil engineering and for finding acceptable solutions, particularly in his/her field of specialization. The student has the competences for planning, supervision and implementation of engineering, developmental and scientific projects, for undertaking the managing role in various firms and research institutions and for the solution of technical and human problems in the working environment. He/she also has the competences for applying the acquired knowledge and skills in planning, design, implementation, supervision and maintenance of engineering structures and systems in his/her field of specialization, considering their bearing capacity, stability, safety, exploitability as well as the economic and environmental aspects. He/she is capable of applying the obtained knowledge, of acquiring new insights and experience and drawing scientifically and professionally based conclusions applicable both in scientific research and in engineering practice. After completing the university graduate studies in civil engineering the student acquires the basic competences for the continuation of post-graduate studies, both specialized and scientific, and various programmes for permanent education	
Access to further studies	Postgraduate studies in Civil Engineering	
Qualification awarded	Master in Civil Engineering	

3. Study/Degree programme

Graduate cycle is performed with three main study orientations: General Civil Engineering, Structural Modelling and Structural Engineering. Sections from 3.1.1. to 3.1.2. provide the lists of compulsory courses as follows: 3.1.1. for General Civil Engineering, 3.1.2. for Structural Engineering. Section 3.1.3. provides a list of all elective courses for Graduate cycle which can be selected by students. Each orientation curriculum offers one elective course which can be selected by student's free choice while other elective courses are selected in collaboration with the mentor.

3.1. Programme structure with credits

3.1.1. Compulsory courses with credits for General Civil Engineering orientation

1st Semester			
Course code	**Course title**	**Course structure***	**ECTS**
PPRI07	Applied mathematics	30+30	5.0
PKON05	Concrete structures I	30+30	5.0
PMEH07	Dynamics of structures and earthquake engineering	30+15	4.0
PGEO03	Geotechnical engineering	30+30	5.0
DHID01	Hydraulics	45+30	6.0
DHID02	Coastal engineering	30+30	5.0
TOTAL:			**30**
* LECTURE + EXERCISE			

2nd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DARH01	Building construction	30+30	5.0
DHID03	Engineering hydrology	30+30	5.0
DPRO01	Pavement of roads and railways	30+30	5.0
DPRO02	Traffic engineering	30+30	5.0
DGEO01	Rock mechanics	30+30	5.0
DPRI01	Operational research in civil engineering	30+30	5.0
TOTAL:		**180+180**	**30**
* LECTURE + EXERCISE			

3rd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DHID04	Water resource management	30+30	5.0
DORG01	Business and investments in civil engineering	30+30	5.0
	Elective courses – in collaboration with mentor		15.0
	Elective courses – free choice		5.0
TOTAL:			**30**
* LECTURE + EXERCISE			

4th Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DZAV01	Diploma work	0+15**	**30**
* LECTURE + EXERCISE ** Lecturer's time spent for each student.			

3.1.2. Compulsory courses with credits for Structural Engineering orientation

1st Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
PPRI07	Applied mathematics	30+30	5.0
PKON05	Concrete structures I	30+30	5.0
PMEH07	Dynamics of structures and earthquake engineering	30+15	4.0
PGEO03	Geotechnical engineering	30+30	5.0
DKON01	Stability of structures	30+30	5.0
DKON02	Metal structures I	45+30	6.0
TOTAL:			**30**
* LECTURE + EXERCISE			

2nd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DKON03	Surface Structures	30+30	5.0
DMEH01	Dynamics models of earthquake engineering	30+30	5.0
DARH01	Building construction	30+30	5.0
DKON04	Concrete structures II	30+30	5.0
DKON05	Metal structures II	30+30	5.0
DKON06	Concrete bridges	30+30	5.0
TOTAL:		**180+180**	**30**
* LECTURE + EXERCISE			

3rd Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DORG01	Business and investments in civil engineering	30+30	5.0
DKON07	Prestressed concrete	30+30	5.0
DKON08	Metal bridges	30+30	5.0
	Elective courses – in collaboration with mentor		10.0
	Elective courses – free choice		5.0
TOTAL:			**30**
* LECTURE + EXERCISE			

4th Semester			
Course code	**Course title**	**Course structure ***	**ECTS**
DZAV01	Diploma work	0+15**	**30**
* LECTURE + EXERCISE ** Lecturer's time spent for each student.			

3.1.3. Elective courses' for all orientations

Elective courses			
Course code	**Course title**	**Course structure ***	**ECTS**
DPRO03	Highway interchanges	30+30	4.0
DHID05	Ecohydrology	45+15	4.5
DGEO02	Geodesy in the engineering	15+0	1.5
DGEO03	Geotechnical structures	30+30	5.0
DARH02	Urbanistic methodology and management	30+0	2.0
DPRO04	Urban traffic areas	30+30	4.0
DMAT01	Building materials II	30+30	5.0
DHID06	Hydro power energy	30+30	5.0
DHID07	Karst hydrology	45+30	5.5
DKON09	Structural testing	30+30	5.0
DKON10	Construction of concrete structures	30+30	5.0
DARH03	Constructions of historical structures	30+15	4.0
DARH04	Housing installations	30+30	4.5
DPRI02	Linear algebra	45+30	6.0
DORG02	Management in civil engineering	45+15	4.0
DMEH02	Mechanics of deformable body	30+30	5.0
DGEO04	Mechanics of materials	30+30	5.0
DHID08	Groundwater flow and transport modelling	30+30	5.0
DMEH03	Non-linear engineering statics	30+30	5.0
DMEH04	Numerical modelling of concrete structures	30+30	5.0
DKON11	Specific timber structures	30+30	5.0
DPRI03	Applied stohastic methods	30+30	5.0
DGEO05	Applied geology	30+30	4.0
DKON12	Structure reliability	30+30	5.0
DINF01	Computer aided design of structures	30+30	5.0
DPRO05	Transportation facilities and environment	30+0	3.0
DINF02	Computer graphic	30+30	4.0
DINF03	Numerical programming	30+30	5.0
DGEO06	Complex foundations	30+30	5.0
DKON13	Composite structures	30+30	5.0
DORG03	Decision systems in civil engineering	45+15	4.0
DKON14	Durability of structures	30+30	5.0
DGEO07	Tunnels and underground structures	30+15	4.0
DORG04	Project management	45+15	4.0
DHID09	Water pollution control and environmental engineering	30+30	4.5
DHID10	Wastewater and solid waste management	30+30	4.5
DGEO08	Soil in construction	30+30	5.0
DKON16	Masonry structures	30+30	5.0
DPRO06	Airports	30+30	4.0
DPRO07	Railway station	30+30	4.0

3.2. Course informations

3.2.1. Compulsory courses' informations

3.2.2. Elective courses' informations

3.2.1. Compulsory courses' informations

Course title	CONCRETE STRUCTURES I		
Course code	PKON05		
Type of course	Lectures, practice.		
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	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	CONCRETE STRUCTURES II		
Course code	DKON04		
Type of course	Lectures, practice.		
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 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 complex problems of reinforced concrete structures design and calculations.		
Prerequisites	Basics of concrete structures.		
Course contents	Details of reinforced concrete structure calculations according to limit states -bearing capacity and exploitation (slender compression elements; deflection, cracks; simultaneous bending, shear and torsion; dimension complex composite cross-section of arbitrary shape). Impact of concrete shrinkage and creep on internal forces and concrete structure safety. Impact of construction method on concrete structure calculations. Crack width calculation of complex composite concrete elements. Reinforcement details. Fiber-reinforced concrete structures. Ferrocement structures. Lightweight concrete and high-strength concrete. Concrete structures in extreme climate conditions and aggressive environment. Very high concrete buildings. Water towers. Concrete wall girders with openings. Structural solutions and principles of seismic-resistant concrete structures. Structural design of ductile structures. Complex spatial reinforced concrete structures. Prefabricated reinforced concrete structures. Examples of reinforced concrete structures remediation. Quality control in design and construction. Basic numerical modelling of reinforced concrete structures. 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 a design of a complex reinforced concrete structure, complete with required reinforcement calculations and reinforcement plans.		
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	CONCRETE BRIDGES		
Course code	DKON06		
Type of course	Lectures, seminars, practice.		
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 lecturer's estimation. 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 complex problems of bridge design and construction.		
Prerequisites	Completed I year of graduate studies.		
Course contents	State-of-the-art design solution and construction methods for concrete underpasses, overpasses and viaducts on roads and motorways. Slab bridges. Concrete girder bridges with prefabricated longitudinal girders (continuous and with continuous slabs). Concrete girder bridges of box cross-section. Bridge design and construction by launching. Arch bridges. Cable-stayed concrete bridges. Integral concrete bridges. Pylons of cable-stayed bridges. Bridge external prestressing. Bridge loads. Bridge calculation and design in seismic areas. Bridge bearings. Concrete bridge substructure (columns and abutments). Shallow and deep foundations. Construction details (cables, anchoring, prestressing protocol, railing, cornice, drainage, transition devices, aseismic blocks and devices). Common concrete bridge construction procedures. Well-known bridges in Croatia. Field visits to concrete bridges under construction and some already constructed ones. Regulations.		
Recommended reading	(1) K. Tonković, Mostovi (Bridges), SNL, Zagreb, 1981.; (2) K. Tonković, Masivni mostovi-opća poglavlja (Massive bridges - general chapters), Školska knjiga, Zagreb, 1977.; (3) K. Tonković, Masivni mostovi-građenje (Massive bridges - construction), Školska knjiga, Zagreb, 1979.; (4) D. Horvatić, Metalni mostovi (Metal bridges), Školska knjiga, Zagreb, 1988.		
Supplementary reading	(1) Hewson R. N.: Prestressed concrete bridges, Thomas Telford, 2003: (2) Walther R. and all: Cable stayed bridges, Thomas Telford, 1999.; (3) Rayall M. J. and all: Manual of bridge engineering, Thomas Telford, 2000; (4) Trojano L. F.: Bridge Engineering, Thomas Telford, 2003.		
Teaching methods	Lectures using the blackboard, projector and computer. During practice, with a help of the assistant lecturer, students will elaborate concrete bridge design, complete with appurtenant calculations and reinforcement plans.		
Assessment methods	Oral exam, oral presentation of assignment.		
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 MODELS OF EARTHQUAKE ENGINEERING		
Course code	DMEH01		
Type of course	Lecture, seminar, guided personal study.		
Level of course	Advanced 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	Mladen Kožul, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to calculate and understand dynamics analysis of buildings, bridges, towers, masts, chimneys, silos and tanks according to European Standards.		
Prerequisites	Engineering statics II, Strength of materials II.		
Course contents	Dynamics analysis of structures subjected to seismic action: linear analysis, non-linear analysis, simplified non-linear analysis. Dynamics modelling of trusses, frames, plane structures, plates and shells, structural systems, structure-soil-fluid interaction. Dynamics calculation and modelling of earthquake resistant structures: - Buildings: computational methods, specific requirements for concrete, steel, timber and masonry buildings, modelling of buildings (regular and non-regular in plan and elevation), computation of building resistance, repair and strengthening of exist buildings. - Bridges: basic rules and methods of dynamics computation, details, bridges with special isolating devices, special bridges. - Towers, masts and chimneys: modelling of seismic action and structure, methods of analysis. - Silos and tanks: modelling of seismic action and structure, methods of analysis.		
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) Eurocode 8 - Design provisions for earthquake resistance of structures.; (4) D. Aničić, P. Fajfar, B. Petrović, A. Szavits-Nossan, M. Tomažević: Zemljotresno inženjerstvo, Građevinska knjiga, Beograd, 1990.		
Supplementary reading	(1) M. Čaušević: Potresno inženjerstvo (odabrana poglavlja), Školska knjiga, Zagreb, 2001.; (2) A. K. Chopra: Dynamic of structures – Theory and Applications to Earthquake Engineering, Prentice Hall, New Jersey, 1995.; (3) P. Fajfar: Dinamika gradbenih konstrukcij, Fakultet za arhitekturo, gradbeništvo in geodezijo, Ljubljana, 1984.		
Teaching methods	Lectures by using computers. Movies showing an earthquake influence to structures. Guided studies with the use of knowledge and skills about dynamic modelling and available computer programs for dynamics analysis of structures.		
Assessment methods	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	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	I	**Semester**	I
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on 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	DIPLOMA WORK		
Course code	DZAV01		
Type of course	Guided personal study.		
Level of course	Advanced level course		
Year of study	II	**Semester**	IV
ECTS (Number of credits allocated)	30,0 Number of allocated credits is based on estimation showing that the student needs 850 hours for the thesis research and preparation and 50 hours for the preparation of the oral presentation.		
Name of lecturer	Lecturer from the selected subject.		
Learning outcomes and competences	After the Diploma work is completed, the learner is expected to acquire knowledge he/she evaluated in collaboration with the mentor within the selected subject.		
Prerequisites	Completed all courses of 3rd semester of Diploma degree cycle.		
Course contents	The student selects the subject of the Diploma 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 Diploma 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 Diploma work in a defined form.		
Assessment methods	Oral presentation of the Diploma work.		
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.		

