UNIVERSITY OF JOSIP JURAJ STROSSMAYER IN OSIJEK
FACULTY OF CIVIL ENGINEERING IN OSIJEK

GRADUATE UNIVERSITY STUDIES OF CIVIL ENGINEERING

STUDY PROGRAMME

Osijek, March 2005

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1 INTRODUCTORY PART

1.1 University of Josip Juraj Strossmayer in Osijek, Faculty of Civil Engineering in Osijek

1.1.1 Brief History of the Faculty

University education of civil engineers in the region of East Croatia reaches back into the year 1967, when the department of the Technical College Zagreb was established in Osijek. This department has been active in the region up to 1976 when, as a part of the Educational Centre for Civil Engineers, the Civil Engineering College Osijek was established. The Civil Engineering College was separated from the Civil Engineering School in 1982 and in 1983 it was merged with the Department for Materials and Constructions Osijek into the Faculty of Civil Engineering Sciences of the Osijek University. Since than the Faculty has been active within the Civil Engineering Institute Zagreb and after its transformation during the Homeland War in 1991, the four independent units in Zagreb, Split, Rijeka and Osijek were formed. With the separation of the Business centre Osijek of the Civil Engineering Institute of Croatia, the independent Faculty of Civil Engineering Osijek was founded February 7, 1992.

1.1.2 Past Experiences in the Implementation of University Educational Programmes

Faculty of Civil Engineering Osijek, with its 29 years of experience in educating civil engineers in Slavonia, is today one of the prominent faculties of Josip Juraj Strossmayer University, and of Slavonia, Croatia and Europe. This fact has become evident in the increased interest of students for the studies at the Faculty of Civil Engineering in Osijek and in the tendency of shortening the time of the studying. According to the present situation at the Faculty, the quality of curricula of the undergraduate and postgraduate studies, the success of the scientific and teaching workers, co-workers and other faculty members in all fields of their work, and the successful managing with the revenues, the Faculty has proved its seriousness and high position in university education and science in Croatia. During the last 29 years of the Faculty, over 1100 students have become civil engineers, almost 300 of them have become Bachelors of Science in civil engineering, and 4 candidates have acquired their doctoral degrees in technical sciences (Ph.D.). In 2003 the Faculty established the dislocated study of civil engineering for the Vukovar-Srijem county in Vinkovci. The concept of the new study programmes of the Civil Engineering Faculty of Josip Juraj Strossmayer in Osijek follows the tradition of high-quality university education of civil engineers in our region and coordinates them with the modern European (the Bologna Declaration) and world trends.

1.1.3 Taking Part in the Community Life

The Faculty staff has been active in the community life by taking part in those kinds of engineering work that demand specific knowledge and experience: reviews, environmental protection studies, geodetic and geotechnical measurements, and measurements of the seismic response, structure testing, architectural recording of protected structures and engineering objects and innovations in the production of engineering structural elements. The revenue coming from the scientific-research work in the economy makes more than 20 % of all the Faculty revenues which approximately corresponds the trends at other university institutions in the world.
1.1.4 International Cooperation

Many Faculty members were staying as visiting lecturers and co-workers on the projects of two European (3 members) and two US universities (3 members). Some Faculty members were awarded scholarships at some prominent European (ETH, Vienna, Utrecht, Stuttgart, Hagen) and US universities (Penn State, Berkley, Purdue, Illinois). The Faculty also sends a representative of Osijek University in the European University Association, and cooperates with the Pecs University in Hungary with which it has preliminary agreed to organize joint postgraduate studies of civil engineering (official language – English). Our students participate in the IAESTE programme of students' exchange and during the last 5 years more than 30 students were exchanged and at the same time our faculty hosted 5 foreign students. 3 students took part in the international CEEPUS programme.

1.2 Reasons for Initiating the Studies

1.2.1 Needs of the Labour Market

There are several basic reasons for initiating the studies, the most important one is based on the needs analyses of the labour market. According to the Regional Employment Office in Osijek of the Croatian Employment Bureau, there were no unemployed civil engineers in the region of Slavonija-Baranya county in December 2004. Reputable civil engineering firms which employ many workers are often limited with the lack of qualified workers, so that some public (Croatian Waters) and private (APZ Zagreb) firms give scholarships to third- and forth-year students. From time to time they also do «head hunting» among best students offering them jobs. The labour market offers civil engineers great employment possibilities: in manufacturing firms (concrete batching plants, cement plants, in the production of bricks, tiles, carpentry, locksmith's products...) in firms that build roads, bridges, residential, public and industrial buildings, in firms that deal with rehabilitation and wrecking, in public firms, in management and state administration, in schools and universities.

For the purpose of better communication, in 2001 AMCA-FA-Mursae, the association of former students of Civil Engineering Faculty was founded. According to AMCA-FA-Mursae more than 90% of our former students work in the region of Slavonia. They work as junior researchers, teachers in secondary schools, civil engineering firms, design offices, Civil Engineering Institute of Croatia, public companies, in management and abroad.

1.2.2 Connection with Modern Scientific Concepts

The new study programmes are based on the long-time and diverse scientific work of our employees in Croatia, as well as on the cooperation with European scientific and educational institutions. Currently nine scientific-research projects financed by the Ministry of Science, Education and Sports are being carried out at our Faculty. There are also three international projects which involve American, German and Slovenian partners. The projects deal with very diverse topics and comprise the problems of earthquake engineering, timber and concrete constructions, soil mechanics, as well as different economical aspects of civil engineering. Scientists of the Faculty of Civil Engineering in Osijek take part in the three TEMPUS projects: the first one dealing with the coordination of civil engineering education in Croatia with the Bologna Declaration, the second one with the application of the Bologna Declaration at the Osijek University. The Faculty is a partner in CARDS inter-border cooperation projects of the sustainable development of Baranya family farms, with the accent on the preservation of the landscape of Baranya villages.
1.2.3 Comparison with Foreign University Study Programmes

During the making of the study programmes we took part in shaping the TEMPUS project «Restructuring and Updating of Civil Engineering Curriculum, TEMPUS JEP NO. 17062-2002» on which all four civil engineering faculties in Croatia are engaged together with the international consortium of 10 European faculties. This cooperation, as well as the active participation in the adaptation of study programmes of engineering studies in Croatia organized by the Ministry of Science, Education and Sports, led to the coordination of all the suggested programmes of civil engineering faculties in Croatia (November 2004). The differences in the undergraduate study programmes were less than 10%.

During the making of the programmes we consulted the contents of study programmes of many European and American civil engineering faculties, and used the guidelines of professional organisations which, in some countries, define engineering competencies. We mostly followed the instructions of EUCEET (European Civil Engineering Education and Training) which embraces 136 scientific institutions of which more than 100 civil engineering faculties in Europe (EUCEET projects «Harmonising Engineering Education Across Europe» 2004). We also coordinated the programmes with the guidelines of SEFI (European Society for Engineering Education) project: »Enhancing Engineering Education in Europe, Innovative Curricula in Engineering Education 2003), with the standards of the German institution for accreditation of university programmes in civil engineering ASBau (Akkreditierung und Qualitatsicherung zeitgemaesser Studiengange des Bauingenieurwesens an deutschen Hochschulen) from 2003, and with the criteria for accreditation of engineering programmes in USA (Engineering Accreditation Commission, Accreditation Board for Engineering and Technology (ABET) from 2003 and 2004.

The compilation of the Bologna Declaration, the recommendation of the ASCE Body of Knowledge committee and the results of EUCEET study on the basic content of the civil engineering studies, gave us a good criterion needed for defining professional knowledge necessary to any civil engineer. The table shows the ECTS credits for particular courses in the first three years of the studies on the chosen European universities in comparison with the suggested undergraduate study programme of the Faculty. Despite certain differences, undergraduate curriculum of our faculty fits into the frame of ECTS credits in all courses and it is most similar to the study programmes of 100 European universities (EUCET).

1.3 Potential Partners Outside the Institutions of Higher Education

Outside the higher education system there is an interest for study programmes, particularly in the form of the continuous engineering education.

1.4 Openness of the Studies towards the Mobility of Students

In 1993 the Civil engineering studies, with its first autonomous programme, has already been declared as an «international programme». Today it continues to aim toward the openness of the studies and mobility of students. As a result of these aspirations several dozen foreign students have graduated at our faculty. Moreover, the mobility of students is ensured by the agreement on coordination and mutual acknowledgment of curricula at all civil engineering faculties in Croatia and harmonisation of programmes with European standards (see the table 1) enables mobility on the European level. Besides, this mobility is also enabled by the possibility of conducting some lectures in English language (see the study programme). Also a part of scientific and educational employees is involved in teaching at other faculties of University of Josip Juraj Strossmayer in Osijek, Faculty of Agriculture and Art Academy.
Students’ mobility at the Faculty of Civil Engineering in Osijek
2 GENERAL PART

2.1 Title of Studies

Faculty of Civil Engineering at the University of Josip Juraj Strossmayer in Osijek offers a study programme called Graduate University Studies of Civil Engineering. Study programme is organised within three fields of specialization:

2.1.1 Supporting Structures
2.1.2 Construction Management and Technology
2.1.3 Hydraulic Engineering

2.2 Coordinator of Studies

The Faculty of Civil Engineering of Josip Juraj Strossmayer University is in charge of university studies.

