ACADEMIC UNDERGRADUATE PROGRAMME IN

CIVIL ENGINEERING

Rijeka, July 2012.
STUDY PROGRAMME AND CURRICULUM

ACADEMIC UNDERGRADUATE PROGRAMME IN CIVIL ENGINEERING

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CONTENTS

1. INTRODUCTION .................................................................................................................. 3

2. GENERAL INFORMATION ................................................................................................... 4
   2.1. PROGRAMME NAME .................................................................................................. 4
   2.2. PARTY MANAGING AND CARRYING OUT THE STUDY PROGRAMME ................. 4
   2.3. PROGRAMME DURATION ......................................................................................... 4
   2.4. PROGRAMME ENTRANCE REQUIREMENTS ............................................................... 4
   2.5. COMPETENCES ACQUIRED BY THE STUDENT WITH COMPLETION OF THE PROGRAMME .......................................................................................... 4
   2.6. ACADEMIC TITLE OR DEGREE ACQUIRED ON COMPLETION OF THE PROGRAMME ........................................................................................................ 4

3. PROGRAMME DESCRIPTION ................................................................................................ 5
   3.1. LIST OF MANDATORY AND OPTIONAL COURSES .................................................... 5
   3.2. COURSE DESCRIPTION ............................................................................................ 6
   3.2.1. Description of mandatory and optional courses ...................................................... 6
   3.2.2. Explanation of ETCS credits .................................................................................. 58
   3.2.2.1. Explanation of ETCS credits by courses ............................................................... 58
   3.2.3. Quality assurance procedures and course (module) performance indicators ........ 59
   3.3. STUDY STRUCTURE .................................................................................................. 60
   3.3.1. Study Dynamics .................................................................................................... 62
   3.3.2. Student Requirements ........................................................................................... 62
   3.3.2.1. Enrollment requirements for the subsequent academic year ................................ 62
   3.3.2.2. Pre-requisites for courses enrolment ................................................................. 62
   3.4. LIST OF COURSES THE STUDENTS CAN ENROLL INTO AT OTHER COURSES OF STUDY .......................................................................................... 63
   3.5. LIST OF COURSES THAT CAN BE OFFERED IN FOREIGN LANGUAGE .................. 63
   3.6. CRITERIA AND CONDITIONS FOR TRANSCRIPTION OF ECTS ......................... 63
   3.7. COMPLETION OF THE STUDY .................................................................................. 63
   3.8. CONDITIONS FOR CONTINUATION OF THE STUDY FOR STUDENTS WHO INTERRUPTED THE STUDY ........................................................................ 63
1. INTRODUCTION

During the implementation of the Bologna process the Faculty of Civil Engineering of the University of Rijeka plans to reform the current study programmes (academic, vocational and postgraduate programmes) in line with the principles of the Bologna Declaration, namely in accordance with the propositions of the European Credit Transfer System (ECTS). This will be performed in order to promote student mobility in the Integrated European Higher Education Area.

The Faculty of Civil Engineering of the University of Rijeka organized and started carrying out civil engineering studies as an independent institution in 1976. During a forty-two-year activity a total of 1332 Diploma Engineers graduated from the Academic Programme, and 1431 Engineers from the Vocational Programme.

In structuring the new study programmes, the Faculty has followed the past experience in educating civil engineering professionals. For the purpose of integrating Croatia into the European Higher Education and Labour Area, the needs of the labour market have been considered, and the demands that will be set on prospective students, the Faculty, its staff and specialists in civil engineering, have been assessed. Consideration has been given to the fact that the Faculty of Civil Engineering in Rijeka is the only higher education institution in the greater area (the Primorsko-goranska County, the Istrian County, and the Lika-Senj County) that educates civil engineering professionals.

Due to the present-day intense activity in planning, designing and constructing the infrastructure (transportation systems, housing development, water supply systems, etc.) there is a great need for highly educated professionals in civil engineering. Figures show that there are no unemployed Diploma Engineers and Engineers in Civil Engineering registered with the employment agencies. It is safe to say that the trend toward an intense infrastructure construction will also continue in the years to come (during the process of approach and admission of Croatia to the European Union). In the longer term the need to plan and design new civil engineering structures will be transformed into the need to manage, maintain and reconstruct the infrastructure systems. Therefore part of the curriculum has also been adapted to meet this demand.