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	PAVEMENT OF ROADS AND RAILWAYS		
Course code	DPRO01		
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 lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Dušan Marušić, PhD, Full Professor		
Learning outcomes and competences	The learner is expected to acquire the knowledge about design, building and maintenance of road pavement as well as the practical estimation methods of road pavement design. The learner is also expected to be able to understand the basic elements of railway permanent way and to estimate a permanent way.		
Prerequisites	Building materials I, Geodesy, Railway, Highways.		
Course contents	Modern flexible and rigid pavements. Traffic loading conditions. Ambient conditions. Design procedures and techniques of rigid and flexible pavements (empirical and theoretical methods). Reinforcement of existing pavements. Pavement surface characteristics. Pavement maintenance. Pavement management. Subgrade and pre-overlay design. Geotextil. Asphalt pavement layers. Rigid pavement structures. Deterioration and maintenance of pavements. Track elements for forcefully driven vehicles: rails, sleepers, fastening elements, ballast. Special construction on the track: turnouts, travelling platform, turntable. Permanent way estimation and dimension. Maintenance work of track level and track direction; track closure. A track closure in continuous welded rails. Special railway: cable railway, funicular, monorail. Construction site visit.		
Recommended reading	(1) B. Babić: Projektiranje kolničkih konstrukcija, Hrvatsko društvo građevinskih inženjera, Zagreb 1997.; (2) Babić, B., Horvat, Z.: Građenje i održavanje kolničkih konstrukcija, Fakultet građevinskih znanosti, Zagreb 1984.; (3) Prister, G.; Polak, B.: Željeznički gornji stroj. Zagreb: Građevinski fakultet Zagreb, 1982.		
Supplementary reading	(1) Marušić, D.; Čatlak, Z.: Izbor radijusa horizontalnih krivina pri rekonstrukciji pruga. Građevinar 43 (1991.); (2) Zavada, J.: Željeznička vozila i vuča vlakova. Zagreb: Fakultet prometnih znanosti sveučilišta u Zagrebu, 1991.		
Teaching methods	Lecture with the help of modern teaching methods. Preparing written assignment about selected subjects. Practical contains the individual task estimation and field work.		
Assessment methods	Oral examination, oral presentation of written assignment, 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	HYDRAULICS		
Course code	DHID01		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
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	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	At the end of the lectures and exercises the learner is expected to be able to solve alone or in team standard problems in planning and building objects and systems in civil engineering.		
Prerequisites	Hydromechanics, Hydraulic structures.		
Course contents	Hydraulic short systems: objects for evacuation of high water, flow over spillways, crest shape of overflow spillways, discharge over spillways, aeration, small and large cascades, hydraulic jump and stilling basin. Hydraulics of pressurized systems: Characteristics of centrifugal engines, pumps and turbines, speed regulation, frequency regulation, and hydraulics of pumping stations. Hydrodynamic equations of non steady flow in pipes, steady, quasi non steady analysis of water supply networks, slow time changes – mass oscillations, surge tanks, rapidly varied time changes, water hammer, protection of dangerous pressure states, fundamentals of unsteady flow modelling. Hydraulics of open channel flow: Saint-Venant equations of non steady flow, characteristic form of non steady flow equations. Kinematics of elementary waves, wave propagation in sub critical, critical and super critical flow. Sharp changes: waves of finite height, velocity and height in relative motion, positive and negative waves, dam break problems. Fundamentals of modelling of non steady flow in channels. Hydrodynamics of groundwater: generalization of Darcy low, 2D and 3D steady seepage problems, seepage equations, boundary conditions, methods of solution, electro analogy, viscose analogy, numerical methods, pressure and lift on structures, seepage gradients and forces, drainage, unsteady groundwater flow, Bousinesq equation, non steady well flow, determination of transmissibility and effective porosity by pumping tests, radius of well influence.		
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) J. Bear: Dynamics of fluids in porous media, Am. Elsevier Pub. Co.		
Supplementary reading	K. Urumović: Fizikalne osnove dinamike podzemnih voda, Sveučilište u Zagrebu, RGN fak. 2003.		
Teaching methods	Lectures, exercises, seminars.		
Assessment methods	Written and oral 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	WATER RESOURCES MANAGEMENT		
Course code	DHID04		
Type of course	Lecture, research seminar, exercise course, guided personal study.		
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 lecturer's estimation. 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 to understand basic knowledge in the field of water resources planning and management.		
Prerequisites	Hydrology.		
Course contents	Water resources elements and characteristics; water balance and characteristics flows; water and society; water functions; management of water use, pollution, floods and droughts; integrated concept of water resource management; water resources planning; reservoirs design and operation; application of systems analysis and techniques in water resources planning and management.		
Recommended reading	(1) Margeta, J.: Osnove gospodarenja vodama, G.F. Split, 1992.; (2) Margeta J.:Smjernice za integralni pristup razvoju, gospodarenju i korištenju vodnih resursa, 1999; (3) Margeta, J., Uvod u sistemsko inženjerstvo u projektiranju i upravljanju akumulacijama, Split, 1988.		
Supplementary reading	(1) Kos, Z., Hidrotehničke melioracije - odvodnja, Zagreb, 1982.; (2) Kos, Z., Hidrotehničke melioracije - navodnjavanje, Zagreb, 1987.; (3) Stojić, P., Hidroenergetika, G.F. Split		
Teaching methods	Lecturing, examples presentation, individual work, homework and projects.		
Assessment methods	Oral examination, written examination, oral presentation, test, continuous assessment, etc.		
Language of instruction	Croatian, 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	ENGINEERING HYDROLOGY		
Course code	DHID03		
Type of course	Lecture, seminar, 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 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	This course enables students to understand and solve various engineering problems connected with: analyzing runoff from catchments, determining runoff components and calculating catchment water budget.		
Prerequisites	Hydrology.		
Course contents	Water budget. Effective rainfalls. Runoff coefficient. Hydrograph form analysis and flow separation methods. Infiltration and evapotranspiration as hydrological processes. Catchment as a system. Characteristics of linear and nonlinear systems. Rainfall-runoff relationships. Theory of the unit hydrograph. Unit hydrograph estimation. Impact of nonlinearity and nonstationarity to the form of unit hydrograph. Synthetic unit hydrograph. SCS method. The unit hydrograph application for the estimation of high flows. Hydrologic methods for flood rooting. Hydrologic data analysis, homogeneity and independency of data series and data series extrapolation. Determination of extreme flows. Application of time series analysis in hydrology. Course exercises include individual solving and elaboration of seminars associated with: the unit hydrograph, SCS method, flood rooting in the open flows and hydrologic data series analysis.		
Recommended reading	(1) O. Bonacci: Meteorološke i hidrološke podloge, Priručnik za hidrotehničke melioracije, I kolo; (2) Mc Cuen: Hydrologic analysis and design, Prentice Hall, 1989.; (3) M.P. Wanielista, Hydrology and water quantity control, John Wiley & Sons, 1990.; (4) E. Zelenhasić, Inženjerska hidrologija, Naučna knjiga, Beograd, 1991.		
Supplementary reading	(1) V.P. Singh, Hydrologic Systems, Rainfall-Runoff Modelling, Prentice Hall, 1988.; (2) D. Srebrenović, Primijenjena hidrologija, Tehnička knjiga, Zagreb, 1986.		
Teaching methods	Teaching methods: lectures and exercises using appropriate teaching spaces complemented with the use of up to date computers.		
Assessment methods	Oral examination, written examination, oral presentation.		
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	ROCK MECHANICS		
Course code	DGEO01		
Type of course	Lecture, exercise course, laboratory work.		
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 lecturer's estimation. 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 determination of the characteristics of rock, discontinuities and rock mass, and use that knowledge in design of foundations on rock, the rock slope stability and stability of the underground excavations.		
Prerequisites	Soil mechanics.		
Course contents	Physical and structural properties of intact rock, discontinuities and rock mass. Deformability and strength of intact rock, discontinuities and rock mass. Index properties of rock mass. Classification of the rock mass. Soft rocks. Initial stresses in rock masses. Stereographic projection. Block theory. Rock slope stability. Bearing capacity of foundation on rock. Stress and strain analysis around underground excavations. Support of the underground excavation. Ground response curve and available support line. Excavation principles. Monitoring in the underground openings.		
Recommended reading	"Uvod u inženjersku mehaniku stijena", P. Miščević, Građevinsko-arhitektonski fakultet Split, 2004.		
Supplementary reading	(1) Programski paketi FLAC 3.05 i Z_SOIL 2001; (2) Goodman R. E. (1989.), *Introduction to Rock Mechanics (second edition)*, John Wiley & Sons; (3) Hoek E. & Bray J. W. (1974.), *Rock slope engineering*, The Institution of Mining and Metallurgy, E & FN Spon; (4) Hoek E. & Brown E. T. (1980.), *Underground Excavations in Rock*, Institute of Mining and Metallurgy, London; (5) Hudson J. A. & Harrison J. P. (1997.), *Engineering rock mechanics, an introduction to the principles*, Pergamon.		
Teaching methods	Teaching with the use of overhead and video projector with PC, practical (students are suppose to make two examples during practical; presentations - examples of numerical models), laboratory presentations, fieldwork.		
Assessment methods	Oral examation.		
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	METAL STRUCTURES I		
Course code	DKON02		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	I	**Semester**	I
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on 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	After the completion of the course the student will be able to understand advanced theoretical findings from the field of stability of metal structures and dimensioning of complex metal structures.		
Prerequisites	Introduction to metal structures.		
Course contents	Methods of elastic and plastic global analysis of metal structure. Problems of stability of elastic and plastic global analysis in metal structures. Stability problems (buckling, lateral torsion buckling, local buckling). Theory of plasticity – application in steel structures. Theorem of the lower and upper limit, dimensioning, stability requirement. Multi-component compression/pressure elements. Fatigue – general dimensioning principles – new concept. Computation of thin profiles. Design of frame systems – frame classification, global imperfections, computation of joints. Plate girders – the stability problem. Truss supporters and columns – structural formation, joints. Design of a steel production hall – dimensioning and structural formation of elements (purlins, roof girders, crane supporters, columns, wind bracings, etc.).		
Recommended reading	(1) B. Peroš: Metalne konstrukcije II - skripta, Građevinsko - arhitektonski fakultet, Split, 2004.; (2) B. Androić, D. Dujmović, I. Džeba: Metalne konstrukcije I, II, III, IV i Modeliranje konstrukcija prema EC 3, IGH, Zagreb, 1994.; A. Vukov: Uvod u metalne konstrukcije, GF, Split, 1988.		
Supplementary reading	(1) A. Vukov, B. Peroš, B. Gotovac, P. Marović, A. Meštrović: Upustvo za projektiranje, izvedbu i ugradbu šipkastih čeličnih nosača, GF, Split, 1980.; (2) A. Mihanović: Stabilnost konstrukcija, DHGK, Zagreb, 1993.; (3) Eurocode 3 i 4; Stahal im Hochbau, 14 Auflage.		
Teaching methods	Lectures with a blackboard, overhead transparencies and LCD projector. One section of the lectures is based on the European Steel Design Education Programme (ESDEP). Exercises – design of complex steel production halls (computation and development of workshop drawings). 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 Quality Assurance Committee (3) Lecturer's level.		