2.3 Duration of Studies

The duration of Graduate University Studies of Civil Engineering is two years.

2.4 Admission Policy

Enrolment in the Graduate University Studies of Civil Engineering study programme is open to:

- Bachelors of Science in Civil Engineering
- Bachelors of Civil Engineering after completing a differentiated year study programme

2.5 Competencies

Competence /skills of Master of Civil Engineering
- ability of designing and dimensioning in particular field of specialization
- understanding of legal and professional practice connected with construction industry
- understanding of construction processes, conveying of knowledge, methods, materials, systems, machines, planning, safety, analysis and expenses control
- understanding fundamentals of economy, business, law, statistics, professional ethics, management, optimization, process analysis, engineering economy and developing of decision making skills
- understanding of general phenomena and problems in civil engineering context along with knowledge of boundary conditions and through interaction with other areas of science
- design, realisation and maintenance of civil engineering structures and systems in terms of bearing capacity, stability, safety, environmental protection and prices

After graduating and on-the-job training one will be able to assume responsibility in the field he/she graduated in. He/she will use acquired knowledge and develop abilities in problem formulation and problem solving and to gain an ability to apply such skills to solve real problems and to find an optimal solution. He/she is qualified to obtain new knowledge in the development and methods of scientific and applied-scientific research.
Master of Civil Engineering is trained for:
- project design and design of necessary technical documents for construction and reconstruction of buildings and civil engineering works of all kinds
- independent management of a building site...
- design of structures, design of stability of structures, dimensioning of elements...
- design of water supply, land reclamation, sewers and other hydraulic engineering structures
- design of roads, railways, airports, ports, maritime and river waterways and other similar structures
- coordination of complex technical documentation for civil engineering projects, construction management and technology, environmental protection...
- production and management of various geotechnical projects, including the planning and control of geotechnical investigation works
- design, testing and control of the quality of civil engineering works and materials
- preparation of feasibility study; investments in construction of buildings
- scientific – research work in civil engineering
- education of civil engineers

Undergraduate studies in Republic of Croatia which are necessary for the enrolment:
- undergraduate studies of civil engineering faculties in Zagreb, Split, Rijeka and Osijek
- professional studies of civil engineering under condition of taking differentiated exams (differentiated year)

2.6 University Degree Acquired after Finishing the Studies

The Faculty provides a study programme leading to the master's degree (Master of Civil Engineering).
### 3. DESCRIPTION OF STUDY PROGRAMME

#### 3.1. Study programme

##### 3.1.2 Field of specialization Construction Management and Technology

#### I SEMESTER

<table>
<thead>
<tr>
<th>Compulsory courses</th>
<th>Course</th>
<th>Lecturer</th>
<th>Hours a week Lectures+practice</th>
<th>Exam</th>
<th>ECTS credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.05-105</td>
<td>Probability Theory and Statistics</td>
<td>Asc.Prof. RADOSLAV GALIĆ</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>4.00</td>
</tr>
<tr>
<td>2.05-204</td>
<td>Structural Dynamics</td>
<td>Ass.Prof. IVICA GULJAŠ</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>4.00</td>
</tr>
<tr>
<td>2.05-205</td>
<td>Bridges I</td>
<td>Asc.Prof. ZVONIMIR MARIĆ</td>
<td>3.00 2.00</td>
<td>yes</td>
<td>6.50</td>
</tr>
<tr>
<td>2.05-206</td>
<td>Concrete Structures II</td>
<td>Prof. DRAGAN MOCIĆ</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>4.00</td>
</tr>
<tr>
<td>2.05-304</td>
<td>Hydraulic Engineering Systems</td>
<td>Ass.Prof. LIDIJA TADIĆ</td>
<td>3.00 2.00</td>
<td>yes</td>
<td>6.50</td>
</tr>
<tr>
<td>2.15-111</td>
<td>Construction Management II</td>
<td>Prof.PETAR BRANA</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>5.00</td>
</tr>
</tbody>
</table>

**total of all courses**  
14.00 12.00 30.00

#### II SEMESTER

In the II semester a student chooses three optional courses; one of them has to be from their field of specialization. Optional courses are specified at the end of the study programme.

<table>
<thead>
<tr>
<th>Compulsory courses</th>
<th>Course</th>
<th>Lecturer</th>
<th>Hours a week Lectures+practice</th>
<th>Exam</th>
<th>ECTS credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.15-112</td>
<td>Construction Technology II</td>
<td>Prof.PETAR BRANA</td>
<td>2.00 2.00</td>
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</tr>
<tr>
<td>5.01-102</td>
<td>Management</td>
<td>Prof. BARBARA MEDANIĆ</td>
<td>2.00 2.00</td>
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<td>5.00</td>
</tr>
<tr>
<td>2.15-113</td>
<td>System Engineering</td>
<td>Prof.PETAR BRANA</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>5.00</td>
</tr>
</tbody>
</table>

**optional**  
- at least 1 from the field of specialization  
- 15.00

**total of obligatory courses**  
7.00 6.00 15.00

**total of optional courses**  
15.00

**total of all courses**  
30.00

#### III SEMESTER

In the III semester a student chooses three optional courses; one of them has to be from their field of specialization. Optional courses are specified at the end of the study programme.

<table>
<thead>
<tr>
<th>Compulsory courses</th>
<th>Course</th>
<th>Lecturer</th>
<th>Hours a week Lectures+practice</th>
<th>Exam</th>
<th>ECTS credits</th>
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<tbody>
<tr>
<td>2.15-114</td>
<td>Project Management</td>
<td>Asc.Prof. VLADIMIR SKENDROVIĆ</td>
<td>3.00 2.00</td>
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<td>6.00</td>
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<tr>
<td>5.02-102</td>
<td>Tenders and Contracts</td>
<td>Asc.Prof. VLADIMIR SKENDROVIĆ</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>4.50</td>
</tr>
<tr>
<td>2.15-115</td>
<td>Processes of Construction Planning and Control</td>
<td>Ass.Prof. SAŠA MARENJAK</td>
<td>2.00 2.00</td>
<td>yes</td>
<td>4.50</td>
</tr>
</tbody>
</table>

**optional**  
- one from their field of specialization  
- 5.00
- two from the other fields of specialization  
- 10.0

**total of obligatory courses**  
7.00 6.00 15.00

**total of optional courses**  
15.00

**total of all courses**  
30.00
### IV Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Description</th>
<th>Lecturer</th>
<th>Hours a week</th>
<th>Exam</th>
<th>ECTS Credits</th>
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<tbody>
<tr>
<td>5-101</td>
<td>Essentials of Scientific Work</td>
<td>Prof. Ksenija Čulo</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>2.05-DR</td>
<td>Master's thesis</td>
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<td></td>
<td></td>
<td>30.00</td>
</tr>
<tr>
<td>total of all courses</td>
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<td></td>
<td></td>
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<td>30.00</td>
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</table>
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.05-105</td>
<td>PROBABILITY THEORY AND STATISTICS</td>
<td>2 + 2</td>
<td>COMPUL SORY</td>
<td>I</td>
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</tbody>
</table>

Lecturer: Asc.Prof. RADOSLAV GALIĆ

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>NO</td>
<td>NO</td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Descriptive statistics: Types of data, Collection of data, Description of data: Graphs and tables.
Random variables: Discrete random variables, numerical characteristics and their meaning, Independent Bernoulli trials and binominal random variable, meaning of parameters, normal approximation, Continuous random variable, some parametric families (uniform, exponential, normal, $\chi^2$).
Sampling distribution.
Inference based on a single sample: Estimation for a population proportion, Large-sample confidence interval for a population proportion, Estimation for a population mean, Large-sample confidence interval for a population mean, Tests of hypothesis about a population proportion and a population mean (large-sample).
Inference based on two samples: Comparing two population means, Comparing two population proportions, Comparing two population distributions.

1.4 Competence

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: yes Seminar: no

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05-204</td>
<td>STRUCTURAL DYNAMICS</td>
<td>2 + 2</td>
<td>COMPULSORY</td>
<td>I</td>
<td>4.00</td>
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</table>

Lecturer: Ass.Prof. IVICA GULJAS

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- Analysis of structures subjected to dynamic loads: environmental, machine, vehicular and blast sources.
- Discrete and continuous mechanical models.
- Approximate and numerical methods. Frequency domain analysis.
- Vibrations of continuous systems.

1.4 Competence

Understanding of the dynamic response of structures and of the common analysis techniques employed to evaluate these responses to earthquake excitation, blast loading, wave forces on structures and wave propagation.