In the course of structuring the curricula, the Faculty cooperated closely with the related Faculties of Civil Engineering in Croatia. The core curriculum at the Undergraduate Programme Level was brought into tune with the related programmes of the other Faculties of Civil Engineering in Croatia in order to enable student mobility, first and foremost, at the national level.

In the course of structuring the undergraduate and graduate programmes, the curricula of respectable foreign institutions that educate professionals of the Engineering of Munich: Technische Universität München-Studienplan für same profile (the University of Engineering of Prague, the University of Studierende des Bauingenieurwesens, Eigenossische Technische Hochschule Zürich-ETH-Abteilung für Bauingenieurwesen in Zürich), as well as the recommendations of the association of European Faculties of Civil Engineering (European Civil Engineering Education and Training – EUCEET) were analysed. This was performed through coordination inside the TEMPUS Project «Restructuring and Updating of Civil Engineering Curriculum» (in which the 4 Faculties of Civil Engineering from Croatia, along with international experts and scientists, were, and still are, cooperating).

The Faculty teachers were actively included in structuring the curricula, and the students were consulted, too. The structure of the study programme was accepted at the Board of the Faculty of Civil Engineering on 21st December 2004.

The scheme adopted for academic programmes according to education cycles is «3+2+3», namely:
- Three-year Undergraduate Programme
- Two-year Graduate Programme
- Three-year Postgraduate Programme.

The Academic Undergraduate Programme proposed represents, in its core part, the continuation of the current Academic Graduate Programme. The curriculum is adapted to the standards of the Bologna process and brought up to date in terms of contents and methodology.

The Academic Undergraduate Civil Engineering Programme is the necessary first step in the process of educating highly qualified personnel in the civil engineering and other engineering professions.
2. GENERAL INFORMATION

2.1. PROGRAMME NAME
The name of the programme is: Academic Undergraduate Programme in Civil Engineering.

2.2. PARTY MANAGING AND CARRYING OUT THE STUDY PROGRAMME
The party that manages and carries out the proposed programme is the Faculty of Civil Engineering of the University of Rijeka with its basic organisation units: the Chair of Hydraulic Engineering, the Chair of Geotechnical Engineering, the Department of Computer Modelling of Materials and Structures, the Chair of Load Bearing Structures, the Chair of Technical Mechanics, the Chair of Transportation Engineering, the Chair of Construction Organization and Technology and Architecture, the Chair of Mathematics, and the Chair of Physics and other sciences.

2.3. PROGRAMME DURATION
The duration of the Academic Undergraduate Programme in Civil Engineering is three (3) academic years, during which students obtain a minimum of 180 ECTS credits.

2.4. PROGRAMME ENTRANCE REQUIREMENTS
The right to apply for enrolment on the Academic Undergraduate Programme has a candidate who has completed secondary schooling or has a comparable qualification of at least four years of schooling, or as defined by special Faculty regulations.

The citizens of the Republic of Croatia have the right to apply for the programme. Foreign citizens and persons without citizenship have the right of enrolment under the same conditions.

The selection of enrolment applicants for the Academic Undergraduate Programme is made on the basis of secondary school marks (overall mark, marks in mathematics and physics) and results of compulsory (Mathematics) and elective (Physics or Chemistry or Informatics) of the state high-school exit exam.

2.5. COMPETENCES ACQUIRED BY THE STUDENT WITH COMPLETION OF THE PROGRAMME
With completion of the Academic Undergraduate Programme the student acquires the fundamental competences for the planning and design of structures as well as basic knowledge that enables him/her to attend Graduate and Postgraduate Programmes in Civil Engineering or related fields as well as various programmes of lifelong learning.

During his/her studies the student develops the ability to communicate and inform the interested experts and the public about the problems and solutions connected with the civil engineering profession. He is able, upon analysis, to form an opinion on specific civil engineering issues from the viewpoint of the profession and social usefulness, for example environmental protection.