Course title	METAL STRUCTURES II		
Course code	DKON05		
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 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	After the completion of the course the student is able to solve problems related to the design and computation of composite steel structures.		
Prerequisites	Introduction to metal structures.		
Course contents	Analysis of complex supporting systems in steel structures. Computational methods and concepts (elastic and plastic global analysis). Interaction between the supporting structures and extreme loads. Analysis of the influence of structural and geometric imperfections. Multy-storey steel skeletons. Linear light grid metal structures with large spans. Cable structures-suspended bearing/supporting systems. Shell bearing systems, corrugated shell structures. Metal structure in hydrotechnical projects (steel pressure pipelines, water-towers, reservoirs, dams, gates). Application of the reliability theory model in computation of complex supporting systems in metal structures.		
Recommended reading	(1) R. Englekirk: Steel structures, John Wiley & sons, Inc., New York, 1994.; (2) B. Peroš: Radna skripta, Građevinsko - arhitektonski fakultet, Split, 2004.; (3) B. Androić, D. Dujmović, I. Džeba: Metalne konstrukcije I, II, III i IV, IGH, Zagreb, 1994.		
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) EUROCODE 1, 3, 4, 8.		
Teaching methods	The lectures include a guest lecturer. Lectures by using the blackboard, overhead transparencies and LCD projector. One section of the lectures is based on European Steel Design Education Programme (ESDEP). Exercises – design of a complex steel pressure pipelines, water-towers, reservoirs (computation and workshop drawings). Fieldwork.		
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	METAL BRIDGES		
Course code	DKON08		
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 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	After the completion of the course the student will be able to solve specific problems related to the design and construction of metal bridges and truss bridges.		
Prerequisites	Introduction to metal structures, Metal structures I and II, Composite structures.		
Course contents	Historical review of the development of metal bridges. Modern solutions in the design of metal bridges – general remarks. Characteristic actions upon bridges. The concept of stability proof. Plate main girders, box girders. Torsion resistance. Optimal dimensions. Main truss girders – types, theory, structural rules for the computations, details, modern implementations. Pavements for highway and railroad bridges. Composite structures, general remarks, stability and interaction with main girders. Span composite steel-concrete structure. Limit state of the bearing capacity and exploitability. Stress redistribution by creeping and contraction, elastic and plastic analysis. Steel orthotropic plate in bridges, structural formation, main analyses. Arch bridges, Cable bridges, Suspended bridges. Bearing/supporting structures. Expansion joints. Transitory devices. Accompanying elements. Bridge equipment. Connections and joints, Production and assembly of bridges. Scientific research in bridge construction.		
Recommended reading	(1) Androić B., Peroš B. i drugi: Čelični i spregnuti mostovi, IA projektiranje, Zagreb, 2005.; (2) Horvatić D., Šavor Z.: Metalni mostovi, HDGK, Zagreb, 1998.		
Supplementary reading	(1) Tonković K.: Mostovi, Liber, Zagreb, 1981.; (2) Horvatić D.: Spregnute konstrukcije čelik – beton, Mas media, Zagreb, 2003.		
Teaching methods	Lectures include a guest lecturer. The course is organized in the form of lectures and exercises with the focus not only on computations but also on the development of the concept of bridges based on understanding the problems related to the disposition of bridges. Part of the course is based on European Steel Design Education Programme (ESDEP). Students are given guidelines regarding the European norms for structures EUROCODE 1, 2, 3, 4, 8.		
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	COASTAL ENGINEERING		
Course code	DHID02		
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 lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Mijo Vranješ, PhD, Associate Professor		
Learning outcomes and competences	In this course gives basic knowledge of large spectar civil engineering tasks on shore necessary for design and constract marine constructions.		
Prerequisites	Hydromechanics, Fundamentals of geology and petrography, Ports and marine constructions, Soil mechanics, Geotechnical engineering, Basics of concrete structures.		
Course contents	Definition and classification marine structures. Sea bottom and hydrogeology. Oceanographic, physical and chemical properties of the sea. Movement seawater, waves, currents. Seawaves, linear wave theory, finite amplitude wave theory, wind generated waves. Wave transformation, refraction, diffraction, reflection, breaking. Wave energy and force on structures. Design wave environment, wave energy spectral analysis, wave statistics, wind wave prediction. Long period waves, springtide-ebbtide, seiche, tsunami. Sea currents on shore. Seawater levels. Wave measurement. Breakwaters, type of constructions, define force and design. Jetties, wharves, piers and quays, type of constructions, define force and design. Navigation locks. Docks: on the land and floating, floating airports. Underwater pipelines, cables, wastewater outfalls, underwater constructions, seawater forces on it. Sinking of submarine pipes. Wave force on small structures. Wave force on large structures. Floating structure dynamics. Coastal processes. Estuaries and river deltas, formation and development deltas. Seawater intrusion in the rivers. Sea effect on the shoreline, design and protection. On shore sediment transport, design and beach stability. Field measurements in the on shore area, topographic, hydrographic, and geotechnical measurement. Modelling, physical and numerical models. Construction and maintenance of marine objects, technology, equipment. Diving and protection.		
Recommended reading	(1) Babić, L.: Primjena betona kod radova u moru, Epoha, Beograd, 1968.; (2) Silvestar, R.: Coastal Engineering 1, 2, Scientific Publishing 1974; (3) Horikawa, K.: Coastal engineering, University of Tokyo Press, 1978.; (4) Chakrabarti, S.K.: Hydrodinamics of Offshore Structures, Springer-Verlag, 1987.; (5) Sorensen, M.R.: Basic Coastal Engineering, Academic Publishers, Boston 2002.; (6) Kamphuis, J.W.: Introduction to Costal Engineering and Mangement, World Scientific, 2002.		
Supplementary reading	(1) Reeve, D., Chadwick, A. and Fleming, C.: Coastal Engineering, Processes, Theory and Design Practice, Spon Press 2004.; (2) Shore Protection Manual CERC Coastal Engineering Resesarch Center, US Government Printing Office, Washington DC 1984.; (3) McDowell, D.M. and O'Connor B.A.: Hydraulic Behaviour of Estuaries, MacMillan Press Ltd, 1977.		
Teaching methods	Lectures, exercises in theory and practice with special practical exercises in solving the problems of design and dimensioning on - shore constructions.		
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	OPERATIONAL RESEARCH IN CIVIL ENGINEERING		
Course code	DPRI01		
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	Snježana Knezić, PhD, Full Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to describe, explain and apply methods of operation research in civil engineering. The learner is also expected to be able to understand basic theoretical knowledge of system analysis and mathematical modelling.		
Prerequisites	Completed undergraduate studies.		
Course contents	Introduction, objective and definition of operation research (OR). Basics of system theory. System analysis. System structure and functioning. System modelling. Process modelling. Definition, basic terms and application of cybernetics. Principles of complex problem solving and principles of approach. Cybernetics models and modelling. Basics of decision theory. Decision process. Decision models. Mathematical models of OR applicable in civil engineering. Linear programming. Transport problem. Mixture model. Integer programming. Dynamic programming. Simulation models. Games theory (Monte Carlo). Queuing theory. Inventory model. Application of information theory in civil engineering. OR software and application in civil engineering.		
Recommended reading	D. Kalpić, V. Mornar: Operacijska istraživanja, Zeus, Zagreb, 1996.		
Supplementary reading	(1) A. T. Handy: Operations Research – An Introduction, Prentice – Hall Inc., New York, 1997.; (2) S. K. Brown, B. J. Re Velle: Quantitative methods for managerial decisions, Addison-Wesley, Massachusetts, 1978.		
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.		
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	SURFACE STRUCTURES		
Course code	DKON03		
Type of course	Lecture, seminar, 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 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	At the end of the course unit the learner is expected to be able to create on his own a numerical model of engineering structures composed of plane and linear parts; explain the obtained results in elements such as: beam, plane girder, plate, shell element; describe stress state due to concentrated effects and at border of openings and curved boundary.		
Prerequisites	Mechanics II, Strength of materials II, Engineering statics II.		
Course contents	Membrane stress state, equation and boundary conditions. Plate bending. Thin and thick plates, equation and boundary conditions. Contribution of shear and bending, comparison to linear models. General formulation of the finite element method in theory of plates and shells. Degenerated 3D isoparametric elements. Co-ordinate systems and geometry of elements. Fields of displacements, strains and stresses. Constitutive law. Shell structures. Cylindrical and rotational shells – known solutions. Numerical solution of shell structures, particularly folded shell structures, pipes, tunnels, channels, structures composed of shells and beams (halls, sport structures, cooling towers, bins etc.). Numerical examples of reinforced concrete and metal plates and shells. Reference to stress state around openings and curved borders of shell structure. Connection of shell and beam element, problem of sixth degree of freedom.		
Recommended reading	(1) Kostrenčić Z.: Theory of Elasticity, Školska knjiga, Zagreb 1982.; (2) B. Gotovac; V. Kozulić; I. Čolak: Introduction to numerical modelling of spatial structures, Mostar, 2001.; (3) Hinton E., Owen D.R.J.: Finite element software for plates and shells, Pineridge press, Swansea, U.K., 1984.; (4) Jović V.: Introduction to Engineering Numerical Modelling, Aquarius Engineering, Split, 1993.		
Supplementary reading	(1) Girkman K.: Surface Girder Systems (translation from German), Građevinska knjiga, Beograd, 1965.; (2) Timoshenko, S. P.; Woinowsky-Kriger, S.: Theory of Plates and Shells, 2nd edn, McGraw-Hill, New York, 1959.; (3) D. R. J. Owen and E. Hinton, Finite Elements in Plasticity: Theory and Practice, Pineridge Press, Swansea, U.K., 1980.		
Teaching methods	Use of blackboard, projector and computer in teaching and exercises. During exercises students prepare one programme on their own with examples previously prepared by the assistant lecturer. Exercise course includes a visit to the actual site and/or already constructed representative structures.		
Assessment methods	Oral examination, written examination.		
Language of instruction	Croatian. Possibility of attending the course 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	BUSINESS AND INVESTMENTS IN CIVIL ENGINEERING		
Course code	DORG01		
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	Snježana Knezić, 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 of business and investments in civil engineering as well as key elements of costs and investment analysis, including basics of accounting. The learner is also expected to be able to perform a feasibility study.		
Prerequisites	Completed undergraduate studies.		
Course contents	Investments in civil engineering. Business concepts. Success factors of business strategy. Business principles (rationalisation, productivity, profitability, return on investment and cash flow). Production factors. Cost functions. Choice and replacement of technology or equipment. Depreciation. Balance sheet. Profit and loss. Direct costing and controlling. Break-even analysis. Estimation. Investment types. Sources of investment funds. Intercalar interest. Working capital. Borrowing. Financial analysis of investment (time value of money, cash-flow, rate of return, present worth method, equivalent uniform annual cash flow, period of return). Other methods of financial analysis (cost-benefit analysis, sensitivity analysis). Importance and content of investment studies. Contract models, BOT (Build Operate Transfer), joint-venture. Tender documentation.		
Recommended reading	(1) Z. Ribarović: Ekonomske osnove i jednoperiodični investicijski račun, Zebra plus d.o.o. Split, 2003.; (2) Z. Ribarović: Uvod u studiju podobnosti, Zebra plus d.o.o. Split, 2005.		
Supplementary reading	(1) J. Bendeković i koautori: Planiranje investicijskih projekata, Ekonomski institute Zagreb, 1993.; (2) D. Marušić: Optimalizacija Investicijskih projekata, Građevinski fakultet, Split, 1999.; (3) E. L. Grant, W. G. Ireson, R. S. Leavenworth: Principles of Engineering Economy, John Wiley & Sons1976.		
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, 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	PRESTRESSED CONCRETE		
Course code	DKON07		
Type of course	Lectures, practice.		
Level of course	Basic level course		
Year of study	II	**Semester**	II
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 complex problems of design, calculations and detailing of prestressed concrete structures.		
Prerequisites	Concrete structures I.		
Course contents	Detail analyses of prefabricated subsequently prestressed concrete girders (cross-section selection; prestressing force calculations; prestressing force loss calculation; cross-section stress state for exploitation loads; ultimate bearing capacity; prestressing system selection; cable and anchor selection; cable plan; cable holders; prestressing protocol; calculations and design of conventional and prestressed reinforcement; prestressing girder edge; girder calculations to shear; elements for girder extraction from moulds and transport; girder grouting; girder construction). Details of prefabricated preliminary/adhesion prestressed girders. Continuous prestressed girders. Prestressed box girders. Cables outside concrete cross-section (external prestressing). Partial prestressing. Cable jointing and anchoring. Prestressed slabs. Prestressed membranes and cables. Prestressed complex spatial structures. Examples of prestressed structures. Details of some cable prestressing and anchoring systems. Basics of prestressed structures durability. Regulations. Field visits to prestressed concrete structure - constructed and 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 4.; Eurocode 6.; Eurocode 8. (4) Kos V.: Prenapregnuti beton (Prestressed concrete), Zagreb 1974.; (5) Romić S.: Prednapeti beton u teorijskoj i arhitektonskoj praksi (Prestressed concrete in theory and architectural practice), Građevinska knjiga Beograd 1978.; (6) Jeftić D.: Prenapregnuti beton (Prestressed concrete), Građevinska knjiga Beograd 1979.		
Supplementary reading	Nilson A. H.: Design of prestressed concrete, John Wiley and Sons, 1987.		
Teaching methods	Lectures using the blackboard, projector and computer. Practice using the blackboard, projector and computer. During practice, students will elaborate a design of large-span prestressed concrete girder, complete with necessary calculations and reinforcement and cable plans, based on previously elaborated examples by the assistant lecturer.		
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	APPLIED MATHEMATICS		
Course code	PPRI07		
Type of course	Lecture, seminar, 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 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	TRAFFIC ENGINEERING		
Course code	DPRO02		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Advanced 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	Ivan Lovrić, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course unit the learner is expected to be able to choose optimal elements (types and elements of intersections or interchanges as well as optimal elements of other traffic infrastructures) of urban street network based on analysis of input parameters (traffic volume structure and distribution) and resulting measures of effectiveness.		
Prerequisites	Highways, Probability and statistics.		
Course contents	History of traffic engineering. Transportation planning fundamentals. Trip generation models. Trip distribution models. Modal split analysis. Route assignment models. Solution analysis, evaluation and choice. Traffic demands and supply. Short term forecasting methods. Traffic studies inventories. Functional street classification. Traffic flow, speed, density. Capacity and Level of services of highways segments, intersections, elements of interchanges. Intersections; optimal type and location. Traffic volume distribution. Traffic flow structure. Capacity and other measures of effectiveness. Intersection design. Safety. Traffic flow management. Fundamentals of analytical and simulation traffic models.		
Recommended reading	(1) McShane,W.R. Roess, R.P., Prassas,E.S.: *Traffic engineering*, Prentice Hall,1998.; (2) Pađen, J.: *Osnove prometnog planiranja*, Informator Zagreb, 1986.; (3) Lozić, I.,Tedeschi, S.: *Osnovni elementi za planiranje i projektiranje gradskih prometnica*, Fakultet građevinskih znanosti Split, 1979.		
Supplementary reading	(1) *Highway capacity manual 2000*, Transportation research board.; (2) ITE: *Transportation and traffic engineering handbook*, Prentice-Hall.		
Teaching methods	Class lectures using modern technology and methods, guided personal study, fieldwork. Presentation and demonstration of analytical and simulation traffic flow software packages.		
Assessment methods	Oral examination, written examination, 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	STABILITY OF STRUCTURES		
Course code	DKON01		
Type of course	Lecture, seminar, exercise course, guided personal study.		
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	Mladen Kožul, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand problems of structural stability and to be able to perform practical use of Stability Theory in structural calculations.		
Prerequisites	Engineering Static II, Strength of Materials II.		
Course contents	The tasks of structural stability. Determining stability. General methods. Equilibrium branching. Geometrical stiffness. Mechanical models of stability of single levelled and multi levelled systems. Small and large displacements. Perfect and imperfect structural. Linear-elastic bending stability of columns, bearers and arches. Lateral buckling stability of bearers. Stability of rings and arches. Stability of frames. Stability of material and geometrical non-linear line structural with numerical and analytical methods. Factor of critical load. Bulging of plates and shells with small and large displacements. Introduction of numerical methods to plate and shell stability. Use of Stability Theory on Ferro concrete, steel and wooden constructions. Bearer local stability. General, considerations about stability according to European standards.		
Recommended reading	A. Mihanović: Stabilnost konstrukcija, DHGK, Zagreb, 1993.		
Supplementary reading	Bažant Z. P. and Cedolin L., STABILITY OF STRUCTURES: Elastic, Inelastic, Fracture and Damage Theories, Dover Publications, Inc., New York, 2003.		
Teaching methods	Lectures with computers. Guided personal study applying acquired gained knowledge in Stability Theory, with introduction to available program packages.		
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 CONSTRUCTION		
Course code	DARH01		
Type of course	Lecture.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	2,5 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture) = 0.7 ECTS; Individual work and learning = 1.8 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 establish a good cooperation with the architect and other designers at preliminary and final design (working drawings) of buildings of diverse purposes, as well as to be familiar with the basics of legislation, particularly the segment regarding fire-fighting and safety at working process.		
Prerequisites	Elements of building construction.		
Course contents	Introduction: organisation and use of space; concepts of function, construction, and form / design. Man as a module in the space organisation. Designing processes. Residence: functions and functional groups; operating space and equipment. Residential building: typology classification of single-family houses and blocks of flats; construction systems; building technology and rationalisation. Technical conditions and standards. Public buildings of different purposes: typology features, construction, and technology. Construction design as an essential element of the project solution. Principles of creative cooperation between designers of diverse specialities. Contemporary building aesthetics. Designer aspect of different forms of protection: physical, fire-fighting, occupational safety, and other forms of protection.		
Recommended reading	(1) Knežević, G., Kordiš, I.: Stambene i javne zgrade, Zagreb, 1986; (2) Knežević G.: Višestambene zgrade, Zagreb, 1984.		
Supplementary reading	Neufert, E.: Elementi arhitektonskog projektiranja Zagreb, 2002.		
Teaching methods	Frontal lectures using overhead projector and transparencies.		
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.		