The course emphasizes numerical solution techniques for a range of applications in structural dynamics.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

<table>
<thead>
<tr>
<th>Exam:</th>
<th>Oral: yes</th>
<th>Written: yes</th>
<th>Seminar: yes</th>
</tr>
</thead>
</table>

Pre/Corequisites: Mathematics, Statics, Strength of materials

1.8 Quality control

Assessment of knowledge is carried out in the semester, during the process of teaching, practical work, seminars and colloquia according to the teaching plan. The final evaluation mark is determined during the written examination (2 or 3 problems have to be solved within two hours), complemented in doubtful case by an oral examination.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05-205</td>
<td>BRIDGES I</td>
<td>3 + 2</td>
<td>COMPULSORY</td>
<td>I</td>
<td>6.50</td>
</tr>
</tbody>
</table>

Lecturer: Asc.Prof. ZVONIMIR MARIC
Collaborators: Ph.D. DAMIR VAREVAC

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
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<th>Seminar</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

Since, the road construction (especially, highway construction) is the most represented part of construction industry in Croatia, and bridges are great part on it, it is necessary that each construction engineer overcome basic knowledge of this course. Exercises qualify each student that after short work experience beside an experienced expert can independently design simple bridges.

1.5 Obligatory literature


1.6 Additional literature


1.7 Exam

Exam: Oral: Yes    Written: Yes    Seminar: yes

Pre/Corequisites:

1.8 Quality control

Seminar
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05-206</td>
<td>CONCRETE STRUCTURES II</td>
<td>2 + 2</td>
<td>COMPULSORY</td>
<td>I</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Lecturer: Prof. DRAGAN MORIĆ
Collaborators: Ph.D. DAMIR VAREVAC

1.2 Instructional format

<table>
<thead>
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<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula


Shear stresses in I and II stadiums. Critical area and critical penetration cross section. Slabs with change in dimensions (capitels). Reinforcements details.

RC slabs and plates, RC walls, RC high girded walls, RC beams, RC columns, RC rigid conection zones.

Preferences and faults of RC prefabricated structures, Calculation approach and design concept, Vertical structural elements (columns and walls), Horizontal structural elements (beams, TT and T slabs, slabs with opennings) Vertical conections, Horisontal conections.

Global informations of deflections and cracks limit states for some RC structural elements.

1.4 Competence

Knowing of rules for design, calculations and construction of RC structures for various combinations of loads, types of structures and structural elements in projecting phases.

1.5 Obligatory sources


1.6 Additional sources

1. I. Tomić, Reinforced concrete structures, Chosen chapters (In Croat) DHGK, Zagreb, 1999

1.7 Exam

Exam: Oral: yes Written: yes Seminar: no

Pre/Corequisites: Reinforced concrete structures I

1.8 Quality control

Two colloquial exams during course lecture
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05-304</td>
<td>HYDRAULIC ENGINEERING SYSTEMS</td>
<td>3 + 2</td>
<td>COMPULSORY</td>
<td>I</td>
<td>6,50</td>
</tr>
</tbody>
</table>

Lecturer: Ass. Prof. LIDIJA TADIČ

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Experimental exercises</th>
<th>Seminar</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Structures as basis of hydrotechnical systems – review and role of hydrotechnical structures; Inquisitorial works – environment, soil, water, development; Engineering foundation, grouting, anchorage, diaphragms (cat-off walls); Building site protection from water impacts – weirs, diversions; Dams – purpose, types, specific impacts, loads; Concrete dams – calculations, subtypes (massive, unload, buttress, arch, gated dams); Backfill dams (earthfill, rockfill dams) and embankments; Functional elements of dams – spillways and outlets; Hydrotechnical canals, tunnels and penstocks – discharge-intake structures, surge chambers; Structures of waterways and ports – docks, breakwaters, navigation locks; Power houses, water reservoirs, water gates, pumping-stations, aqueducts, siphons;

1.4 Competence

Introduction to specificities of building and utilisation of structures in presence water conditions; Reference to concepts and calculations diverse water influences; Introduction of appropriate techniques and technologies of building; Development of engineering approach to realisation complex hydrotechnical structures.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

<table>
<thead>
<tr>
<th>Exam:</th>
<th>Oral:</th>
<th>Written:</th>
<th>Seminar:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Pre/Corequisites:

1.8 Quality control

Analyses: seminary works, case study of some hydrotechnical structure and questionnaire for field education realisation.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.15-111</td>
<td>CONSTRUCTION MANAGEMENT II</td>
<td>2 + 2</td>
<td>OPTIONAL</td>
<td>I</td>
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</tbody>
</table>

Lecturer: Prof. PETAR BRANA
Collaborators: M.Sc.ZLATA DOLAČEK

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Preparation of construction (adapting construction technologies, realization dynamics, distributing space and logistical aspects of the construction process, goals and problems in preparing and conducting construction, the principles of construction, ways of presenting construction, planning technological chains, researching capacities and project management)
Organizational structures in a construction project (basic organizational structures, models of organizing main players, the influence of agreed models on project organization, connecting the public and private sectors)
Making optional solutions for organizing construction (work rationalization, making optional solutions, analysis and evaluation of optional solutions, examples)
Developing work structures and organizing construction (WBS) (Tasks and structure of WBS, WBS Methods, Levels and WBS marks, Making WBS in construction projects, Connecting work structures and organization)
Organizing supplies and logistics in the construction process (OL) (Fragmenting the construction process, OL definition, The problem of OL complexity in a construction project, OL task, OL Cycle in a construction project, basic OL documents, Organizing OL in a construction project, International OL experience)
The theory of expenses and time (the significance theory principle, determining expenses and time schedules, Applying the theory of expense significance for optional solutions)
Methods of direct calculations for construction expenses and prices (the budget of direct and indirect construction expenses, offered calculation, agreed calculation and cost management, implementing computers for price calculations)
Connecting money and construction schedules (accurate cost estimates in time, the flow of money in the project, model expenses – time, construction company capital, the influence of changes in the project on expenses, calculating the difference in prices)

1.4 Competence

Introduce students with the principles of construction organization and detailed expense calculations, and their relation with time.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: Yes  Written: Yes  Seminar:
Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
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<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.15-112</td>
<td>CONSTRUCTION TECHNOLOGY II</td>
<td>2 + 2</td>
<td>COMPULSORY-OTM</td>
<td>II</td>
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Lecturer: Prof. PETAR BRANA
Collaborators: M.Sc. DRŽISLAV VIDAKOVIĆ

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Concrete operations in contemporary construction projects. Technological chains. Implementation, vibrating, technical processing, vacuuming, centrifuge. Underwater concrete laying.

Procedures for quick concrete firming (factory and construction site steaming).


Mixtures and quality control for shotcrete concrete.

Assembling technology (Transport and lifting machinery, Ways of monolithization, Transporting elements, Construction site prefabrication, safety measures, Differential complex assembly, Assembling columns and beams, Assembling bars, Assembling bridges)

Defining a dead spot for profitability in element production

Selecting type, size and number of machines and equipment for various technologies depending on operations (Examples).

Defining a dead spot for profitability in element production

Making tunnels and underground objects (Classification of rocks according to hardness, basic methods of advancing in rocks, basic machinery for making tunnels and digging).

Special technologies of demolition and restoring buildings (Brick and A.B. constructions).

1.4 Competence

Introduce students with contemporary construction technologies and possibilities of multicriteria selection for technology options.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: Yes Written: Yes Seminar: 
Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>5.01-102</td>
<td>MANAGEMENT</td>
<td>2 + 2</td>
<td>COMPULSORY-OTM</td>
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</table>

Lecturer: Prof. BARBARA MEDANIĆ
Collaborators: Prof. KSENJA ĆULO

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
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</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- Modern construction firm, structure and functioning.
- Current and developmentally business goals.
- Business politics as resource for realization business goals and it's methods.
- Decision theory, contents, elements and criteria.
- Models, methods and procedures at the modern decision making.
- Risk as the element and limit in business decision making and it's role in managing global construction business.
- Decision tree and it's use in current and strategic decision making in directing business to defined goals.
- Combining and target effectuation business functions of the modern construction firm.

1.4 Competence

Course program is the part of the wider conceptual knowledge necessary for everyone manager in construction independent of hierarchial level in the construction firm.
This manager will be qualified for the wide spectar business decision making in the terms of risks and uncertain for recognition and appreciation business risk, it's dimensioning and managing.