He is qualified for structural designs in concrete, timber and steelwork and for taking part in planning and designing hydraulic and transportation systems and structures.

He is qualified for independent design of simpler structures or components of complex structures, construction management and supervision of the construction of simpler civil engineering structures and building construction.

The knowledge and competences the student acquires with completion of the Academic Undergraduate Programme are sufficient to attend an Academic Graduate Programme and a Specialisation Programme at the Faculty of Civil Engineering (the proposing party) as well as to attend the same or similar programmes at other Faculties of Civil Engineering in the Republic of Croatia. The acquired fundamental knowledge enables the student to attend graduate programmes of other related engineering programmes.

2.6. ACADEMIC TITLE OR DEGREE ACQUIRED ON COMPLETION OF THE PROGRAMME
According to the proposed study programme, the academic title or degree acquired on completion of the Academic Undergraduate Programme is Bachelor (baccalaureus) of science in civil engineering (univ. bacc. ing. aedif.)
3. PROGRAMME DESCRIPTION

3.1. LIST OF MANDATORY AND OPTIONAL COURSES FOR THE PROPOSED UNDERGRADUATE STUDY PROGRAMME IN CIVIL ENGINEERING

List of mandatory courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Mandatory Course</th>
<th>Hours of active classes (L+E+S)</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>M-178 Linear Algebra</td>
<td>30+30+0</td>
<td>6.0</td>
</tr>
<tr>
<td>2.</td>
<td>M-183 Mathematical Analysis I</td>
<td>45+45+0</td>
<td>7.5</td>
</tr>
<tr>
<td>3.</td>
<td>TM-147 Mechanics I</td>
<td>30+30+0</td>
<td>5.5</td>
</tr>
<tr>
<td>4.</td>
<td>M-179 Computers and Information Science</td>
<td>30+25+5</td>
<td>4.0</td>
</tr>
<tr>
<td>5.</td>
<td>M-180 Constructive Geometry</td>
<td>45+15+30</td>
<td>6.0</td>
</tr>
<tr>
<td>6.</td>
<td>FD-198 Physics</td>
<td>45+15+0</td>
<td>4.5</td>
</tr>
<tr>
<td>7.</td>
<td>TM-145 Strength of Materials I</td>
<td>30+30+0</td>
<td>5.5</td>
</tr>
<tr>
<td>8.</td>
<td>TM-148 Mechanics II</td>
<td>30+30+0</td>
<td>5.5</td>
</tr>
<tr>
<td>9.</td>
<td>P-164 Geodesy</td>
<td>30+15+0</td>
<td>3.5</td>
</tr>
<tr>
<td>10.</td>
<td>OA-157 Civil Engineering Structures</td>
<td>30+15+0</td>
<td>4.0</td>
</tr>
<tr>
<td>11.</td>
<td>FD-195 The English Language</td>
<td>30+0+30</td>
<td>3.5</td>
</tr>
<tr>
<td>12.</td>
<td>FD-196 The German Language</td>
<td>30+0+30</td>
<td>3.5</td>
</tr>
<tr>
<td>13.</td>
<td>FD-793 Physical Training and Health Culture</td>
<td>0+30+0</td>
<td>1.0</td>
</tr>
<tr>
<td>14.</td>
<td>M-181 Mathematical Analysis II</td>
<td>45+45+0</td>
<td>7.5</td>
</tr>
<tr>
<td>15.</td>
<td>TM-146 Strength of Materials II</td>
<td>30+30+0</td>
<td>5.5</td>
</tr>
<tr>
<td>16.</td>
<td>G-104 Applied Geology</td>
<td>30+5+0</td>
<td>3.0</td>
</tr>
<tr>
<td>17.</td>
<td>TM-150 Structural Mechanics I</td>
<td>45+30+0</td>
<td>6.5</td>
</tr>
<tr>
<td>18.</td>
<td>MK-123 Structure and Characteristics of Materials</td>
<td>30+0+0</td>
<td>2.5</td>
</tr>
<tr>
<td>19.</td>
<td>H-117 Hydrology</td>
<td>30+15+0</td>
<td>3.0</td>
</tr>
<tr>
<td>20.</td>
<td>G-106 Soil and Rock Mechanics</td>
<td>45+20+10</td>
<td>5.5</td>
</tr>
<tr>
<td>21.</td>
<td>TM-149 Structural Mechanics II</td>
<td>45+30+0</td>
<td>6.5</td>
</tr>
<tr>
<td>22.</td>
<td>H-115 Fluid Mechanics</td>
<td>30+30+0</td>
<td>5.5</td>
</tr>
<tr>
<td>23.</td>
<td>P-165 Introduction to Road Design</td>
<td>30+30+0</td>
<td>4.5</td>
</tr>
<tr>
<td>24.</td>
<td>MK-124 Engineering Materials</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>25.</td>
<td>NK-135 Basics of Concrete Structures</td>
<td>45+30+0</td>
<td>6.0</td>
</tr>
<tr>
<td>26.</td>
<td>NK-136 Introduction to Steel Structures</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>27.</td>
<td>H-118 Introduction to Hydraulic Engineering</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>28.</td>
<td>OA-147 Construction Management and Technology</td>
<td>45+30+0</td>
<td>6.0</td>
</tr>
<tr>
<td>29.</td>
<td>G-107 Geotechnical Engineering</td>
<td>45+30+0</td>
<td>6.0</td>
</tr>
<tr>
<td>30.</td>
<td>OA-148 Construction Economics</td>
<td>30+15+0</td>
<td>4.0</td>
</tr>
<tr>
<td>31.</td>
<td>OA-149 Fieldwork</td>
<td>0+30+0</td>
<td>3.0</td>
</tr>
<tr>
<td>32.</td>
<td>ZR-PRED Final Year Project</td>
<td>0+0+30</td>
<td>5.0</td>
</tr>
</tbody>
</table>