3.2.2. Elective courses' informations

Course title	HIGHWAY INTERCHANGES		
Course code	DPRO03		
Type of course	Lecture, seminar, exercise course, guided personal study.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 be able to determinate optimal location and type of interchanges; design horizontal alignment, vertical alignment and cross sections elements of main roads and ramps.		
Prerequisites	Highway, Traffic engineering.		
Course contents	Traffic flow conflict points. Crossing, merging, diverging and weaving. General types of interchanges. Traffic operation. Interchange ramp design. Ramps terminals. Segments. Ramps; types and examples, one quadrant ramps…General ramp design consideration: types according to topography and angle of crossing. Geometric design of ramp terminals and through traffic lanes. Horizontal and vertical alignment. Cross section elements. Signing and markings. Longitudinal distance of adjacent terminals. Capacity and Level of service. Optimal interchange type warrants: 1) functional classification of highways; 2) traffic volume and capacity; 3) safety; 4) landscape and topography; 5) environmental warrants.		
Recommended reading	(1) Klemenčić, A.: *Oblikovanje cestovnih čvorišta izvan razine*, monografija, Građevinski institut, 1982.; (2) Korlaet, Ž.: *Čvorišta*, skripta, Građevinski fakultet, Zagreb, 1995.; (3) *A Policy on geometric design of Highways and streets*, AASHTO 2001.		
Supplementary reading	*Highway* capacity *manual 2000*, Transportation research board.		
Teaching methods	Class lectures using modern technology and methods, guided personal study, fieldwork. Presentation and demonstration of road design software packages; analytical and simulation traffic flow software packages.		
Assessment methods	Oral examination, written examination, 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	ECOHYDROLOGY		
Course code	DHID05		
Type of course	Lecture, seminar.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,5 Number of allocated credits is based on lecturer's estimation. Teaching (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.0 ECTS		
Name of lecturer	Gordan Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	This course enables students to understand the connection between ecology and hydrology and prepares students to perform a wide range of engineering tasks associated with ecohydrology.		
Prerequisites	Hydrology.		
Course contents	Interaction between hydrology and ecology. Concepts of sustainable development. The definition of ecohydrology. Elements of hydrology and water resources fundamental for ecology. Hydrological systems and processes. Impact of global climate changes on hydrological cycle. Floods, flooded and wet areas. Droughts and arid areas. Open flows as the part of ecosystem. Open channel flow management. Environmental requirements for the open channel flows. Principles and problems in determination of an ecologically acceptable flow.		
Recommended reading	O. Bonacci, Ekohidrologija, Građevinski fakultet Split, 2003.		
Supplementary reading	O. Bonacci: Oborine-glavna ulazna veličina u hidrološki ciklus, Geing, Split, 1994.		
Teaching methods	Teaching methods: lectures using appropriate teaching equipment.		
Assessment methods	Oral examination, oral presentation.		
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	GEODESY IN THE ENGINEERING		
Course code	DGEO02		
Type of course	Lecture, seminar, exercise course, practical, guided personal study, fieldwork.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	1,5 Number of allocated credits is based on lecturer's estimation. Teaching (15 hrs lecture) = 0.4 ECTS; Individual work and learning = 1.1 ECTS		
Name of lecturer	Petar Cerovac, MSc, Senior Lecturer		
Learning outcomes and competences	After the completed course, it is expected from the student to be able to make use of geodetic services in civil engineering applying previously gained knowledge.		
Prerequisites	Geodesy.		
Course contents	Geodetic works in the civil engineering. Determining shifts and deformations of construction objects. Survey underground installations and objects. Geodetic works at the regularisation and levelling housing project. Use of the topographic maps. Agrarian operations. Land register. Hydrographical level surface. Hydrographic survey. Photogrammetric survey: single photograph measurements, stereophotogrammetry, orientation photographs, new technology in photogrammetry, photogrammetric application.		
Recommended reading	(1) S. Macarol: Praktična geodezija, Tehnička knjiga, Zagreb, 1985.; (2) M. Janković: Inženjerska geodezija III, SNL, Zagreb, 1980.		
Supplementary reading	(1) M. Janković: Inženjerska geodezija prvi dio, Tehnička knjiga, Zagreb, 1968.; (2) M. Janković: Inženjerska geodezija drugi dio, Tehnička knjiga, Zagreb, 1966.		
Teaching methods	Lectures with the use of geodetic instruments.		
Assessment methods	Oral 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	GEOTECHNICAL STRUCTURES		
Course code	DGEO03		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	After the lecture ending, student mast bee capable to project, organise field works, manage and control quality all geotechnical works with soils or/and in soils.		
Prerequisites	Soil mechanic and foundation, Geotechnical engineering.		
Course contents	Soil as construction material: Engineering properties of soils and its investigation in situ and in laboratory (2h) Excavation: large excavations, excavations in limited space, excavations with protection (6h) Embankments: Classification and sorts, dams. Planning, realization and oscultation. (108h) Reinforced soil: fabric-reinforced soils, soil nailing, jet grouting (8h) Soil improvement: dinamic shallow and deep soil stabilization, vertical and horizontal drainage, shallow and deep soil stabilization mix in place (4h) Exercise course (30h) :Lecture (6h), in lab (4h), project work (20h) Project of deep excavation (Slope stability, drenage, 10h) Project of multilayer embankment (Slope stability, settlement, waterproff , erosion protection, culvert projects 10h) Soil reinforcement project: affecting of reinforcement on soil structures, design of reinforcements, stability control of construction 10 h)		
Recommended reading	(1)Roje-Bonacci, T. Mehanika tla (2003.), Građevinski fakultet Sveučilišta u Splitu, Split. (2) Roje-Bonacci, T. (u pripremi 2005.) Potporne građevine i građevne jame, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu. (3) Nonveiller, E. (1983.) Nasute brane, projektiranje i građenje, Školska knjiga, Zagreb. (4) Nonveiller, E. (1987.) Kliženje i stabilizacija kosina, Školska knjiga, Zagreb. (5) Babić, B. (1995.) Geosintetici u graditeljstvu, Hrvatsko društvo građevinskih inženjera, Zagreb. (6) Linarić, Z., Žabek, K. (2004.)Tehnike i tehnologije poboljšanja temeljnog podtla. U V. Simović, ur., Građevni godišnjak '03/04, Hrvatski savez građevinskih inžanjera, Zagreb.		
Supplementary reading	(1) Schroderer, W.L. (1975.) Soils in construction, John Wilwy&Sons, Inc. New York. (2) Fang, H.-Y. (1991.) Foundation engineering handbook. Poglavlje 7 Dewatering and groundwater control (autor Powers, P.); poglavlje 8 Compacted fill (autor Hilf, J.W.) i poglavlje 9 Soil stabilization and grouting (autori Winkerton, H.F. i Pamukcu, S.), Chapman&Hall, New York. (3) U.S. Department of the interior, Bureau of raclamation, (1977.) Design of small dams (poglavlje V. Foundations and construction materials, VI. Eatrhfill dams, poglavlje VII. Rokfill dams, United States Government printing office, Washington D.C. (4) U.S. Department of the interior, Bureau of raclamation, (1974.) Earth Manual, A guide to the use of soils as foundations and as construction materials for hydraulic structures, United States Government printing office, Washington D.C.		
Teaching methods	Lecture, exercise course, guided personal study		
Assessment methods	Oral presentation on project work, continuous assessment, etc.		
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	URBANISTIC METHODOLOGY AND MANAGEMENT		
Course code	DARH02		
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	Jaroslav Vego, PhD, Full Professor		
Learning outcomes and competences	Upon the completion of the course the students are expected to be familiar and conversant with the procedure of use and procuring / obtaining documents required by the urban planning regulations and permits necessary for construction.		
Prerequisites	None.		
Course contents	Definitions of basic concepts: management; space. Legislation: laws, statutes, codes, decrees. Programming, planning, and designing; function analysis, zoning, infrastructure, traffic. Space / urban plans: strategy and programme of urban planning at the national, county, municipal, city, and other levels. Balance of surfaces with development coefficients from the aspects of efficiency and density parameters. Urban planning: preparation and construction of a facility, equipment and installations of both individual and communal utility / use. Management of the developed areas. Parameters for determining utility costs. Investment programme concerning the use of developed areas. Space management organisation models.		
Recommended reading	Marinović-Uzelac, A.: Teorija namjene površina u urbanizmu, Zagreb, 1989.		
Supplementary reading	Marinović-Uzelac, A.: Prostorno planiranje, Zagreb, 2001.		
Teaching methods	Frontal lectures using overhead projector and transparencies.		
Assessment methods	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 Control Committee; (3) Lecturer's level.		

Course title	URBAN TRAFFIC AREAS		
Course code	DPRO04		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 be able to consider urban transportation facilities planning process as well as to be able to choose and design appropriate elements of urban traffic areas such as streets, urban freeways, intersections, interchanges, parking facilities, pedestrian facilities, multimodal transportation facilities.		
Prerequisites	Highway, Traffic engineering.		
Course contents	Course introduction. Types of vehicles. Public transportation systems. Individual passenger transport. Planning of urban traffic areas (location, capacity, design). Functional classification of urban streets. Capacity and Level of service. Design elements: Horizontal and Vertical alignment. Optimal type of intersection design and control. Typical cross sections. Speed change lanes. Grades. Horizontal and vertical sight distance. Intersection superelevation design. Pavements. Drainage. Illumination. Signing and markings. Structures. Parking. Parallel and diagonal parking. On street and off street parking. Garages. Bus stations and multimodal transportation terminals. Gas stations. Traffic control devices. Pedestrian traffic areas. Cyclist traffic areas. Types of public transport facilities and vehicles.		
Recommended reading	(1) Lozić, I., Tedeschi, S.: *Osnovni elementi za planiranje i projektiranje gradskih prometnica*, Fakultet građevinskih znanosti Split, 1979.; (2) PTI, *Tehnični normativi za projektiranje in opremo mestnih prometnih površin*, Univerza v Ljubljani 1991.;(3) *A Policy on geometric design of Highways and streets*, AASHTO 2001.		
Supplementary reading	(1) *Highway* capacity *manual 2000*, Transportation research board.; (2) ITE: *Transportation and traffic engineering handbook*, Prentice-Hall.		
Teaching methods	Class lectures using modern technology and methods, guided personal study, fieldwork. Presentation and demonstration of road design software packages; analytical and traffic flow simulation software packages.		
Assessment methods	Oral examination, written examination, 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	BUILDING MATERIALS II		
Course code	DMAT01		
Type of course	Lecture, exercise course, laboratory work.		
Level of course	Advanced 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	Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	After the completed course one should expect from the student the knowledge of material properties and design of structure and technology of special types of concrete.		
Prerequisites	Building materials I.		
Course contents	Non-ferrous metals. Polymers. Glues. Paints and coatings. Carbohydrate binders, properties and products. Coatings and waterproofing. Asphalt-concrete, characteristics of aggregate, design of structure. Lightweight concrete, fibre reinforced concrete, hydrotechnical concrete, massive concrete, roller-compacted concrete and heavyweight concrete. High performance concrete and concrete for prestressing. Decorative concrete. Floors. Clay-concrete. Preplaced-aggregate concrete. Pumped concrete. Grouting. Splashed concrete. Structural design and technology of special concretes.		
Recommended reading	V. Ukrainczyk: Concrete - Structure, Properties, Technology, Alcor, Zagreb, 1994. (In Croatian).		
Supplementary reading	D.F. Orchard: Concrete Technology, Vols. 1-3, Applied Science Publishers, Essex, 1979.		
Teaching methods	Lectures ex-cathedra, demonstrative and laboratory exercises. At demonstrative exercises characteristic problem is solved. Afterwards, the students get problems they have to solve by themselves. For laboratory exercises groups of up to ten students are formed. At laboratory exercises students actively participate in performing tests and afterwards they analyse the obtained results.		
Assessment methods	Oral examination, written examination, project.		
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	HYDRO POWER ENERGY		
Course code	DHID06		
Type of course	Lectures and audio exercises.		
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 lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	Student is expected to be able to understand the principles of hydropower and other renewable energy, be proficient in performing the analysis of water resources power assessment, analysis of water and Sea energy budget, design typical (big and small) hydro power facilities and being able to design the management and control of hydropower system.		
Prerequisites	Engineering Hydrology, Hydraulics.		
Course contents	First part: Types of energy, renewable energy sources (biogas, sun and wind), estimation of fossil fuel energy lifespan, energy conservation principles. Second part: Water power utilization, water power budget, river discharge, power, energy. Volumetric discharge curve, method of subsequent maximums, energy-economic characteristics of artificial reservoirs and reservoir sizing. Multicriteria analysis for defining location, size and discharge characteristics for small hydro power plants. Third part: Sea energy, tides and energy from waves and kinetic energy from sea currents. Introduction into the design principles in utilizing sea energy and geothermal energy. Energy from biogas: gas generation from landfills, energy from animal waste, current practice and future directions.		
Recommended reading	Petar Stojić, Iskorištavanje vodnih snaga, GAF Split, 1994.		
Supplementary reading			
Teaching methods	Lecturing is done through: lectures and audio exercises. Besides homework, the student is required to turn a seminar paper which includes design of reservoir sizing and energy potential assessment.		
Assessment methods	Written and oral exam.		
Language of instruction	Croatian language with capability to read some auxiliary material on 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	KARST HYDROLOGY		
Course code	DHID07		
Type of course	Lecture, seminar, research seminar.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	5,5 Number of allocated credits is based on lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 3.6 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 hydrological processes and analyses of water circulation in the karst. Students are expected to understand and solve related engineering problems and projects.		
Prerequisites	Hydrology.		
Course contents	Karst terminology and definitions. Soluble rocks as the basis of karstification processes. Geomorphologic characteristics of karst. Hydrological characteristic of karst. The phenomena of water in karst. Groundwater circulation in karst. Karst aquifer. Hydrological budget. Karst springs. Discharge curves. Hydrograph analysis. Determination of the catchment area. Swallow holes (Ponors). Determination of swallow capacity of ponors. Natural streamflows in karst. Interaction between groundwater and water in the open streamflows in karst. Hydrological regime of rivers in karst. Water losses along the open streamflows in karst. Tracer tests in karst hydrogeology. Groundwater temperature in karst. Hydrologic characteristic of the Dinaric karst.		
Recommended reading	(1) O. Bonacci, Karst Hydrology, Springer Verlag, Heidelberg, 1987.; (2) O. Bonacci, T. Roje-Bonacci, Posebnosti krških vodonosnika, Građevni godišnjak '03/'04.		
Supplementary reading	(1) P. Milanović, Hidrogeologija krša, Svjetlost, Sarajevo, 1979.; (2) W.B. White, Karst hydrology-concepts from the Mammoth Cave area. Van Nostrand Reinhold New York: 223-258.		
Teaching methods	Lectures using appropriate teaching equipment.		
Assessment methods	Oral examination, oral presentation.		
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	STRUCTURAL TESTING		
Course code	DKON09		
Type of course	Lecture, exercise course, practical, laboratory work, fieldwork.		
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 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	The student should obtain basic theoretical knowledge from the field of structural testing and practical implementation of basic procedures and methods in structural testing.		
Prerequisites	Completed undergraduate study.		
Course contents	Historical review and the role of structural testing. Classification of testing: control, scientific, special; site, model; short-time, long-time; static, dynamic; field, laboratory. Mechanical and geometrical quantities which are measured during structural testing. Instruments for measuring different quantities. Determination of structural properties, accuracy and bandwidth of measurement instruments. Project, performance, loading systems, handling and marking of results of measurement. Particularities of static and dynamic testing. Structural testing norms. Extensometry. Classification and types of extensometers. Advantages and disadvantages of electro-resistant strain gages. Procedures for determination and verification of tested structure material properties by core sampling, ultrasonic testing, sclerometry or radiography. Stress state analysis based on strain measurements and forecast of generated stresses. Outline of some other important methods for determining stress and strain state: Brittle lacquers method; Photoelastic method of stress analysis; Moire method; Holography; Photogrametry. Description of some procedures and methods of measurement on illustrative examples from practice.		
Recommended reading	(1) Measurement of Deformations and Stress Analysis, Seminar authorized lectures, Ed. A. Kiričenko, Zagreb Society of Civil Engineers and Technicians, Zagreb, 1982. (in Croatian); (2) D. Aničić: Structural Testing, Faculty of Civil Engineering, University of Osijek, Osijek, 2002. (in Croatian); (3) P. Marović: Lecture Notes in Structural Testing, Faculty of Civil Engineering and Architecture, Split, yearly updated (written materials + CD)		
Supplementary reading			
Teaching methods	Lectures ex-cathedra supplied with overhead projector (overhead transparencies), diaprojector (slides), PC (ppt) and clipboard. The work with instruments and methods of structural testing will be shown in the practicum while the students will perform some less demanding tests in the exercises. The full procedure of structural testing will be shown at the fieldwork during structural testing of some actual structure.		
Assessment methods	Oral examination, written examination, practical demonstration of skills in working with measurement equipment.		
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	CONSTRUCTION OF CONCRETE STRUCTURES		
Course code	DKON10		
Type of course	Lectures, research seminars.		
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 lecturer's estimation. 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	At the end of the course unit the learner is expected to be able to understand basic construction problems of concrete structures.		
Prerequisites	Construction management, Construction production.		
Course contents	Construction site organization for residential, public and industrial buildings in different conditions – examples from practice. Construction site organization for bridges and other engineering structures in different conditions – examples from practice. Construction technology for residential and public buildings (foundations, columns, walls, floor structures). Construction of prefabricated concrete and steel factory halls. Bridge substructure construction technology (abutments, columns, head beams). Some common construction methods for bridge span structures. Construction and erection technology of prestressed concrete girders. Construction and erection technology of steel girders. Organization and construction methods of high cuts and embankments. Particularities of coastal and hydrotechnical structure's construction (quays, berths, breakwaters, dams, navigation locks). Construction of complex foundation structures. Formwork. Scaffolding. Elementary construction machinery. Concrete production, transport and placement. Steel bending workshops. Welding technology. Contractor's parties. Field visits to several construction sites in regard to applied construction organization and technology.		
Recommended reading	Lecture notes, movies, photographs and other education materials prepared by lecturers.		
Supplementary reading	Organization and technology projects of some constructed structures.		
Teaching methods	Lectures using blackboard, foils, computers and filmed educational material. Practice – elaboration of construction site organization plan, elaboration of main technological solutions for construction of a real structure.		
Assessment methods	Oral presentation of written assignment.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer.		