1.5 Obligatory sources

1. Medanić, B.: Construction Management, University in Zagreb, Split, Rijeka, Osijek – Faculty of Civil Engineering in Zagreb, Split, Rijeka, Osijek., 1997

1.6 Additional sources

1. Lacković, Z.: Small Business Management, Požega, Osijek, 2004

1.7 Exam

Exam: Oral: Yes Written: No Seminar: Yes
Pre/Corequisites: passed exam Engineering Economy

1.8 Quality control

Analysis of the quality and presentation of the individual seminar papers, analysis students' polling results, course presence, level of the students' activities on the course.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>2.15-113</td>
<td>SYSTEM ENGINEERING</td>
<td>2 + 2</td>
<td>COMPULS ORY-OTM</td>
<td>II</td>
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</table>

Lecturer: Prof. PETAR BRANA

1.2 Instructional format

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- System opinion as a component of system engineering (S.E.), About systems in general
- General models for open dynamic systems
- The meaning of system approach in planning
- System engineering tasks (setting goals, defining planned phases, Gathering and processing information, Structuring the total system in operational subsystems, the criteria of success, Optimal use of resources, Flexible planning for ideas and technologies with risks as low as possible)
- Development models S.E. (from rough to detailed, system development phases, problem solving cycles, relations between problem solving cycles and development phases)
- The methodology of S.E. (Analysis of the situation, defining problems, suggestions, analysis and concept estimates, selecting options, planning development, planning construction)
- The systematics of system sciences and its correlation (System research, system theory, the decision making theory, operations research)
- Implementing the system concept on production issues (Super and subsystems, the company as a system, the efficiency of organizational systems)
- Instrumental base for manipulating production systems (management and regulations)
- System theories and organizational theories (System oriented organization research, System oriented organization creation, Reengineering in construction processes)

1.4 Competence

Introduce students with the system approach and basic assumptions of S.E., models and methods used for developing construction projects.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: - Seminar: yes

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.15-114</td>
<td>PROJECT MANAGEMENT</td>
<td>3 + 2</td>
<td>COMPULSORY-OTM</td>
<td>III</td>
<td>6.00</td>
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Lecturer: Asc.Prof.VLADIMIR SKENDROVIĆ
Collaborators: M.Sc.ZLATA DOLAČEK

1.2 Instructional format

<table>
<thead>
<tr>
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<th>Seminar</th>
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<tbody>
<tr>
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<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

The knowledge gained from this course will enable students to understand functioning of a project as a complex manageable system. They will learn the theory and practice of investment project management using conventional methods as well as software packages. The goal of the course is mastering interdisciplinary knowledge needed for the organization and successful project management.

1.5 Obligatory sources

1. V.Skendrović: Upravljanje projektima, skripta

1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: Seminar: yes

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>5.02-102</td>
<td>TENDERS AND CONTRACTS</td>
<td>2 + 2</td>
<td>COMPULSORY-OTM</td>
<td>III</td>
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</tbody>
</table>

Lecturer: Asc.Prof.VLADIMIR SKENDROVIĆ
Collaborators: M.Sc.ZLATA DOLAČEK

1.2 Instructional format

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

The knowledge gained from this course will enable students to learn the legal framework and practice for tendering and contracting as well as to understand obligations and responsibilities imposed by contracts. The aim of the course is mastering of essential legal knowledge needed for construction management.

1.5 Obligatory sources

2. Law on Public Procurement
3. Law on Obligations

1.6 Additional sources

1. V. Skendrović: Course textbook

1.7 Exam

Exam: Oral: yes Written: Seminar:

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>2.15-115</td>
<td>PROCESS OF CONSTRUCTION PLANNING AND CONTROL</td>
<td>2 + 2</td>
<td>COMPULSORY-OTM</td>
<td>III</td>
<td>4.50</td>
</tr>
</tbody>
</table>

Lecturer: Ass.Prof. SAŠA MARENJAK

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

In this module students learn the importance of integrated thinking and how to develop robust cost and time planning and control of construction activities.

1.5 Obligatory sources

1. Nonveiller, S., Metode mrežnog planiranja i njihova primjena u rukovođenju građenjem, GF, Zagreb, 1982.

1.6 Additional sources

1. McHaffer: Construction project management.

1.7 Exam

Exam: Oral: Yes Written: Yes Seminar: no
Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tr>
<td>5-101</td>
<td>ESSENTIALS OF SCIENTIFIC WORK</td>
<td>1 + 0</td>
<td>COMPULSORY</td>
<td>IV</td>
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</table>

Lecturer: Prof. KSENIJA ČULO

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
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<tbody>
<tr>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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</tbody>
</table>

1.3 Course curricula

About scientific/research work.
Scientific methods.
Research methods in construction.
Planning of the scientific/research work.
Scientific and technological information, information resources.
Researching.
Kinds of scientific/research and professional papers.
Structure of the scientific paper and scientific documentation.
Writing papers – technics.
Defense of paper.

1.4 Competence

The target of the course is introduce students to scientific research, to every formal and informal specific qualitative scientific work. Aim of the course is stimulating creativity by using correct methodology.

1.5 Obligatory sources

2. Low on scientific/research work NN 123/03

1.6 Additional sources

1.7 Exam

Exam: Oral: No Written: No Seminar: No

Pre/Corequisites:

1.8 Quality control

Exam is on consultant level during students work on diploma paper.
### 3.1.4. **LIST OF OPTIONAL COURSES**

All optional courses earn 5 ECTS credits. Optional courses from the following fields of specialization:
- **O** – general optional courses
- **K** – Supporting Structures
- **OTM** - Construction Management and Technology
- **H** - Hydraulic Engineering

<table>
<thead>
<tr>
<th>Optional</th>
<th>Course</th>
<th>Lecturer</th>
<th>Hours of active classes</th>
<th>Field of specialization</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.09-103</td>
<td>Information Systems and Data Bases</td>
<td>Ass.Prof. NIKOLA KLEM</td>
<td>4,00</td>
<td>O</td>
<td>winter</td>
</tr>
<tr>
<td>1.05-106</td>
<td>Applied Numerical Methods</td>
<td>Ass.Prof. NINOSLAV TRUHAR</td>
<td>4,00</td>
<td>O</td>
<td>summer</td>
</tr>
<tr>
<td>2.01-107</td>
<td>Reconstruction of Heritage</td>
<td>Ass.Prof. SANJA LONČAR-VICKOVIĆ</td>
<td>4,00</td>
<td>O</td>
<td>winter</td>
</tr>
<tr>
<td>2.01-108</td>
<td>Architecture of Industrial Buildings</td>
<td>Ass.Prof. SANJA LONČAR-VICKOVIĆ</td>
<td>4,00</td>
<td>O</td>
<td>winter</td>
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<tr>
<td>2.05-402</td>
<td>Transportation Engineering</td>
<td>Ph.D. MATE SRŠEN</td>
<td>4,00</td>
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<td>winter</td>
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<tr>
<td>2.05-403</td>
<td>Road Construction and Maintenance</td>
<td>Ph.D. MATE SRŠEN</td>
<td>4,00</td>
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<td>summer</td>
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<tr>
<td>2.05-214</td>
<td>Bridges II</td>
<td>Asc.Prof. ZVONIMIR MARIĆ</td>
<td>4,00</td>
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<td>summer</td>
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<tr>
<td>2.05-215</td>
<td>Masonry Structures II</td>
<td>Prof. STJEPAN TAKAČ</td>
<td>4,00</td>
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<tr>
<td>2.05-216</td>
<td>Composite Structures</td>
<td>Ass.Prof. DAMIR MARKULAK</td>
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<tr>
<td>2.05-217</td>
<td>Structure Modelling</td>
<td>Prof. DRAGAN MORIĆ</td>
<td>4,00</td>
<td>K</td>
<td>winter</td>
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<tr>
<td>2.05-218</td>
<td>Analysis of Structure Stress and Bearing Capacity</td>
<td>Prof. VLADIMIR SIGMUND</td>
<td>4,00</td>
<td>K</td>
<td>winter</td>
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<tr>
<td>2.05-219</td>
<td>Rock Mechanics</td>
<td>Prof. MENSUR MULABDIĆ</td>
<td>4,00</td>
<td>K</td>
<td>summer</td>
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<tr>
<td>5.01-103</td>
<td>Marketing</td>
<td>Asc.Prof. ZLATKO Lacković</td>
<td>4,00</td>
<td>OTM</td>
<td>winter</td>
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<tr>
<td>2.15-116</td>
<td>Industrialized Construction</td>
<td>Prof. PETAR BRANA</td>
<td>4,00</td>
<td>OTM</td>
<td>winter</td>
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<tr>
<td>5.01-104</td>
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<td>Prof. BARBARA MEDANIĆ</td>
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<td>Maintenance of Structures</td>
<td>Ass. Prof. SAŠA Marenjak</td>
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<tr>
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<td>2.05-313</td>
<td>Hydrology II</td>
<td>Ass.Prof. VLADIMIR PATRČEVIĆ</td>
<td>4,00</td>
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<td>2.05-314</td>
<td>Torrent Control</td>
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<tr>
<td>2.05-315</td>
<td>Hydrotechnical Modelling</td>
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<td>4,00</td>
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</tr>
</tbody>
</table>
1 Course

1.1 General data

<table>
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<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>2.09-103</td>
<td>INFORMATION SYSTEMS AND DATA BASES</td>
<td>2 + 2</td>
<td>OPTIONAL -O</td>
<td>winter</td>
<td>5,00</td>
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</table>

Lecturer: Ass.Prof. NIKOLA KLEM

1.2 Instructional format

<table>
<thead>
<tr>
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<th>Practical exercises</th>
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<tbody>
<tr>
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<td>YES</td>
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<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Information technology
Computers, software, data, communications.
Information systems
Introduction. Basic concepts. Categories of IS. Characteristics of IS components. Management of IS.

Databases

1.4 Competence

Introducing students into basic concepts of information systems and databases and prepare them for designing and creating of smaller databases.