For students some sports and recreational activities coordinated through the course Physical Training and Health Culture are organized.
List of Optional Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Optional Course</th>
<th>Hours of Active Classes (L+E+S)</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. M-182</td>
<td>Engineering Geometry</td>
<td>10+0+20</td>
<td>3.0</td>
</tr>
<tr>
<td>34. M-184</td>
<td>Computer Applications</td>
<td>10+10+10</td>
<td>3.0</td>
</tr>
<tr>
<td>35. M-177</td>
<td>Introduction to Programming</td>
<td>10+20+0</td>
<td>3.0</td>
</tr>
<tr>
<td>36. FD-193</td>
<td>Communication Skills</td>
<td>15+15+0</td>
<td>2.0</td>
</tr>
<tr>
<td>37. FD-199</td>
<td>Introduction to Language Culture</td>
<td>15+15+0</td>
<td>2.0</td>
</tr>
<tr>
<td>38. OA-154</td>
<td>Construction History</td>
<td>15+0+15</td>
<td>2.0</td>
</tr>
<tr>
<td>39. FD-197</td>
<td>Building and Constructing English</td>
<td>10+10+5</td>
<td>2.0</td>
</tr>
<tr>
<td>40. OA-144</td>
<td>Introduction to Spatial Planning</td>
<td>30+0+15</td>
<td>3.0</td>
</tr>
<tr>
<td>41. OA-143</td>
<td>Building Design</td>
<td>15+30+0</td>
<td>3.0</td>
</tr>
<tr>
<td>42. MK-122</td>
<td>Introduction to Building Physics</td>
<td>20+0+10</td>
<td>2.0</td>
</tr>
<tr>
<td>43. G-108</td>
<td>Environmental Protection</td>
<td>15+0+15</td>
<td>2.0</td>
</tr>
<tr>
<td>44. OA-155</td>
<td>Management in Civil Engineering</td>
<td>30+0+15</td>
<td>3.0</td>
</tr>
<tr>
<td>45. OA-156</td>
<td>Civil Engineering Regulations</td>
<td>30+0+0</td>
<td>3.0</td>
</tr>
<tr>
<td>46. NK-134</td>
<td>Bridges</td>
<td>30+15+15</td>
<td>5.0</td>
</tr>
<tr>
<td>47. NK-137</td>
<td>Introduction to Timber Structures</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>48. H-119</td>
<td>Introduction to Coastal Engineering</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>49. H-114</td>
<td>Water Resources and Systems</td>
<td>30+0+30</td>
<td>5.0</td>
</tr>
<tr>
<td>50. P-167</td>
<td>Urban Roads and Intersections</td>
<td>30+30+0</td>
<td>5.0</td>
</tr>
<tr>
<td>51. P-163</td>
<td>Railway Design</td>
<td>45+15+0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