Course title	CONSTRUCTIONS OF HISTORICAL STRUCTURES		
Course code	DARH03		
Type of course	Lecture, seminar, exercise course.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Jaroslav Vego, PhD, Full Professor; Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	At the end of the course unit the learner is expected to be able to assume a competent attitude towards monuments of cultural heritage that surround him (Diocletian Palace, historical core of towns of Trogir, Šibenik, Dubrovnik, Hvar, Korčula etc.); properly select types of materials and design schemes for revitalization of historical structures.		
Prerequisites	Geotechnical engineering, Engineering statics II, Building materials I, Hydromechanics.		
Course contents	Review of the most significant historical structures (monuments, religious structures, fortresses, stone bridges and aqueducts and other historical stone structures). Introduction of main characteristics of materials used, original building techniques and technologies. Techniques of reconstruction and remedial works on structures of cultural heritage, particularly in view of adequate selection of materials (rock, brick, lime, sand, wood, metal etc.). Defining of original static system and application of modern materials (calx romana, carbon grain, stainless steel, compregnated wood, mixtures based on epoxide resin) and technologies of ''patching'', grouting, ''stitching'' and prestressing. Partially and fully reinforced stone structures (Old Bridge in Mostar). Constructive measures for taking over loads caused by earthquake.		
Recommended reading	(1) Crnković B., Šarić Lj.; Construction by natural stone, IGH, Zagreb, 2003.; (2) Gojković M.; Stone structures, ICS, Beograd, 1976.; (3) Gojković M.; Old stone bridges, Naučna knjiga, Beograd, 1989.		
Supplementary reading	Pande G. N and Middleton J.; Computer Method in Structural Masonry 1-2-3, University of Wales Swansea, Wales U. K., 1995.		
Teaching methods	Use of blackboard, overhead transparencies and computers + projector in teaching. Lectures on locality of significant historical structures (parts of Diocletian Palace, Diocletian aqueduct, structures in the historical core of Trogir, Sv. Jakov cathedral in Šibenik, bridges, fortresses and palaces in Dubrovnik, locality of Old Bridge in Mostar). Exercise course (analysis of condition of existing structures and remedial and conversion design).		
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	HOUSING INSTALLATIONS		
Course code	DARH04		
Type of course	Lecture, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,5 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.0 ECTS		
Name of lecturer	Jaroslav Vego, PhD, Full Professor		
Learning outcomes and competences	After the completion of the course the student is expected to use final design/projects for specific installations during the design and construction phases.		
Prerequisites	Elements of buildings.		
Course contents	Engineering aspects of installations. Engineering prerequisites for building-in the sewer system installations; installations for cold and hot water, fire-protection systems for raising the pressure in the sewer system installations, sanitary issues. Engineering prerequisites for heating installations and boiler-room; pipeline implementation, location of heating equipment, location solutions for the boiler-room, fuel storehouses, chimney, remote heating. Engineering conditions for the use of renewable energy sources. Engineering conditions for the installation of high-voltage and low-voltage electric current, thunder protection installations. Bringing into accordance all types of installations in engineering design and construction.		
Recommended reading	(1) B Tušar: Sewer system in buildings, Civil Engineering Faculty, Zagreb, 2001.; (2) M. Šivak: Central heating, ventilation, air-conditioning system, Nakladnička djelatnost M. Šivak, Zagreb, 1998.		
Supplementary reading	(1) J. Grabovac, M. Dragović: Application of low-temperature solar thermal equipment in housing, "Đ. Đaković", Sarajevo, 1988.		
Teaching methods	Lectures with the use of blackboard and projector. Exercise course: solving tasks in class; solution of an independent project task. Introducing students to the implementation of building installations at the construction site.		
Assessment methods	Exam: oral.		
Language of instruction	Croatian.		
Quality assurance methods	The quality assurance will be performed at three levels: 1. University level, 2. Faculty level by Quality Assurance Committee and 3. Lecturer's level.		