1.5 Obligatory sources

1. Mile Pavlić: Razvoj informacijskih sustava (Development of Information Systems), Znak, Zagreb, 1996

1.6 Additional sources

2. Velimir Šriča, Mario Spremić: Informacijskom tehnologijom do poslovnog uspjeha (Business Success with Information Technology), Sinergija, Zagreb, 2000.

1.7 Exam

Exam: Oral: Written: Yes Seminar: Yes
Pre/Corequisites: positive evaluation of more than 75% exercises

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.05-106</td>
<td>APPLIED NUMERICAL METHODS</td>
<td>2 + 2</td>
<td>OPTIONAL -O</td>
<td>SUMMER</td>
<td>5.00</td>
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</table>

Lecturer: Ass.Prof. NINOSLAV TRUHAR

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Introduction
- Modelling of physical processes. Numerical models and approximate solutions. Sources of errors and uncertainty in numerical computation.
- Numerical methods

1.4 Competence

To introduce students to numerical solution of problems, advantages and disadvantages of usage of computer

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: Yes  Written:  Seminar: Yes

Pre/Corequisites:

1.8 Quality control

GRADUATE UNIVERSITY STUDY PROGRAMME
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01-107</td>
<td>RECONSTRUCTION OF HERITAGE</td>
<td>2 + 2</td>
<td>OPTIONAL -O</td>
<td>WINTER</td>
<td>5.00</td>
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</tbody>
</table>

Lecturer: Ass.Prof. SANJA LONČAR-VICKOVIĆ, Architect

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Lectures:
The origin and definition of architectural heritage. The role of heritage in cultural and national identity. Law on Protection of cultural goods. Levels of protection. A review of protected architectural entities in Croatia; Dubrovnik, Trogir, Tvrđa. Architectural heritage protection in Europe and the world; case studies. Documenting heritage; methods, standards, information technologies, examples, case studies. Typology of revival; faximil, adaptation, revitalization, restauration, reconstruction, interpolation. Cultural and architectural landscape. Rural heritage; growth and transformation of villages, rural heritage protection, case studies in Croatia and in Osijek's surroundings. Urban heritage; history of cities, urban typology, fortifications and fortified towns, examples. Managing and maintaining urban heritage in the world and in Croatia. Osijek and Tvrđa; origins, history, today’s status, UNESCO list, documentation, heritage protection review, management.

Practical exercises: completing architectural documentation for a building (elements of a building) in Tvrđa.

1.4 Competence

Understanding the role of heritage in national and cultural identity, knowledge of methods of documenting and protecting architectural heritage around us.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam


Pre/Corequisites: none

1.8 Quality control

During the semester students complete a research paper where they use text and graphics to present a chosen protected building in Osijek or its surroundings, implementing knowledge acquired in class and using regional approach. At the end of each lecture another student prepares short presentation of his/her paper for other students.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
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<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.01-108</td>
<td>ARCHITECTURE OF INDUSTRIAL BUILDINGS</td>
<td>2 + 2</td>
<td>OPTIONAL</td>
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</table>

Lecturer: Ass.Prof. SANJA LONČAR-VICKOVIĆ, Architect

1.2 Instructional format

<table>
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<th>Lectures</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
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</tbody>
</table>

1.3 Course curricula

Lectures:
History of industrial architecture. Industrial revolution; materials, typology, structures. Formal dictionary of industrial architecture. Workplace; definition, types, dimensions. Location of industrial zones nad buildings. External and internal traffic organization.
Types of industrial buildings. Factories; textile ad leather industry, metal production, chemical industry, food industry, construction industry, other industry types, warehouses. Buildings for road, railroad and air traffic; bus and train stations and terminals, tank stations, airports. Agricultural buildings; farms, warehouses, factories, wine cellars. Buildings for production of energy.
Practical exercises: completing a design of an industrial building

1.4 Competence

Learning basic principles of designing industrial architecture, including understanding of town planning, typology structures and materials.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: none Written: none Seminar: yes
Pre/Corequisites: none

1.8 Quality control

During the semester students complete a research paper where they use text and graphics to present a chosen type of industrial buildings, implementing knowledge acquired in class and using regional approach.
At the end of each lecture another student prepares short presentation of his/her paper for other students.
1 Course

1.1 General data

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<tr>
<th>Code</th>
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<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.05-402</td>
<td>TRANSPORTATION ENGINEERING</td>
<td>2 + 2</td>
<td>OPTIONAL -O</td>
<td>WINTER</td>
<td>5.00</td>
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</table>

Lecturer: MATE SRŠEN, Ph.D.Civ.Eng. Professor – permanent vocation

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
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<th>Seminar</th>
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<td>YES</td>
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</tbody>
</table>

1.3 Course curricula

Development and division of traffic. Traffic analysis and forecast. Designing criteria. Roads: history, classification, cross-section and basic road elements, systems of modern pavement structures (types, construction materials, construction, maintenance, management), drainage. Urban roads: introduction, vehicle types, public and individual traffic, categorisation of urban roads, design elements, free and traffic profiles, pavement structures, drainage, lightening, equipment, signalisation Traffic at rest: urban-traffic propositions, types of parking areas and structures, characteristics and methods of areas placement and shaping, pavement structures, drainage, lightening, equipment, signalisation, parking areas for special purposes Airports: history, types and categories of airports, airport areas, classification of airplanes and pavements, pavement surface loading, pavement structures Railways: history, general characteristics of railways, railway track elements, upper and lower railway track structure, alignment designing, construction and maintenance, railway stations

1.4 Competence

Acquiring the knowledge of types and ways of progress of traffic, basic characteristics and details of different road types, as well as designing criteria that define them. After successfully passing the exam the students will be trained for competent designing, construction and maintenance of the above-mentioned transport infrastructure a technically correct and economically feasible way.

1.5 Obligatory sources

2. Sršen, M.: Road Maintenance (orig. in Croatian), Građevni godišnjak, HSGI, Zagreb, 2000

1.6 Additional sources


1.7 Exam

<table>
<thead>
<tr>
<th>Exam: Oral: YES</th>
<th>Written: YES</th>
<th>Seminar: YES</th>
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</thead>
</table>
| Pre/Corequisites: Passing the written exam is a precondition for taking the oral exam.

1.8 Quality control

Via preliminary exams and seminar paper.
1 Course

1.1 General data

<table>
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<tr>
<th>Code</th>
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<th>Semester</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.05-403</td>
<td>ROAD CONSTRUCTION AND MAINTENANCE</td>
<td>2 + 2</td>
<td>OPTIONAL</td>
<td>SUMMER</td>
<td>5.00</td>
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</table>

Lecturer: MATE SRŠEN, Ph.D.Civ.Eng.Professor – permanent vocation

1.2 Instructional format

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</table>

1.3 Course curricula


1.4 Competence

The students will acquire the knowledge of construction and maintenance of roads, as well as of details on materials used for different types of pavement structures. After attending classes and passing the exam, the students will be able to analyse competently the impacts of construction and maintenance that are crucial for pavement performance under traffic.

1.5 Obligatory sources


1.6 Additional sources

2. Schweizer Norm, Beilage, SN 640 925: Schadenkatalog, Zürich, 1991
3. Babić, B. i Z. Horvat: Construction and Maintenance of Pavement Structures (orig. in Croatian), Faculty of Civil Engineering of Zagreb University, 1984

1.7 Exam

Exam: Oral: YES Written: YES Seminar: elaborated

Pre/Corequisites: Passing the written exam is a precondition for taking the oral exam.

1.8 Quality control

Via preliminary exams and seminar paper.
1 Course

1.1 General data

<table>
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<th>Code</th>
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<tr>
<td>2.05-214</td>
<td>BRIDGES II</td>
<td>2 + 2</td>
<td>OPTIONAL -K</td>
<td>SUMMER</td>
<td>4.00</td>
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</table>

Lecturer: Prof. ZVONIMIR MARIC
Collaborators: Ph.D. DAMIR VAREVAC

1.2 Instructional format

<table>
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<th>Lectures</th>
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<tbody>
<tr>
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<td>YES</td>
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<td>YES</td>
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</table>

1.3 Course curricula


1.4 Competence

This course gives a wider and deeper insight into material which is necesary to overview this area of structural activity, so that after a short participation in design projects students will be able to independently design bridges of medium complexity.

1.5 Obligatory literature


1.6 Additional literature


1.7 Exam

<table>
<thead>
<tr>
<th>Exam:</th>
<th>Oral:</th>
<th>Written:</th>
<th>Seminar:</th>
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<tr>
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Pre/Corequisites:

1.8 Quality control

Quality analysis in making and presenting of seminars.
1 Course

1.1 General data

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<th>Code</th>
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<th>Semester</th>
<th>ECTS</th>
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</thead>
<tbody>
<tr>
<td>2.05-215</td>
<td>MASONRY STRUCTURES II</td>
<td>2 + 2</td>
<td>OPTIONAL-K</td>
<td>WINTER</td>
<td>5.00</td>
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</table>

Lecturer: Prof. STJEPAN TAKAČ

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
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<tbody>
<tr>
<td>YES</td>
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<td>YES</td>
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</tbody>
</table>

1.3 Course curricula

- Wall elements as architectural elements
- Innovative wall elements and mortars
- Prefabricated masonry structures
- Reinforcement and prestressing of walls
- Cellular concrete walls
- Permanent, temporary and nonregular actions on masonry structures
- Fire resistance
- Durability of masonry structures

1.4 Purpose of the course

To extend the level of students’ knowledge (according to the educational level of the students), to inform students about the specific topics of the masonry structures (scientific-research work).