Course title	LINEAR ALGEBRA		
Course code	DPRI02		
Type of course	Lecture, research seminar.		
Level of course	Advanced level course		
Year of study	II	Semester	III
ECTS (Number of credits allocated)	6,0 Number of allocated credits is based on lecturer's estimation. Teaching (45 hrs lecture + 30 hrs exercise) = 1.9 ECTS; Individual work and learning = 4.1 ECTS		
Name of lecturer	Branko Červar, PhD, Assistant Professor		
Learning outcomes and competences	Knowledge of matrix calculus, eigenvalues and eigenvectors of matrices, numerical linear algebra, applications to differential equations and mechanics.		
Prerequisites	Mathematics I and II.		
Course contents	Matrix calculus, scalar and tensor product of vectors, vector and matrix norm, derivation and integral of matrix function. Vector space of matrices, vector basis, orthonormal basis, orthogonal matrices, diagonalisation of symmetric matrix. Systems of linear equations, over-determined systems of linear equations, linear problem of quadrate error, Gauss transformation. Solving linear systems by iteration methods, convergence of sequence and series of matrices, geometric series of matrices, Neumann series, convergence of iterating procedures and error bound. Nonlinear equations and systems. Eigenvalues and eigenvectors of matrix, forms, minimal polynomial, characteristic polynomial, Hamilton Cayley theorem. Real symmetric matrices and similarity transformations, Gram-Schmidt orthogonalisation, transformation of principle axes of quadratic form, Jordan form. Eigenvalues and eigenvectors of positive definite symmetric matrix. General eigenvalue problem. Numerical procedures for eigenvalues of matrix. Transformation methods: Jacobi method, Householder tridiagonalisation, Rutishase LR factorisation, Francis QR factorisation. Iterative method: vector iteration, Rayleigh-Ritz algorithm, inverse iteration, Lanczos method, von Mises potential method. Systems of linear differential equations, small amplitude oscillations, linear systems with constant coefficients, exponential function of matrix, high order linear differential equation.		
Recommended reading	(1) K. Horvatić, Linearna algebra, Goldeng marketing – Tehnička knjiga, Zagreb, 2004.; (2) S. Kurepa, Uvod u linearnu algebru, Školska knjiga, Zagreb, 1995.		
Supplementary reading	(1) J. W. Demmel, Aplied Numerical Linear Algebra, SIAM, 1997.; (2) S. Kurepa, Konačno dimenzionalni vektorski prostori, Liber, 1975.		
Teaching methods	Lectures, seminar assignment, mid-term exams, consultations.		
Assessment methods	Oral examination, oral presentation, 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	MANAGEMENT IN CIVIL ENGINEERING		
Course code	DORG02		
Type of course	Lecture, research seminar, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 as well as selected contemporary methods of management at all levels. The learner is also expected to be able to manage state companies, and run big and small construction firms.		
Prerequisites	Completed undergraduate studies.		
Course contents	Basic concept of management and its role in construction company management. Classification of construction companies according to business types. Company organization. Planning (operative, tactical, strategic). Statistical methods in management. Business risk management. Positioning of construction company in business environment. Operational management in construction production. Business forecasting. Financial management. Project management within company business. Human resources management. Market research and marketing. Marketing management in construction industry. Management information systems (MIS).		
Recommended reading	(1) B. Medanić.: Management u građevinarstvu, Sveučilište u Osijeku, 1997; (2) Z. Ribarović: Uvod u studiju podobnosti, Zebra plus d.o.o. Split, 2005.; (3) S. Knezić: Autorizirani materijali s predavanja		
Supplementary reading	(1) Lj. Vidučić: Financijski menadžment, Ekonomski fakultet Split, RRiF-plus, Zagreb 2004.; (2) F. Bahtijarević-Šiber: Management ljudskih potencijala, Golden marketing, Zagreb 1999.; (3) P. Kotler: Upravljanje marketingom, Mate, Zagreb 2001.; (4) M. Buble: Management, Ekonomski fakultet Split, Split 2000.; (5) M. Harrison: Principles of Operations Management, Pitman Publishing, London 1996.		
Teaching methods	Frontal lectures. Exercises in groups. Preparing written assignment about a selected subject.		
Assessment methods	Oral presentation of the written assignment.		
Language of instruction	Croatian, 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 OF DEFORMABLE BODY		
Course code	DMEH02		
Type of course	Lecture, seminar, 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 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	At the end of the course unit the learner is expected to be able to perform a critical analysis of global fields of stress and strain for various engineering structures; use various linear and nonlinear models of materials; explain local effects at places of concentrated actions; describe conditions around openings and curved parts of model area boundary.		
Prerequisites	Mechanics II, Strength of materials II, Engineering statics II.		
Course contents	Defining the general purpose of mechanics of deformable body. Elastical and linear elastical deformable body and elaboration of elasticity theory submodels. Definition of state of equilibrium by principles of virtual work and minimum potential energy. Torsion of prismatic bars – problem equation and boundary conditions by stress and strain methods, strict solution, variational formulation, approximate solutions, numerical solutions, practical results. Plane problems. Semiplane. Stress and strain conditions under foundation. Lame's solution of circular ring. Application of Lame's solution for tunnels and underground structures. Practical solution of plane stress and plane strain, known solutions. Introduction to theory of plasticity. Principal models of nonlinear behaviour of material. Illustration on examples of axial symmetry.		
Recommended reading	(1) Kostrenčić Z.: Theory of Elasticity, Školska knjiga, Zagreb 1982.; (2) Boresi A. P. and Lynn P. P.: Elasticity in Engineering Mechanics, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1974.		
Supplementary reading	(1) Gurtin M. E.: An Introduction to Continuum Mechanics, Academic Press, New York, 1981.; (2) Hill R.: The Mathematical Theory of Plasticity, Oxford Universitiy Press, New York, 1985.; (3) D. R. J. Owen and E. Hinton, Finite Elements in Plasticity: Theory and Practice, Pineridge Press, Swansea, U.K., 1980.		
Teaching methods	Use of blackboard, projector and computer in teaching and exercises. During exercises students prepare a number of seminar works.		
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	MECHANICS OF MATERIALS		
Course code	DGEO04		
Type of course	Lecture, exercise course, laboratory work.		
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 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; Mladen Glibić, PhD, Full Professor		
Learning outcomes and competences	The student should obtain basic theoretical knowledge in the field of Mechanics of Materials, Rheology and Fracture Mechanics.		
Prerequisites	Completed undergraduate study.		
Course contents	**Mechanical characteristics of materials.** General considerations. Mechanical characteristics in tension. Mechanical characteristics in compression. Schematization of stress-strain curve of material. Influence of different parameters on the behaviour of solids under loadings. Strength of materials under dynamic load. Impact strength of materials or toughness. Strength of materials under alternating load. Technological material tests. Hardness of a material. Determination of hardness of a material: statical and dynamical procedures. Non-destructive tests. **Basis of the Rheology of Materials**. Introduction. Basic rheological models and basic mathematical equations. Creation of complex rheological models and appropriate mathematical equations **Basis of the Fracture Mechanics**. Introduction. Basic notes and tasks of fracture mechanics. Griffith's and Irwin's criterion for crack instability. Connection between fracture mechanics and strength of materials.		
Recommended reading	(1) V. Šimić: Strength of Materials I – Chapter 9, Školska knjiga, Zagreb, 1992. (in Croatian); 2nd edition, 2001. (in Croatian); (2) J. Brnić: Elastomechanics and plastomechanics, Školska knjiga, Zagreb, 1996. (in Croatian); (3) P. Marović: Lecture Notes in Mechanics of Materials, Faculty of Civil Engineering and Architecture, Split, yearly updated (written materials + CD).		
Supplementary reading			
Teaching methods	Lectures ex-cathedra supplied with overhead projector (overhead transparencies), PC (ppt) and blackboard. Demonstrative laboratory exercises.		
Assessment methods	Oral examination, written examination.		
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	GROUNDWATER FLOW AND TRANSPORT MODELLING		
Course code	DHID08		
Type of course	Lectures, audio exercises, seminars.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	Student is expected to become proficient in basic principles of physical processes defining the flow and transport in groundwater, be able to design monitoring programs and describe heterogeneity of geologic formations-aquifers. In addition, the student is expected to become proficient in using software packages introduced in the course.		
Prerequisites	Hydrology, Hydraulics, Engineering Hydrology.		
Course contents	First part: Hydrogeology and aquifer definition, confined and unconfined conditions, vadose zone, generalization of Darcy's law and equation of groundwater flow, hydraulic conductivity heterogeneity, conductivity and porosity measurements. Second part: Governing flow equation, stationary and nonstationary conditions, mathematical modelling and numerical methods, use of filed data and defining initial and boundary conditions. Introduction to software package MODFLOW and SUTRA. Third part: Introduction to transport processes in the aquifers, advective transport, mass-balance consideration and the Eulerian approach to advective transport, dispersive transport and mass transfer. Introduction in mathematical modelling and numerical/analytical methods of solution. Introduction to software package PTRACK, MODPATH and MT3DMS. Fourth part: Application of the introduced software package in the field case study, uncertainty and sensitivity analysis, risk assessment caused by contaminated groundwater resources.		
Recommended reading	(1) Andričević, R., Groundwater flow and transport modelling, Class notes, University of Nevada System, USA, 1999.; (2) Zheng, C. and G. D., Bennet, Applied Contaminant transport modelling, John, Wiley and Sons, Inc., 2002.		
Supplementary reading	(1) Bear, J. and A. Verrujit, Modelling groundwater flow and pollution, D. Reidel, Dordrecht, Netherlands, 414 p. 1987.; (2) Andričević, R., J. Daniels, and R. Jacobson, Radionuclide migration using travel time transport approach and its application in risk analysis, Journal of Hydrology, 163, 125-145, 1994.		
Teaching methods	Lectures, audio exercises including seminar paper.		
Assessment methods	Homework (25%), Seminar paper (25%), Final exam (50%).		
Language of instruction	Croatian with a capability to read some auxiliary material 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	NON-LINEAR ENGINEERING STATICS		
Course code	DMEH03		
Type of course	Lecture, exercise course, practical.		
Level of course	Advanced level course		
Year of study	I	**Semester**	II
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 Kožul, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course the learner is expected to be able to understand material non linearity, calculation methods of non linear structural and practical use of non linear models.		
Prerequisites	Engineering statics II.		
Course contents	Material non-linearity. Types of simple numerical models, uniaxial and multiaxial. Non linear material line structural with small displacements theory. Incremental – iterative procedure. Concentrated plasticity. Continuous plastic. Space frames with material and geometrical non-linearity. Error estimate of incremental – iterative procedure. Line structural with large displacements theory and small displacements theory. Usage of tangential and quasi-tangential method. Introduction of material and geometrical non-linearity. Model of torsion. Large displacements and small displacements in numerical assignment of form finding for cable structures. A basic numerical material non-linear model for boulders, plates and shells Usage small and large displacements models for small deformations. Incremental – iterative procedures. Engineering static for complex space structural of rods, plates, shells and boulders. Numerical model of material and geometric non-linearity with small and large displacements theory. Plates and bearers on non-linear supports. Non linear release of point and line supports. Simulation of time dependent deformation with static models. Static adaptation of moments. Static interaction of non-linear complex construction – non-linear soil.		
Recommended reading	(1) Mihanović A., Stabilnost konstrukcija, Društvo hrvatskih građevinskih konstruktora, Zagreb, 1993.; (2) Owen D. R. J. and Hinton E., Finite elements in plasticity, Pineridge Press, Swansea, 1980.		
Supplementary reading	(1) Bažant Z. P. and Cedolin L., STABILITY OF STRUCTURES: Elastic, Inelastic, Fracture and Damage Theories, Dover Publications, Inc., New York, 2003.		
Teaching methods	Lecture, exercise courses, practical work and work on computers.		
Assessment methods	Written examination and oral 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	NUMERICAL MODELLING OF CONCRETE STRUCTURES		
Course code	DMEH04		
Type of course	Lectures, seminars, practice.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	The student shall get acquainted with the complex problems of non-linear analyses of reinforced concrete structures.		
Prerequisites	Completed I year of graduate studies.		
Course contents	Types and properties of concrete and reinforcement. Concrete creep and shrinkage. Concrete strength and deformation under different loads (short-term, long-term, static, dynamic, uniaxial, multi-axial, cyclic). Steel behaviour. Concrete -reinforcement relationship. Tensile and shear rigidity of cracked concrete. Models of concrete behaviour under different loads (linear and non-linear elastic, elastoplastic, plastic with strengthening, cracked, rheologic). Concrete crack modelling. Cracked concrete tensile and shear rigidity modelling. Reinforcement sliding modelling. Some problems and dilemmas in practical analyses of reinforced concrete structures: spatial discretisation, time discretisation, material and geometry models, numerical integration, structural and radiation damping, load increment, time increment, finite element mesh size, convergence criteria, non-linear problem solution method, soil-structure interaction. Reliability of analyses results and congruence with the regulations in force. Some structural analyses details: member structures, plane (2D) structures, slabs and shells, membranes, spatial (3D) structures, complex structures. Modelling of structures in practice: buildings, bridges, dams, silos, masonry structures. Interaction structure-soil-liquid.		
Recommended reading	(1) Radnić J., Harapin A.: Numeričko modeliranje betonskih konstrukcija, napisi za predavanja (Numerical modelling of concrete structures -lectures). (2) Software: ASPALATHOS, DKP, SALJ, DALJ, DAK, DAFIK, SOFISTIK and other available software.		
Supplementary reading	Hofstetter G. and. Mang H.A: Computational Mechanics of Reinforced Structures, Braunschweig/Wiesbaden, 1995.		
Teaching methods	Lectures using the blackboard, projector and computer. Practice using the blackboard, projector and computer. During practice students will carry out non-linear analyses of a complex concrete structure using available software with a help of the assistant lecturer.		
Assessment methods	Oral exam, oral presentation of written assignment.		
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	SPECIFIC TIMBER STRUCTURES		
Course code	DKON11		
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 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	After completion of the course the student will have acquired advanced theoretical and practical knowledge in the field of timber structures and dimensioning of complex timber structures.		
Prerequisites	Introduction to Timber Structures.		
Course contents	HRN, DIN, Eurocode 5. Organization of the production of timber structures. Materials, technologies and quality control. Implementation. Adaptability. Composite structures: timber to other materials. Prestressing, Industrialized prefabricated girders. Plates. Structural glued laminated timber. Details and computations, specific problems. Spatial concept and spatial systems. Special structures. Design and construction of timber bridges: types, details, computation of the structure and details. Wall, floor and roof panels. Details. Industrial construction of buildings. Reconstruction of damaged structures as part of cultural heritage.		
Recommended reading	(1) Eurocode 5 (prijedlog hrvatske verzije EC5 standarda za drvene konstrukcije); (2) S. Takač: Novi concept sigurnosti drvenih konstrukcija, Građevinski fakultet, Osjek, 1997.; (3) Z. Žagar: Drvene konstrukcije I-IV, skripta, Građevinski fakultet, Zagreb, 1994.; (4) Z. Žagar: Proračun građevinskih konstrukcija računalom, Školska knjiga, Zagreb, 1993.; (5) M. Gojković , D. Stojić: Drvene konstrukcije, Grosknjiga Beograd, 1996.; (6) M. Gojković i ostali: Drvene konstrukcije, Čigoja Beograd, 2001.; (7) M. Gojković, B. Stevanović: Drveni mostovi, Naučna knjiga Beograd, 1985.		
Supplementary reading	(1) Gotz-Hoor-Mohler-Natterer. Holzbauatlas, CMA, Munchen, 1980.; (2) Z. Žagar: COSMOS/M FEA program, upute, skripta, Građevinski fakultet, Zagreb, 1994. (3) Halasz R., SCHeer C.: Holzbau-Tachenbuch, IES Verlag, Berlin, 1986.		
Teaching methods	The course includes lectures by a guest lecturer. Lectures with the use of blackboard, overhead transparencies and ppt. Exercises: solutions of tasks and development of a program.		
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	STRUCTURE RELIABILITY		
Course code	DKON12		
Type of course	Lectures, 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 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	After getting insights into the application of the theory of structure reliability the student will be able to apply suitable methods to structural computations in accordance with suggestions presented in specific norms and regulations.		
Prerequisites	Completed undergraduate studies.		
Course contents	The importance of the course and the concept „structure reliability". Deterministic and probabilistic approaches. Determination of reliability/safety by probability concepts, regularities in the distribution of random quantities, resistance and action. The probabilitic procedure in determination of structure reliability. Methods used in the probability procedure of the I, II, III and IV level. The presentation of the Hasofer – Lind procedure/method, Determination of the reliability index β Calibration of existing structures. Reliability models for supporting structures- FORM and SORM methods. Application of reliability models. Reliability of supporting structures from the standpoints of exploitation and damage. Examples illustrating the computation of the reliability index for some supporting structures. In the course of the exercises students independently solve the tasks related to the topics presented during the lectures.		
Recommended reading	Milčić V., Peroš B.: Uvod u teoriju sigurnosti nosivih konstrukcija, Građevinski fakultet Split, 2003.		
Supplementary reading	(1) Schueler, Shinozuka: Structural Safety and Reliability, Proc. Cossar, Vol 1,2,3, Innsbruck, 1993.; (2) Kiureghain L.:Structural component Reliability and Finite element, Reliability Methods, Lecture Note for "Structural Reliability - Methods and Applications", University of California at Brekeley, 1989.		
Teaching methods	Lectures with the use of blackboard, overhead transparencies and LCD projector. Sections of the lectures are based on the European Steel Design Education Programme (ESDEP).		
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	APPLIED STOCHASTIC METHODS		
Course code	DPRI03		
Type of course	Lectures, audio exercises.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	The student is expected to become proficient in basic stochastic approach from monitoring to modelling physical processes, to be able to quantify uncertainty coming from different sources, perform uncertainty propagation in modelling exercises and get acquainted with a stochastic approach required by different EU regulations.		
Prerequisites	Engineering Hydrology, Hydraulics, Applied mathematics.		
Course contents	First part: Introduction to stochastic processes, applications in the engineering problems, expectation, moments, Bayes theorem, conditional probability and conditional moments Second part: Principles of stochastic and deterministic modelling, stochastic simulation, parametric uncertainty and intrinsic uncertainty. Uncertainty propagation in modelling, small perturbation method, Monte Carlo method and spectral method. Third part: Temporal stochastic processes, time series of one and many variables, uncertainty in estimation, statistical stationarity and non-stationarity. Examples in hydrology, hydro-power management, economy and meteorology. Fourth part: Stochastic processes in the space, random fields. Introduction to geostatistics, random field generation. Examples in modelling of groundwater, hydrogeology and atmospheric processes.		
Recommended reading	(1) Andričević, R., Stochastic processes, Class notes, University of Nevada, USA, 1997.; (2) Gelhar, L., Stochastic subsurface hydrology, Academic press, 1993.; (3) Andričević, R., H., Gotovac, Ljubenkov, I., Geostatistika umijeće prostorne analize, Barbat press (in review), 2005.		
Supplementary reading	Kitanidis, P. K. and R. Andričević, Accuracy of the first-order approximation to the stochastic optimal control of reservoirs, in Dynamic Programming for Optimal Water Resources Systems Analysis, edited by A. O. Esogbue, pp. 545, Prentice-Hall, 1989.		
Teaching methods	Lecturing is done through: lectures and audio exercises. Besides homework, the student is required to turn a seminar paper which includes design of reservoir sizing and energy potential assessment.		
Assessment methods	Homework (25%), Mid-term exam (25%), Final exam (50%).		
Language of instruction	Croatian language with capability to read some supplementary material on English.		
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	APPLIED GEOLOGY		
Course code	DGEO05		
Type of course	Lecture, seminar with project work, fieldwork.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 ECTS		
Name of lecturer	Amira Galić, PhD, Lecturer		
Learning outcomes and competences	- fundamental knowledge of terrain problems - understanding and identification of geological structures - understanding of interaction between building and terrain - competence for understanding types of mass movements and differences in materials and style of motion, - competence for understanding groundwater and water resources - understanding of problems in excavations		
Prerequisites	Fundamentals of geology and petrography.		
Course contents	Earth processes such as plate tectonics through a practical approach to study of minerals, rocks, fossils and geological structures. Engineering geology: tunnel geology, dam geology, geology related to road construction, landslides. Rock mechanics: rock mass classification. Hydrogeology: groundwater in Karst. Disaster geology: earthquake disaster and subsurface geology, disaster prevention city planning. Environmental geology: waste disposal. Geophysical prospecting. Geohazards and georesources. Terrain: Lecture and practical work. Training in geological fieldwork is undertaken in Dalmatia.		
Recommended reading	(1) S. Šestanović: Osnove inženjerske geologije - primjena u graditeljstvu, Geing, 159 pp, Split, 1993.; (2) D. Mayer: Kvaliteta i zaštita podzemnih voda, Hrvatsko društvo za zaštitu voda i mora, 146 pp, Zagreb, 1993.; (3) B. Crnković i Lj. Šarić: Građenje prirodnim kamenom, RNG Fakultet Sveučilišta u Zagrebu, 184 pp, Zagreb, 1992.		
Supplementary reading	(1) A.C. McLean and C.D. Gribble (1979): Geology for Civil Engineers, George Allen and Unwin, 310 pp, Boston-Sydney; (2) W.R. Dachrot (1992): Baugeologie, 2, Auflage, Springer-Lehrbuch, 531 pp, Berlin; (3) Goodman, R. (1993): Engineering Geology. J. Wiley & Sons Inc, 412 pp, New York		
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); geomorphological phenomena in Karst; Flysch as a specific sediment in Dalmatia. Tunnel, dam, road construction, groundwater in Karst.		
Assessment methods	Oral examination, written examination, report on fieldwork.		
Language of instruction	Croatian, possible 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	COMPUTER AIDED DESIGN OF STRUCTURES		
Course code	DINF01		
Type of course	Lectures, exercise courses.		
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 lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	The student should obtain knowledge of theoretical fundamentals and practical application of computer-aided drafting and design in structural engineering.		
Prerequisites	Informatics.		
Course contents	Architecture of CAD. Definitions and field of applications. Computer geometric modelling. Coordinate systems and transformations. Computer aided drafting: Basis of 2D graphics primitives and transformations. 3D geometric modelling: wire frame model, surface model, solid model. Parametric solid modelling. Feature based design. Shading, photorealistic model, animation (software applications). Automated drafting based on output results. Computer aided engineering: Basis in application of numerical methods in structural design and computations. Preparing of computations models of trusses, frames, plates, and complex structures. Basis of AUTO-LISP programming language. Creating of DXF-files.		
Recommended reading	(1) Trogrlić B., Harapin A., Multimedia Lectures - Basis of CAD with application in drafting and design of structures; (2) Jović V., INTRODUCTION TO ENGINEERING NUMERICAL MODELLING, Aquarius Engineering, Split, 1993. (in Croatian); (3) Mihanović A., Marović P. and Dvornik J., NONLINEAR COMPUTATIONS OF REINFORCED CONCRETE STRUCTURES, Society of Croatian Structural Engineering, Zagreb, 1993. (in Croatian).		
Supplementary reading	Manuals of computer programs: NEMETSCHEK (in English), FEAT (in English), Asphalathos (in Croatian), EMRC-NISA (in English), PRONEL (in Croatian).		
Teaching methods	Multimedia lectures. Individual student's work on computer drafting and computing in structural design.		
Assessment methods	Continuous 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	TRANSPORTATION FACILITIES AND ENVIRONMENT		
Course code	DPRO05		
Type of course	Lecture, exercise course, project work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	3,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture) = 0.7 ECTS; Individual work and learning = 2.3 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 the basic environment elements and the relationship between the transportation facilities and the environment as well as to plan, design, build and maintain of transportation facilities with regard to the environment.		
Prerequisites	Highways, Railway, Airports.		
Course contents	The basic parts of environment. Impact of transportation facilities on the environment. Emission of the substances and sound from the transportation facilities during their operation. Determination of the harmful environmental impacts of the transportation facilities during the construction and during the operation as well as of possible environmental accidents and the risks of their occurrence. Principles of harmful impact mitigation. Sustainable transportation.		
Recommended reading	(1) Golubić, J.: Promet i okoliš. Fakultet prometnih znanosti, Zagreb, 1999.; (2) Nacionalna strategija zaštite okoliša; Nacionalni plan djelovanja u zaštiti okoliša, Ministarstvo zaštite okoliša i prostornog uređenja RH, Zagreb, 2002.		
Supplementary reading			
Teaching methods	Lecture with the help of modern teaching methods. Preparing written assignment about selected subjects. Practical contains the individual task estimation and field work.		
Assessment methods	Oral examination, oral presentation of written assignment, 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	COMPUTER GRAPHICS		
Course code	DINF02		
Type of course	Lecture, practical work, project work.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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 + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 ECTS		
Name of lecturer	Lecturer from University of Mostar.		
Learning outcomes and competences	At the end of the course the student is expected to understand the basic theoretical background to computer graphics and to perform basic tasks related to computer graphics using the computer. Here, the term "computer graphics" is used in its wider meaning. Through practical work and exercises, the student will learn to work with some common graphical software.		
Prerequisites	Informatics.		
Course contents	The geometrical point of view of computer graphics. The computer graphics in 2'space (plane). The presentation of planar contents, approximation of curves. The visualization of some geometrical objects and surfaces (the projections, visibility). The space's curves, surfaces. The principles of development line's surfaces, application in civil engineering. 3D-graphics, static and dynamic presentation. The elements of animation. Raster graphics: introduction. Data formats. Data acquisition (scanning, digital photography). Editing raster files. Raster/vector conversions, OCR. Advanced techniques in vector graphics. Advanced techniques in computer presentations. Geographical information systems: Spatial data, data acquisition, spatial operations, displaying the spatial data. Basic web design. Visualization of modelling results.		
Recommended reading	(1) J. D. Foley; A. van Dam; S. K. Feiner; J. F. Hughes; R. L. Philips: Introduction to Computer Graphics, Addison-Wesley; (2) S. Turk: Računarska grafika, Osnovi teorije i primjene, Školska knjiga Zagreb.		
Supplementary reading	Numerous available literature.		
Teaching methods	Lectures, exercises (practical work at the computer).		
Assessment methods	Oral examination, test (practical work at 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	NUMERICAL PROGRAMING		
Course code	DINF03		
Type of course	Lecture, exercise course, practical, seminar.		
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 lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.5 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 code simple numerical algorithms and understand programs written in F77/F95.		
Prerequisites	Informatics, Applied mathematics.		
Course contents	Types of data, floating point arithmetic's, control statements, dimensions, procedures, pointers and dynamical structures, Input/Output, compile, link, module, libraries, implementations of numerical algorithms, coding and testing, differences between F77 and F95.		
Recommended reading	(1) Fortran 90/95 Explained by Michael Metcalf, John Ker Reid; (2) Numerical Recipes in Fortran by William H. Press, et al.		
Supplementary reading	*Vinko Jović:* Uvod u inženjersko numeričko modeliranje.		
Teaching methods	Frontal lectures. Exercises in groups. Solving individual tasks by using PC and available software.		
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	COMPLEX FOUNDATIONS		
Course code	DGEO06		
Type of course	Lecture, practical, fieldwork.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	The learner is expected to acquire knowledge about design and construction of complex foundations and retaining structures.		
Prerequisites	Soil mechanics and foundations, Geotechnical engineering.		
Course contents	Soil as the basis of constructions. Physical and mechanical properties, deformation characteristics of soil. Soil models, application of soil model in numerical models. Shallow foundations. Types and design of flexible shallow foundations (analytical and numerical solutions). Deep foundations. Transfer of horizontal forces in soil. Design of horizontally loaded pile (analytical solutions, solutions with numerical models). Foundations loaded with tensile forces. Shallow foundations loaded with tensile force, transfer of tensile loads in deep layer of soil, piles loaded with tensile force, bolts and cabelbolts. Retaining structures built in place or driven into soil. Correlation between strain and stress, solutions with numerical models. Steel sheet piles, diaphragm walls, jet grouting walls, walls mixed in place.		
Recommended reading	(1) Roje-Bonacci, T, Miščević, P. (1997.) Temeljenje. Građevinski fakultet Sveučilišta u Splitu, građevinski fakultete Sveučilišta J.J. Strossmaqyer u Osijeku, Split. (2) Roje-Bonacci, T. Mehanika tla (2003.), Građevinski fakultet Sveučilišta u Splitu, Split. (3) Roje-Bonacci, T. (u pripremi 2005.) Potporne građevine i građevne jame, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu.		
Supplementary reading	(1) Ng, C., Simons, N., Menzies, B., (2004.) Soil-structure Engineering of Deep Foundatins, Excavations and Tunnels, a short course in. Thomas Telford, Cernica, John N. (1995.), Geotechnical engineering: foundation design. (2) John Wiley & Sons, Inc. New York. (3) Nonveiller, E. (1979.) Mehanika tla i temeljenje građevina, Školska knjiga, Zagreb. (4) Verić, F. (ur.) (1981.) Temeljenje, autorizirana predavanja za seminar. Društvo građevinskih inženjera i tehničara, Zagreb. (5) Poulos, H.G., Davis, E.H., (1980.) Pile foundation analysis and design, John Wiley & sons, New York. (6) Zeevaert, L. 81973.) Foundation engineering for difficult subsoil conditions. Van Nostrand Reinhold Company, New York.		
Teaching methods	Teaching with use of the grafoscope and a video projector with PC, practical (students are suppose to make individual examples during practical), fieldwork.		
Assessment methods	Oral presentations of individual examples, contious 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	COMPOSITE STRUCTURES		
Course code	DKON13		
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 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	After completion of the course the student will be able to deal with the main problems in the design and computation of composite structures, such as steel concrete, concrete-concrete and wood-concrete.		
Prerequisites	Basics of concrete structures, Introduction to metal structures.		
Course contents	Fundamentals: Construction principles. Types of composite structures. Properties of materials and equipment for shear connectors. Main problems in composite structures (transfer of shear along the shear surface, ultimate limit state, serviceability limit state, computational methods, duration and maintenance. Dimensioning the cross-section of an arbitrary shape to bending for exploitability and limit loads (including the formation process in phases and the reological effects of concrete). Prestressed steel-concrete structures: The solutions of the element cross-section. Prestressing methods. Levels of prestressing. Influence of the construction upon the internal forces and the prestressing level. Computations of the elements for shear and displacement. Computation of prestressed elements. Problems of prestressed concrete in tension. Prestressed beams. Classification of cross-sections-classes 1,2,3,4. Prestressed slabs. Prestressed columns. Shear connectors. Prestressing the slab in tension. Examples of prestessed structures in high-rise and low-rise buildings. Regulations. Composite concrete-concrete structures. Examples of composite structures in high-rise structures and bridges (slabs, piles, columns). Construction and its influence upon the internal forces. Influence of reological properties of concrete. Solutions for prestressing concrete of different age. Computation of the composite cross-section to bending and shear. Computation of prestressing elements. Limit bearing capacity of the prestressed cross-section. Determination of regulations. Composite wood-concrete structures. Preliminary solutions of the cross-section and elements. Composite equipment. Composite levels/degrees. Influence of construction upon the internal forces and the prestressing level. Computation of the elements for bending and shear. Computation of the composite equipment. Problems related to prestressed concrete in tension. Examples of composite structures in high-rise structures and bridges. Composite wood-wood structures. Identification of regulations. Fundamental principles of numerical modelling of linear presstressed structure for long-term and short-term loading. Visit to the composite structures under construction and structures in use.		
Recommended reading	(1) Horvatić D.: Spregnute konstrukcije čelik-beton, Masmedia. Zagreb 2003.; (2) Pržulj M.: Spregnute konstrukcije, Građevinska knjiga Beograd, 1989.; (3) Gojković i drugi: Drvene konstrukcije, Beograd 2001.; (4) Radnić J., Peroš B., Harapin A.: Spregnute konstrukcije, napisi za predavanja; (5) EUROCODE 1, 2, 3, 4.		
Supplementary reading	(1) Knowles, P.R.: Composite Steel and Concrete Construction, Butterworks, London, 1973.; (2) Johnson, R. P. and Buckly, R. P.: Composite structures of Steel and Concrete, Volume 2, Bridges, Second Edition, 1986.		
Teaching methods	Lectures with the use of blackboard, projector and computers. Exercises with the use of blackboard, projector and computers. The students, in the course of the exercises, independently develop projects of a composite beam with a large span (systems steel-concrete, concrete-concrete and wood-concrete using the necessary computations and details after a similar project developed by the assistant.		
Assessment methods	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	DECISION SYSTEMS IN CIVIL ENGINEERING		
Course code	DORG03		
Type of course	Lecture, research seminar, exercise course.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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 (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 ECTS		
Name of lecturer	Snježana Knezić, 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 of system analysis, decision theory and information technology in decision processes and management, particularly in civil engineering.		
Prerequisites	Completed undergraduate studies.		
Course contents	Basics of system theory. System approach. Decision theory. Decision support systems paradigm. Types of problems. Decision support models. Multicriteria decision making. Examples of decision support systems and application in civil engineering. Information systems (IS). Executive information systems. Geographical information systems (GIS) (spatial data, comparison of GIS and IS). Decision software and IS development in civil engineering. Expert systems (ES). Conceptual basics of expert systems. Knowledge base models. Expert systems as a part of decision support systems. Software in civil engineering.		
Recommended reading	(1) N. Mladineo, S. Knezić: Autorizirani materijali s predavanja.; (2) P. Sikavica, B. Bebek, H. Skoko, D. Tipurić: Poslovno odlučivanje, Informator, Zagreb, 1999.		
Supplementary reading	E. Turban: Decision Support and Expert Systems (Management Support Systems), Macmillan Publishing Company New York, 1993.		
Teaching methods	Frontal lectures. Exercises in groups. Preparing written assignment about a selected subject.		
Assessment methods	Oral presentation of the written 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	DURABILITY OF STRUCTURES		
Course code	DKON14		
Type of course	Lectures, seminars, 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 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 basic knowledge to provide sufficient durability of structures and decrease maintenance costs.		
Prerequisites	Completed I year of graduate studies.		
Course contents	General: Analyses of main factors impacting durability of structures (environment conditions; exploitation conditions; design quality; construction quality; quality of materials; properties of load-bearing systems; construction details; maintenance). External impacts on basic construction material (stone, wood; fired clay; mortar; concrete; conventional reinforced concrete and prestressed concrete; steel). Steel corrosion processes. Concrete corrosion processes. Wood deterioration processes. Impact of structure's durability on their exploitation value, safety and maintenance costs. State-of-the-art requirements for durability of structures. Structures in aggressive environment. Inspection, maintenance and monitoring of structures. Experience regarding structure's durability on constructed structures. Particularities of reinforced concrete and masonry structure's durability: Quality of materials. Concreting. Concrete protective layers. Concrete joints. Protection of conventional and prestressed reinforcement. Concrete protection. Concrete surfaces in contact with soil and water. Impact of construction. Examples of well and inadequately solved construction details for buildings and bridges. Experience and regulations. Particularities of steel and composite (steel-concrete) structure's durability: Steel corrosion protection. Steel surfaces in contact with concrete. Examples of well and inadequately solved construction details for buildings and bridges. Analyses of steel structure damages in regard to fatigue of materials. Experience and regulations. Particularities of wooden and composite (wood-concrete) structure's durability: Detrimental impacts of live organisms and moisture. Wood protection. Wooden surfaces in contact with concrete and stone. Examples of well and inadequately solved construction details. Experience and regulations. Field visits to some damaged structures in aggressive environment.		
Recommended reading	(1) Radnić J., Peroš B., Harapin A.: Trajnost konstrukcija, napisi za predavanja; (2) Tomičić I.: Betonske konstrukcije, Školska knjiga Zagreb, 1988.; (3) EUROCODE 2, 3, 4, 7, 8.		
Supplementary reading	(1) Leonhardt F.: Vorlesungen uber Massivbau, Teile 1-6, Springer Verlag; (2) Mathivar J.: The Cantilever Construction of Prestressed Concrete Bridges, J. Wiley & Sons, 1983.; (3) Menn, Ch.: Stahlbeton-brucken, Springer-Verlag, Vien, 1990.		
Teaching methods	Lectures using the blackboard, projector and computer. Practice – examples, solving of individual tasks, field visits with lectures.		
Assessment methods	Oral exam.		
Language of instruction	Croatian.		
Quality assurance methods	Quality assurance and success rate monitoring at three levels: (1) University; (2) Lecture quality control committee at the Faculty; (3) Lecturer.		