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes  Written:  Seminar: yes

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.05-216</td>
<td>COMPOSITE STRUCTURES</td>
<td>2 + 2</td>
<td>OPTIONA L-K</td>
<td>WINTER</td>
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</tbody>
</table>

Lecturer: Ass. prof. DAMIR MARKULAK


1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
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</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

Composite structures are specific form of connecting the same or different materials in the unique member. Scientific and professional research are still actual, and purpose of the course is introduction to design and details of steel-concrete composite structures.

1.5 Obligatory sources


1.6 Additional sources

5. ECCS – Technical Committee 11, the Group Authors : Composite beams and columns to Eurocode 4, Composite structures, First edition 1993.

1.7 Exam

Exam: Oral: Yes Written: Yes Seminar: Yes

Pre/Corequisites: Attendance to lectures and exercise, positive Semestral project, positive exam in Steel structures II and Concrete structures.

1.8 Quality control

Semestral project is divided into different phases, and students need to work on project continually during semester. Attendance to lectures and exercise will be also monitoring.
1 Course

1.1 General data

<table>
<thead>
<tr>
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<th>Semester</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>2.05-217</td>
<td>STRUCTURE MODELLING</td>
<td>2 + 2</td>
<td>OPTIONAL-K</td>
<td>SUMMER</td>
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</table>

Lecturer: Prof. DRAGAN MORIĆ

1.2 Instructional format

<table>
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<th>Lectures</th>
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<tbody>
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<td>YES</td>
<td>YES</td>
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<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- Types of structures. 1D elements, 2D elements, 3D elements
- Equilibrium and compatibility conditions in discretions points.
- Final element theory
- Numbers of freedom. Condensation of freedom. SDOF model, 2D model, Story model
- Coordinate systems
- Joints.: coordinates, level of freedom. Labels, Arrays and Generation. Master-Slave connection
- Material behaviour (linear, elastic – non-linear, non-elastic)
- Types of final elements: beam, column, shall, plate, solid, nlink, spring
- Loads: concetrate force, uniform load, pressure load, spectum, time histories
- Static and dynamic analysis. P-delta analysis, Earthquake analysis
- Loads combinations
- Results. Control of results, Interpretation of results

1.4 Competence

Knowing of structure modelling and using of comercial engineering programs for structural analysis. Students will use that skill during its study in research program and its theses and will be ready to use it when reach graduate degree.

1.5 Obligatory sources


1.6 Additional sources

1. Manuals of engineering programs (.SAP, Robot, Tower…)

1.7 Exam

Exam: Oral: yes Written: no Seminar: yes

Pre/Corequisites:

1.8 Quality control

Practical exercises and seminar solving engineering problem with one of existing programs
Course

1.1 General data

<table>
<thead>
<tr>
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<th>Semester</th>
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<tbody>
<tr>
<td>2.05-218</td>
<td>ANALYSIS OF STRUCTURE STREE AND BEARING CAPACITY</td>
<td>2 + 2</td>
<td>OPTIONAL-K</td>
<td>WINTER</td>
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</table>

Lecturer: Prof. VLADIMIR SIGMUND
Collaborators: Ass.Prof. MIRJANA BOŠNJAK-KLEČINA

1.2 Instructional format

<table>
<thead>
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<td>YES</td>
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</table>

1.3 Course curricula

Review of fundamentals in stress-strain, engineering materials, concepts of the theory of elasticity, Airy stress function, Prandtl's stress function for torsion, advanced mechanics of materials, energy techniques in stress analysis, strength, failure modes and design consideration, fracture mechanics, fatigue analysis, structural stability, inelastic behavior, engineering approximations.

1.4 Competence

Overall insight in the advanced strength and applied stress analysis.

1.5 Obligatory sources


1.6 Additional sources

2. A.C.Ugural, Stresses in plates and shells, McGraw-Hill WCB, 1999. (3) Alfirević, I., Nauka o čvrstoći I,

1.7 Exam

<table>
<thead>
<tr>
<th>Exam: yes</th>
<th>Oral: yes</th>
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Pre/Corequisites: Continuum mechanics I and II

1.8 Quality control

Seminar
## 1 Course

### 1.1 General data

<table>
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<tr>
<td>2.05-219</td>
<td>ROCK MECHANICS</td>
<td>2 + 2</td>
<td>OPTIONAL -K</td>
<td>SUMMER</td>
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</table>

Lecturer: Prof. MENSUR MULABDIĆ  
Collaborators: KRUNOSLAV MINAŽEK, B.Sc. in Civ.Eng.  
DEJAN MRAČKOVSKI, B.Sc. in Civ.Eng.

### 1.2 Instructional format

<table>
<thead>
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<td>YES</td>
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</table>

### 1.3 Course curricula

- Introductory lecture, development of profession, problems and achievements
- Basic properties of rocks, classification
- Testing of rocks in laboratory
- Testing of rocks in situ
- Mechanical properties of rocks
- Slope stability in rocks
- Underground work, types, execution
- Stabilisation of tunnel excavation
- Anchors in rocks
- Foundation in rocks
- Measurements and instrumentation of work in rocks

### 1.4 Competence

Introduce geotechnical activities in rock materials, type and way of rock stress-strain behaviour analyses, technology, safety and control of work

### 1.5 Obligatory literature

2. Prof. E. Nonveiller (1981.): Mehanika tla i temeljenje, Školska knjiga
3. M. Mulabdić: Notes for Lectures

### 1.6 Additional literature


### 1.7 Exam

Exam: Oral: Yes  Written: No  Seminar: Yes  
Pre/Corequisites: soil mechanics

### 1.8 Quality control

tests, small size working examples
1 Course

1.1 General data

<table>
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<tr>
<th>Code</th>
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<th>Semester</th>
<th>ECTS</th>
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<tr>
<td>5.01-103</td>
<td>MARKETING</td>
<td>2 + 2</td>
<td>OPTIONAL -OTM</td>
<td>WINTER</td>
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Lecturer: Asc.Prof.ZLATKO LACKOVIĆ
Collaborators: Prof.BARBARA MEDANIĆ

1.2 Instructional format

<table>
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</tbody>
</table>

1.3 Course curricula


Seminar work: Analysis of marketing surrounding, Research of market, Definition of market segments, Analysis of elements of marketing mix, Organization of marketing, Marketing plan, Example of electronic business in marketing.

1.4 Competence

Discovering and implementation of marketing in civil engineering. Determination of trends in marketing activities. Analyses and determination of elements of marketing mix. Organization, ethics and culture in marketing.

1.5 Obligatory sources

5. Lacković, Z., Marketing u građevinarstvu, Građevinski fakultet, Osijek, 2005

1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: no Seminar: yes

Pre/Corequisites: Made and positively marked seminar work

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
<td>2.15-116</td>
<td>INDUSTRIALIZED CONSTRUCTION</td>
<td>2 + 2</td>
<td>OPTIONAL -OTM</td>
<td>WINTER</td>
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</table>

Lecturer: Prof. PETAR BRANA  

1.2 Instructional format

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</table>

1.3 Course curricula

The principles of industrial construction (the industrialization process, basic problems of industrial construction, Technical and economic relations of industrial construction).  
Construction site prefabrication (Basic construction site production for bearing structures, Large paneling and tunnel paneling, sliding paneling, pneumatic paneling).  
Construction with prefabricated elements (open and closed mounting systems, Construction examples in a system with components and semi-products, modular basics and geometrical principles for projecting assembled objects).  
Transport procedures and problems of assembled construction. The principles of construction assembling and disassembling parts made of reinforced concrete. A proposal for standardizing construction elements in a prefabricated system (Columns, Panels, Stairways, Foundations, Paths, Beams).  
Production of final parts (Construction site and factory). Measurements and tolerance. Links between elements (Budget principles and dimensions for various phases of production and exploitation, Distributing links, Selecting links, Treating elements in the junction zone, protecting junctions, props).  
Typical assembled buildings (Production installations, Garage, Agricultural objects, Warehouses, Bridges, Apartments and High rise business towers).

1.4 Competence

Introduce the students with the possibilities and advantages of using industrially manufactured elements for construction.

1.5 Obligatory sources

2. K. S. Elliott, Precast Concrete Structures, Butterworth Heinemann, Oxford, 2002

1.6 Additional sources


1.7 Exam

Exam: Oral: Yes Written: Yes Seminar:

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
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<tr>
<td>5.01-104</td>
<td>FINANCIAL MANAGEMENT</td>
<td>2 + 2</td>
<td>OPTIONAL</td>
<td>SUMMER</td>
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Lecturer: Ph.D. BARBARA MEDANIĆ
Collaborators: Ph.D. KSENIJA ĆULO

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- Idea and tasks of the modern financial management.
- Financial decision making.
- Kinds of financial decisions - about investing, about financing, about stock.
- Likvidity.
- Internal and external rentability.
- Time value of the short term and long term capital of the construction business firm.
- Reinvesting retained profit and the other profit resources.
- Investment to securities.
- Credit acquiring and returning.
- Capital costs.