Course title	TUNNELS AND UNDERGROUND STRUCTURES		
Course code	DGEO07		
Type of course	Lecture, seminar, exercise course.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 15 hrs exercise) = 1.1 ECTS; Individual work and learning = 2.9 ECTS		
Name of lecturer	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	At the end of the course unit the learner is expected to be able to understand and take part in project documentation preparation phase and in all construction phases of tunnel and underground structures.		
Prerequisites	Geotechnical engineering, Hydromechanics, Engineering statics II, Building materials I.		
Course contents	Brief presentation of development of tunnel and underground structures construction. Tunnel classification. Selection of tunnel alignment. Geological, engineering geological and hydrogeological basis. Technical elements and specific characteristics of railway tunnels, road tunnels, underground railways, hydrotechnical tunnels and special purpose tunnels. Drainage, discharge and hydro insulation of tunnel. Ventilation in tunnels. Tunnel lighting. Tunnel portal cuts. Classical methods of tunnel construction. Modern methods of tunnel design and construction. Upland pressure on underground structures. Geostatical calculation and selection of support system. Tunnel lining for roadway and hydrotechnical tunnels. Control measurement during construction and exploitation of tunnel. Inspection, repair works, reconstruction and maintenance of tunnel. Technical documentation for tunnel construction.		
Recommended reading	(1) P. Stojić: Hydrotechnical Structures, knjiga II, 237-369, Građevinski fakultet Sveučilišta u Splitu, 1998.; (2) I. Banjad: Tunnels, FGZ, Zagreb 1982.; (3) P. Kožar: Tunnels, Rijeka 1981.; P. Kožar: Underground Structures, Rijeka, 1986.; (4) B. Gotovac, V. Kozulić: Manual for use of programme package "SIGMA", Split 1995. godine.		
Supplementary reading	T. M. Megaw and J.V. Barlett: Tunnels, Volume 1 & Volume 2, Ellis Horwood Ltd. West Sussex, England, 1981.		
Teaching methods	Lectures and exercise course using various teaching aids (overhead projector, technical documentary films, computer + projector, construction site tour). Individual performance of tasks includes: preparation of predicted geotechnical longitudinal section with the help of all types of investigation works, construction of clearance and clear span of tunnel, determining pressure and dimensioning of the support system (using "SIGMA" computer programme for monitoring stress conditions throughout construction phases), determining tunnel construction methods with graphic display of work phases and elaboration of standard profile.		
Assessment methods	Oral examination, written examination		
Language of instruction	Croatia, 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	PROJECT MANAGEMENT		
Course code	DORG04		
Type of course	Lecture, research seminar, exercise course.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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 (45 hrs lecture + 15 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 contemporary methods of project management: optimisation methods, simulations, resources control. The learner is also expected to be able to implement acquired principles and methods in practice.		
Prerequisites	Completed undergraduate studies.		
Course contents	Project life cycle. Basic concepts of project management (PM). System engineering. Planning (continue from Construction Management). Cost, time and quality control. Material management. Resources management, planning and project management in terms of constrained resources. Optimisation methods in PM. Project risk management. Activity duration modelling. Simulation (Monte Carlo, Cyclone). Most economical project duration. Project cash-flow. Quality management. TQM (Total Quality Management) of project. Constructability. Information systems in PM. Software for PM.		
Recommended reading	(1) R. Lončarić: Organizacija izvedbe graditeljskih projekata, HDGI, 1995.; (2) S. Knezić: Autorizirani materijali s predavanja; (3) H.N. Ahuja, S. P. Dozzi, S. M. Abourizk: Project management – Techniques in Planning and Controlling Construction Projects, John Wiley & Sons, 1994.		
Supplementary reading	(1) D. W. Halpin, L.S. Riggs: Planning and Analysis of Construction Operations, John Wiley & Sons, 1992.; (2) H. Kerzner: Project Management, a System Approach to Planning, Scheduling and Controlling, VNR New York.		
Teaching methods	Frontal lectures. Exercises in groups. Preparing written assignment about selected subjects.		
Assessment methods	Oral presentation of the written 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	WATER POLLUTION CONTROL AND ENVIRONMENTAL ENGINEERING		
Course code	DHID09		
Type of course	Lecture, research seminar, exercise course, laboratory work, guided personal study, fieldwork.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,5 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.0 ECTS		
Name of lecturer	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	Student will be educated to understand basic environmental processes, pollution sources analyses, pressure estimation, problem solving in the field of water pollution control and environmental protection, planning water pollution control.		
Prerequisites	Hydrology.		
Course contents	Water and environment pollution: basic ecology and water chemistry, pollution and its characteristics, sources and types of pollution, transport of pollution in the environment and waters, biochemical processes in environment, impact of pollution, standards. Pollution control: integrated approach, management framework, strategy and principles, recipient and their protection, monitoring. Control measures: minimization of pollution, best available technology, best environmental practice, clean technology, treatment processes and operations, disposal and reuse of effluent. Pollution control planning. EIA.		
Recommended reading	(1) S. Tedeschi: Zaštita vodnih sustava i pročišćavanje otpadnih voda, Građevinski institut, Zagreb, 1996.; (2) J. Margeta: Osnove gospodarenja vodama, Građevinski fakultet Split, 1992.		
Supplementary reading	J. Margeta*:* Guidelines on Sewage Treatment and Disposal for the Mediterranean Region, WHO-GEF, Athens, 2004.		
Teaching methods	Lecturing, examples presentation, individual work, homework and projects, laboratory work and field work.		
Assessment methods	Oral examination, written examination, test, report on fieldwork, 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	WASTEWATER AND SOLID WASTE MANAGEMENT		
Course code	DHID10		
Type of course	Lecture, research seminar, exercise course, laboratory work, guided personal study, fieldwork.		
Level of course	Advance level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,5 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 3.0 ECTS		
Name of lecturer	Zoran Milašinović, PhD, Full Professor		
Learning outcomes and competences	Students will be educated to acquire basic theoretical and practical knowledge related to wastewater and solid waste management in urban areas.		
Prerequisites	Water supply and wastewater management in urban areas.		
Course contents	Wastewater and its characteristics; Levels and types of wastewater treatment and processes; Primary, secondary and tertiary treatment; Sludge treatment and disposal; Hydraulic of treatment plants; Wastewater and sludge reuse and disposal; Operation, maintenance and management of treatment plant. Solid waste and its characteristics; Integrate concept; Collection and transport; Treatment and disposal of waste; Special types of waste; Tools and techniques for wastewater and solid waste management.		
Recommended reading	(1) J. Margeta (prijevod): Uređaj za pročišćavanje komunalnih otpadnih voda, WHO, Athens; (2) S. Tedeschi: Zaštita vodnih sustava i pročišćavanje otpadnih voda, Građevinski institut, Zagreb, 1996.; (3) J. Margeta: Kruti otpad, Građevinski fakultet Split, 1986.		
Supplementary reading	J. Margeta*:* Guidelines on Sewage Treatment and Disposal for the Mediterranean Region, WHO-GEF, Athens, 2004.		
Teaching methods	Lecturing, examples presentation, individual work, homework and projects, laboratory work and field work.		
Assessment methods	Oral examination, written examination, oral presentation, test, report on fieldwork, 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	SOIL IN CONSTRUCTION		
Course code	DGEO08		
Type of course	Lecture, exercise course, guided personal study.		
Level of course	Advanced level course		
Year of study	II	**Semester**	III
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	Maja Prskalo, PhD, Assistant Professor		
Learning outcomes and competences	After the lecture ending, student mast bee capable to project, organise field works, manage and control quality all works with soils or/and in soils.		
Prerequisites	Soil mechanic.		
Course contents	Soil as construction material: Excavation fields, field and laboratory investigations of excavated soil, artificial samples. (4h) Excavation: large excavations, excavations in limited space, blasting, slopes stability, water protection and drainage (8h) Embankments: embankments, soil disposals, slopes stability, planning, seepage protection, rain water protection (8h) Soil improvement: reinforced soil, shallow and deep dynamic and chemical stabilisation of soil, vertical drain, accelerated consolidation. theoretical solutions, calculations, case study (8h) Quality control of embankments (2h) and monitoring of high dams. Data collecting, engineer limit, classical methods, statistical methods (2h) Exercise course (30h) :Lecture (6h), in lab (4h), project work (20h) Project of deep excavation (Slope stability, drenage, 10h) Project of embankment for road or waterway (Slope stability, settlement, waterproff , erosion protection, culvert projects 8h) Soil reinforcement project: affecting of reinforcement on soil structures, design of reinforcements, stability control of construction 8 h)		
Recommended reading	(1) Bosnić, P. (1978.) Zemljani radovi, građevinski fakultet u Sarajevu, Sarajevo. (2) Babić, B. (1995.) Geosintetici u graditeljstvu, Hrvatsko društvo građevinskih inženjera, Zagreb. (3) Babić, B., Prager, A. (1997.) Projektiranje kolničkih konstrukcija. U V. Simović, ur., Građevni godišnjak '97, Hrvatsko društvo građevinskih inženjera, Zagreb. (4) Linarić, Z., Žabek, K. (2004.) Tehnike i tehnologije poboljšanja temeljnog podtla. U V. Simović, ur., Građevni godišnjak '03/04, Hrvatsko društvo građevinskih inženjera, Zagreb. (5) Roje-Bonacci, T. (1994.) Upotreba kontrolnih karata u kontroli kvalitete ugradnje zemljanih materijala. U R. Mavar (ur.) Geotehnika prometnih građevina (gp94), IGH d.d., Zagreb.		
Supplementary reading	(1) Schroderer, W.L. (1975.) Soils in construction, John Wilwy&Sons, Inc. New York. (2) Fang, H.-Y. (1991.) Foundation engineering handbook. Poglavlje 7 Dewatering and groundwater control (autor Powers, P.); poglavlje 8 Compacted fill (autor Hilf, J.W.) i poglavlje 9 Soil stabilization and grouting (autori Winkerton, H.F. i Pamukcu, S.), Chapman&Hall, New York. (3) U.S. Department of the interior, Bureau of raclamation, (1977.) Design of small dams (poglavlje V. Foundations and construction materials, VI. Eatrhfill dams, poglavlje VII. Rokfill dams, United States Government printing office, Washington D.C. (4) U.S. Department of the interior, Bureau of raclamation, (1974.) Earth Manual, A guide to the use of soils as foundations and as construction materials for hydraulic structures, United States Government printing office, Washington D.C.		
Teaching methods	Lecture, exercise course, guided personal study.		
Assessment methods	Oral presentation on project work, continuous assessment, etc.		
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	MASONRY STRUCTURES		
Course code	DKON16		
Type of course	Lectures, practice.		
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 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; Ivo Čolak, PhD, Full Professor		
Learning outcomes and competences	The student shall comprehend basic structural solutions of masonry structures and get acquainted with complex problems of their calculations.		
Prerequisites	Engineering statics II, Strength of materials II.		
Course contents	Masonry elements (concrete, stone, fired clay, other). Mortars. Wall types. Wall deformation properties. Non-reinforced and reinforced walls. Bricklaying. Wall openings and niches. Wall bracing (reinforcement, tie beams and tie columns, diaphragms). Concepts of structural designs of masonry structures. Earthquake impact on masonry structures. Impact of foundation soil deformability (foundation shrinkage). Masonry structures calculations to vertical and horizontal loads (in particular earthquake). Simple and complex calculation models. Role of horizontal floor structures. Role and solutions of lintels. Requirements regarding foundation structure. Strengthening (remediation) of stone masonry structures (in particular historic heritage buildings). Strengthening of flexible floor structures. Rising and extension of masonry structures. Basic rules of masonry structure design and construction. Structural solutions and details of masonry structures. Regulations. Construction. Examples of masonry structure construction and remediation. Field visits to masonry structures under construction.		
Recommended reading	(1) Sorić Z.: Zidane konstrukcije I (Masonry structures I), Sveučilište u Zagrebu, Zagreb 2004.; (2) Radnić J., Trogrlić B.: Zidane konstrukcije, napisi za predavanja (Masonry structures - lectures); EUROCODE-2, 6.		
Supplementary reading			
Teaching methods	Lectures and practice using the blackboard, projector and computer. During practice, students will elaborate a masonry structures design, complete with necessary calculations, based on previously elaborated examples by the assistant lecturer.		
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	AIRPORTS		
Course code	DPRO06		
Type of course	Lecture, exercise course, project work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 the basic elements of an airport as well as to plan, design, build and maintain an airport.		
Prerequisites	Physics, Fundamentals of geology and petrography, Geotechnical engineering.		
Course contents	Air transportation system. Classification, types and definitions of airports. The basic elements and characteristics of airports. Airport and airspace marks (codes). Restriction for the airport surrounding area. Airports accesses. Traffic loading analysis for airport pavements. Types of airplanes, types of airport pavement. Design and estimation of airport pavements. Building, maintenance and reconstruction of airport pavement. Airport visit.		
Recommended reading	(1) S. Pavlin: Aerodromi I. Fakultet prometnih znanosti Sveučilišta u Zagrebu. Zagreb 2002.; (2) Z. Horvat: Aerodromi I, Fakultet građevinskih znanosti Zagreb, 1990.; (3) A. Prager: Aerodromi I - izmjene i dopune, Građevinski fakultet Zagreb, 1991.; (4) R. Horanyeff: Planning and Design of Airports, Berkeley, 1975.		
Supplementary reading			
Teaching methods	Lecture with the help of modern teaching methods. Preparing written assignment about selected subjects. Practical contains the individual task estimation and field work.		
Assessment methods	Oral examination, oral presentation of written assignment, 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	RAILWAY STATION		
Course code	DPRO07		
Type of course	Lecture, exercise course, project work.		
Level of course	Basic level course		
Year of study	II	**Semester**	III
ECTS (Number of credits allocated)	4,0 Number of allocated credits is based on lecturer's estimation. Teaching (30 hrs lecture + 30 hrs exercise) = 1.5 ECTS; Individual work and learning = 2.5 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 the basic elements of a railway station as well as to plan, design, build and maintain a railway station.		
Prerequisites	Fundamentals of geology and petrography, Geodesy, Railway.		
Course contents	The role of the railway station on the railway line. Types of railway stations and other official post at the rail-line. Components of railway station: lay-out, station track level. Substructure of the track and the permanent way at the railway station. Railway station elements: number of tracks, track for wagons and coach. Switch connections: turntable, travelling platform, main siding track. Usable track length. Estimation of a station track capacity. Small and middle railway stations. Design of big railway stations and railway junctions: passenger post, goods post, port station, shunting stations.		
Recommended reading	Marušić, D.: Željeznički kolodvori i čvorišta, interno izdanje, Građevinski fakultet Split, 1995.		
Supplementary reading			
Teaching methods	Lecture with the help of modern teaching methods. Preparing written assignment about selected subjects. Practical contains the individual task estimation and field work.		
Assessment methods	Oral examination, oral presentation of written assignment, 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.		