1.4 Competence

The goals of the course are: to give to students knowledge about the importance of the manifestation capital for in the construction business; to give feeling for input and output resource dynamics; to give sense for money time value in the financial decision making.

1.5 Obligatory sources

1. Medanić, B.; Pšunder, I.; Skendrović, V.; Some financing aspects in construction, Faculty of Civil Engineering, Osijek, 2005

1.6 Additional sources


1.7 Exam

| Exam: | Oral: Yes | Written: No | Seminar: Yes |

Pre/Corequisites: passed exam Engineering Economy and Management

1.8 Quality control

Analysis of the individual seminar papers, level of the students' activities on the practical and experimental exercises, analysis students' polling results about course quality.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
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<tr>
<td>2.15-117</td>
<td>TOTAL QUALITY MANAGEMENT</td>
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Lecturer: Prof. KSENIA ČULO

Collaborators: M.Sc. ZLATA DOLAČEK

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula

- Completely access to managing quality of the construction production, processes and business.
- Importance of quality product and process, their relation towards the other business competitiveness elements.
- Assets and procedures of managing quality.
- Baldrige model – description quality through buyers' satisfaction by construction products and services.
- Implementation buyers' attitudes in strategy of global quality management.
- Quality as strategy and its' substantially defining.
- Measuring quality, quality function.
- Methodology of stimulating and of implementation management changes.
- Training of employees in organization, managing by quality, programming of experiments and their execution.
- Tacugen method.
- Reengineering and TQM.
- Competitive engineering.
- Role of the informatical technologies.

1.4 Competence

In this course students are introducing by main tasks of market competitiveness – QUALITY and its' importance. Quality has direct impact to business effectiveness. In the lectures there are main ideas and professional examples, during the exercises and seminars students are taught about adequately technics according to real professional problems. Target is to learn importance of sentence: "Do it only once, but do it correct!"

1.5 Obligatory sources

2. HRN EN ISO 9001:2002 Quality Management Systems

1.6 Additional sources


1.7 Exam

Exam: Oral: Yes  Written: No  Seminar: Yes
Pre/Corequisites: course presence

1.8 Quality control

During seminars students have to write one seminar paper. Final evaluation is formed on the base of quality seminar paper and oral exam.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<td>MAINTENANCE MANAGEMENT</td>
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Nastavnik: Ass.Prof. SAŠA MARENJAK

1.2 Instructional format

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<tr>
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<td>NO</td>
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</tbody>
</table>

1.3 Course curricula

Legislation in maintenance management, Maintenance costs, Defects, diagnosis and methods of inspections, Causes of defects, Life cycles of construction materials and elements, Maintenance management planning, resources, technology and costs, Importance of design and construction fase in maintenance management, Ways of defining optimal strategies in maintenance, Maintenance of buildings, and civil engineering structures, Importance of integrated logistic support in maintenance.

1.4 Competence

The objective of the course is to equip the students with the importance of maintenance management, definition of optimal strategies in maintenance, and optimal maintenance cost solutions.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: Yes Written: Yes Seminar: no

Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
<thead>
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Lecturer: Ass.Prof. LIDIJA TADIĆ
Collaborators: M.Sc. TATJANA MIJUŠKOVIĆ-SVETINOVIĆ

1.2 Instructional format

<table>
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<tr>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

Learn to characterize a raw water based on its source. Introduce conventional water treatment processes. Understand the principles, practices and learn basic design criteria of conventional water treatment system for removal of turbidity, pathogenic bacteria, dissolved organic matter, iron, manganese, hardness and total dissolved solids. Become familiar with the principles and practices the minimization of THM production, fluoridation and corrosion control. Introduce new advanced water treatment processes. Introduce principles and practice wastewater treatment on the specific project and drinking water treatment plant.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: yes Seminar: yes
Pre/Corequisites: Hydrology, Hydromechanic, Water Supply and Sewerage

1.8 Quality control

Midterm exam, seminar work
1 Course

1.1 General data

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Lecturer: Asc.Prof.Vladimir PATRČEVIĆ

1.2 Instructional format

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<th>Seminar</th>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
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</tbody>
</table>

1.3 Course curricula


1.4 Competence

Getting to know of hydrological processes, which are influential on the change quantity ground water. Getting to know of problem erosion and sedimentation. Use parametric hydrology.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: Written: Seminar: yes

Pre/Corequisites:

1.8 Quality control

Programs and partial seminary thesis
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
<th>Status</th>
<th>Semester</th>
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<tr>
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<td>TORRENT CONTROL</td>
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Lecturer: Asc.Prof. VLADIMIR PATRČEVIĆ

1.2 Instructional format

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<td>YES</td>
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</tbody>
</table>

1.3 Course curricula

Factors of erosion processes in river catchments; Categorisation of erosion; Technical activity for protection of land surfaces; Torrent watercourses – parts, parameters; Defining discharge of torrential flow; Regulation torrent channel; Torrent division – lodgemental, consolidational, retardational; Regulation torrent structures – thresholds, water stairs, cascades, consolidation zones (strips); Systems for regulation torrent catchments;

1.4 Competence

Indication of erosion processes and induced problems. Introduction to determination of water erosion parameters; protection measures and techniques and torrent control building. Problems identification and analysis of relevant treatments and building application regarding erosion protection, especially protection on torrent stream.

1.5 Obligatory sources

1. Svetličić, E., Otvoreni vodotoci - regulacije, udžbenik, Fakultet građevinskih znanosti Zagreb, Zagreb, 1987

1.6 Additional sources


1.7 Exam

Exam: Oral: Written: Seminar:

Pre/Corequisites:

1.8 Quality control

Analyses: seminary works, case study of some torrent regulation structures.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
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<td>HYDROTECHNICAL MODELING</td>
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</table>

Lecturer: Asc. Prof. LIDIJA TADIĆ

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
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<th>Experimental exercises</th>
<th>Seminar</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
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</tr>
</tbody>
</table>

1.3 Course curricula

- Introduction to hydrotechnical modeling
- Scenarios
- Hydrological models
- Modeling in fluid mechanics
- Testing and calibration
- Modeling of water distribution system
- Modeling of urban drainage
- Open channel modeling
- Groundwater modeling
- Environmental models

1.4 Competence

Synthesis of gained knowledge from hydraulic engineering and information technology and its application in the process of hydrologic, hydraulic and environmental modelling

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes  Written:  Seminar: yes

Pre/Corequisites:

1.8 Quality control

Individual case study
Differentiated year

Differentiated year is a prerequisite for entering Graduate University Degree Studies for students with Bachelor degrees acquired after finishing professional studies.

<table>
<thead>
<tr>
<th>I SEMESTER</th>
<th>Course</th>
<th>Lecturer</th>
<th>Hours a week</th>
<th>ECTS credits</th>
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<td>Lecturer</td>
<td>Lectures</td>
<td>Practices</td>
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<tr>
<td>1</td>
<td>Mathematics</td>
<td>Ass.Prof. NINOSLAV TRUHAR</td>
<td>4</td>
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<tr>
<td>2</td>
<td>Physics</td>
<td>Ph.D. JOSIP BRANA</td>
<td>3</td>
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<td>Descriptive Geometry</td>
<td>M.Sc.Stipančić-KLAić IVANKA</td>
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<td>Mechanics</td>
<td>Ass.Prof. ALEKSANDAR JURIĆ</td>
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<td>2</td>
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<td>5</td>
<td>Construction Materials</td>
<td>Ass.Prof. MIROSLAV MIKOČ</td>
<td>2</td>
<td>1</td>
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<th>Hours a week</th>
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<td>Lectures</td>
<td>Practices</td>
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<tr>
<td>6</td>
<td>Structural Analysis</td>
<td>Ass.Prof. SILVA LOZANČIĆ</td>
<td>3</td>
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<tr>
<td>7</td>
<td>Strenght of Materials</td>
<td>Ass.Prof. MIRJANA BOŠNJAK-KLEČINA</td>
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<td>8</td>
<td>Fluid Mechanics</td>
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<td>Concrete Structures</td>
<td>Asc.Prof. DRAGAN MORIĆ</td>
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<td>10</td>
<td>Timber and Metal Structures</td>
<td>Asc.Prof. STJEPAN TAKAĆ Asc.Prof. DAMIR MARKULAK</td>
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1 Course

1.1 General data

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Lecturer: Ass. Prof. NINOSLAV TRUHAR

1.2 Instructional format

<table>
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<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Sets in $\mathbb{R}^n$ and metric. The basic concept of multivariable function. Sketch the graph of a function of two variables. Series in $\mathbb{R}^n$. Limits and the concept of continuity of a multivariable function. Partial derivative and concept of differentiability higher-order partial derivatives of a function of two or three variables. Schwartz’s theorem. Jacobian. The Chain Rules for functions of several variables. Lagrange’s mean value theorem. equations of tangent planes and normal lines to surfaces. Taylor’s mean value theorem. Taylor’s series. The absolute and relative extrema of a function of several variables. Polar, cylindric and spherical coordinate system.


1.4 Competence

To inform students about the fundamentals of integral calculus for one variable functions. The basic results of the vector analysis and their application at calculating volumes and surface areas will be analysed as well.

1.5 Obligatory sources

1. S. Suljagić, Matematika 3, Građevinski fakultet, Zagreb,

1.6 Additional sources


1.7 Exam

<table>
<thead>
<tr>
<th>Exam:</th>
<th>Oral: yes</th>
<th>Written: yes</th>
<th>Seminar: no</th>
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Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
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Lecturer: Ph.D. JOSIP BRANA

1.2 Instructional format

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</table>

1.3 Course curricula


1.4 Competence

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: yes Seminar: no
Pre/Corequisites:

1.8 Quality control
1 Course

1.1 General data

<table>
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Lecturer: M.Sc. IVANKA STIPANČIĆ-KLAIĆ

1.2 Instructional format

<table>
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<th>Lectures</th>
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<th>Experimental exercises</th>
<th>Seminar</th>
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<tr>
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<td>YES</td>
<td>NO</td>
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</tr>
</tbody>
</table>

1.3 Course curricula

The task of Descriptive Geometry. The basic geometrical constructions. The basic geometrical curves and their construction. The perspective affinity and collineation. Monge’s method of projections: orthogonal projections onto the pair of planes the laws of the projections. The basic geometrical elements: the point, line, plane and their relationships. The projection of 2-dim (planar) contents, the general and special relationships (the parallelism and orthogonality) between them, the metrics. The additional projections, the rotation of plane, the valid laws, the projections of 2-dim (planar) objects. The basic 3-dim relationships, the problems in space, the projections of 3-dim objects. The general parallel projection, the valid laws. The axonometric (3-D) projections of objects. The planar intersections of some surfaces. The use of computer support graphics is included in all sequences.

1.4 Competence

At the end of the course a student is expected to meet and to know a graphical communication between 3-dimensional space objects and their presentation on 2-dim spaces (and vice versa). Those competences are learned across the different methods of projections which are used in civil engineering. The basic quality of this knowledge is in use of laws which are valid in some methods of projection.

1.5 Obligatory sources


1.6 Additional sources


web-sites: www.hdgg.hr, www.grad.hr/nastava/geometrija and every other book or web site in all world's languages

1.7 Exam

Exam: Oral: yes Written: yes (eliminatory) Seminar: no
Pre/Corequisites: No prerequisites

1.8 Quality control

Four programs
1 Course

1.1 General data

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Lecturer: Ass.Prof. ALEKSANDAR JURIĆ
Collaborators: M.Sc. ĐURICA MATOŠEVIĆ

1.2 Instructional format

<table>
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</table>

1.3 Content


1.4 Competence

The purpose of the study of mechanics is to learn basic principles and methods for solution kinematics and kin problems.

1.5 Obligatory sources

2. Tehnička mehanika II – kinematika, A. Kirichenko, FGZ Zagreb, 1984.;

1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: yes Seminar: yes

Pre/Coreguisites:

1.8 Quality control

Assessment of knowledge is carried out in the semester by two colloquia and seminar.
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
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**Lecturer:** Ass.Prof.MIROSLAV MIKOČ  
**Collaborators:** IVANKA NETINGER, B.Sc. in Civil Engineering

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
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<tr>
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<td>YES</td>
<td>YES</td>
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</tbody>
</table>

1.3 Course curricula


1.4 Competence

Introduce Students with Production, Characteristics properties and Testing, how would could executive correct Selection Building Materials at Building Construction

1.5 Obligatory sources

3. Ukrainczyk, V.; Bjegović D.; Mikulić D.; Rak, Z.; Poznavanje gradiva, auditorne vježbe, praktikum, aktivna nastava, Građevinski fakultet, Sveučilišta u Zagrebu, Zagreb, 1994

1.6 Additional sources

4. Đureković, A.; Cement, cementni kompozit i dodaci za beton, Školska knjiga, Zagreb, 1996

1.7 Exam

<table>
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<tr>
<th>Exam:</th>
<th>Oral: yes</th>
<th>Written: yes</th>
<th>Seminar: yes</th>
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Pre/Corequisites: attend Lectures and Practical exercises 75 percent of total Number of hours. Make and delivery the Programs.

1.8 Quality control

Seminars
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
<th>Hours</th>
<th>Status</th>
<th>Semester</th>
<th>ECTS</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>STRUCTURAL ANALYSIS</td>
<td>3 + 3</td>
<td>DIFFERENT CE</td>
<td>II</td>
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</table>

Lecturer: Ph. D. SILVA LOZANČIĆ, Civ. Eng.
Collaborators: TANJA KALMAN, B.Sc in Civ. Eng.

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
<th>Experimental exercises</th>
<th>Seminar</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

1.3 Course curricula


1.4 Competence

To learn the basics of statically determinate structural systems, the methods of calculating internal forces and structure displacements and numerical analysis of statically determinate systems.

1.5 Obligatory sources

1. V. Simović: Građevna statika I, 1988., sign. 1.19-155

1.6 Additional sources

5. Đ. Solovev: Statika konstrukcija. Statički neodređeni nosači, 1956., sign. 1.19-75

1.7 Exam

Exam: Oral:yes  Written:yes  Seminar:yes
Pre/Corequisites: Mechanics I

1.8 Quality control

Through preliminary exams, seminars and short tests
1 Course

1.1 General data

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td></td>
<td>STRENGTH OF MATERIALS</td>
<td>3 + 2</td>
<td>DIFFERENCE</td>
<td>II</td>
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</table>

Lecturer: Ass.Prof. MIRJANA BOŠNJAK-KLEČINA

1.2 Instructional format

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Practical exercises</th>
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<th>Seminar</th>
</tr>
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<tbody>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>COLLOQUIA</td>
</tr>
</tbody>
</table>

1.3 Course curricula


Special beam problems, statically indeterminate beams, special topics in elastic beam theory, theories of failure, members subjected to combined loadings, the energy methods, buckling and elastic stability, theory of plasticity, experimental elasticity, fundamentals of FEM.

1.4 Competence

Understanding of Stress and Strain Analysis and their Determination.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: Yes  Oral: Yes  Written: Yes  Seminar: Colloquia

Pre/Corequisites: Mathematics, Mechanics

1.8 Quality control

Written and oral Colloquia
1 Course

1.1 General data

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<tr>
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<tr>
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<td>FLUID MECHANICS</td>
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<td>DIFFERENCE</td>
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</table>

Lecturer: Ass.Prof. LIDIJA TADIĆ 
Collaborators: Ass.Prof. MARIJA ŠPERAC

1.2 Instructional format

<table>
<thead>
<tr>
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<th>Seminar</th>
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<tbody>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

1.3 Course curricula

Properties of fluids

1.4 Competence

Introduction to the basic principles of fluid mechanics as a foundation for the solution of all hydro technical problems

1.5 Obligatory sources

1. Vuković, Ž (1996): Osnove hidrotehnike 1

1.6 Additional sources


1.7 Exam

Exam: Oral: yes Written: yes Seminar:
Pre/Corequisites:

1.8 Quality control

3 preliminary exams and analysis of experimental exercises
1 Course

1.1 General data

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<tbody>
<tr>
<td></td>
<td>CONCRETE STRUCTURES</td>
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<td>DIFFEREN CE</td>
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Lecturer: Prof. DRAGAN MORIĆ

1.2 Instructional format

<table>
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<tr>
<th>Lectures</th>
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<td>YES</td>
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</table>

1.3 Course curricula


1.4 Competence

Knowing of structural shapes and forms and rules for construction of RC structures, with basic procedures in design of cross sections based on analysis of strain-stress conditions in cross section.

1.5 Obligatory sources


1.6 Additional sources


1.7 Exam

Exam: yes Oral: yes Written: yes Seminar: no
Pre/Corequisites: Materials, Resistance of materials, Mechanics

1.8 Quality control

Three colloquial exams during course lecture
1 Course

1.1 General data

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<tbody>
<tr>
<td></td>
<td>TIMBER AND METAL STRUCTURES</td>
<td>3 + 2</td>
<td>DIFFEREN</td>
<td>II</td>
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</tr>
</tbody>
</table>

Lecturer: Prof. STJEPAN TAKAČ
Ass.Prof. DAMIR MARKULAK

Collaborators: TIHOMIR ŠTEFIĆ, B.Sc. in Civil Engineering

1.2 Instructional format

<table>
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1.3 Course curricula


1.4 Competence

To gain a basic understanding of wood characteristics and properties and timber structures in general, and introduction to design, fabrication and erection of steel structures.

1.5 Obligatory sources


1.6 Additional sources

2. EN1993-1-1 (EC3): Design of Steel Structures, General Rules and Rules for Buildings

1.7 Exam

Exam: Oral: yes  Written: yes  Seminar: yes
Pre/Corequisites:

1.8 Quality control