3.2. COURSE DESCRIPTION

Explanation of ECTS credits, the quality assessment and the courses delivery success are given in chapters 3.2.2. and 3.2.3. for all subjects.

3.2.1. Description of mandatory and optional courses

Student assessment

Note (1) – Article 43 of Decision of Amendments of Regulations on Studies from May 3rd 2005 (Class: 003-01/05-01/07, Reg. No.: 2170-57-01-05-8) from November 6th 2007

Assessment within the European Credit Transfer System

(1) Student accomplishment in each course is assessed with ECTS grading scale in percentage from 0 to 100%, whereby for the passing grade at the undergraduate studies a student must not score less than 40% and at graduate studies less than 50%.

(2) Student evaluation and assessment for each course (module) is during classes and at the final exam as follows:
- total percentage of student accomplishment during classes (attendance, partial exams, preliminary exams and other activities defined by the study program) makes up to 70% of the grade and
- total percentage of student accomplishment at the final exam makes up to 30% of the grade.

Note (2) – Article 43a, paragraph 3 of Decision of Amendments of Regulations on Studies from May 3rd 2005 (Class: 003-01/05-01/07, Reg. No.: 2170-57-01-05-8) from November 6th 2007

(3) The students attending courses where a numerical grade is not awarded, as defined by the study program, are given by the professors the allotment “all the requirements met” if they have scored 40 or more credits at the university undergraduate studies or 50 or more credits at university postgraduate studies.
- Enrollment into courses taught in the second and the subsequent study years is defined by Article 34 of Amendments of Regulations on Studies of University of Rijeka or by study prerequisites pursuant to article e.3.2.1 of this study program.
## Course: LINEAR ALGEBRA

### Pre-requisites:
- The course consists of:
  - lectures
  - exercises

### Hours of Active Classes:
- Lectures: 30
- Exercises: 30
- Seminars: 0

### Course status: mandatory

### ECTS: 6.0

### Course objectives
- Students will:
  - become familiar with the concepts such as scalar product, vector product, matrix, inverse matrix, determinant, linear independence, eigenvalue, and eigenvector,
  - learn to solve linear systems by the Gauss elimination method,
  - deepen their knowledge about conic sections and quadratic surfaces.

### Syllabus
- Quadratic forms. Transformation to principal axes. Conic sections and quadratic surfaces.

### Student obligations
- Attending lectures and exercises.

### Exam
- The exam is taken in written form.

### Assessment (1)
- Preliminary exams (70%), written exam (30%).

### Literature
- **Essential:**
  1. Notes taken at the classes.

- **Recommended:**
<table>
<thead>
<tr>
<th>Course</th>
<th>MATHEMATICAL ANALYSIS I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>M-183</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>90 lectures: 45 exercises: 45 seminars: 0</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>ECTS:</td>
<td>7.5</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>The course consists of:</td>
</tr>
<tr>
<td></td>
<td>lectures exercises</td>
</tr>
<tr>
<td>Course objectives</td>
<td>Students will revise their knowledge of high-school mathematics, and will learn:</td>
</tr>
<tr>
<td></td>
<td>- to compute limits, derivatives, integrals and Taylor series,</td>
</tr>
<tr>
<td></td>
<td>- to use derivatives and integrals to: sketch a graph of a function, compute the area of a plane figure,</td>
</tr>
<tr>
<td></td>
<td>compute the volume and area of a solid of revolution, compute the length of a graph,</td>
</tr>
<tr>
<td></td>
<td>- to approximate functions by means of Taylor (and some other) polynomials.</td>
</tr>
<tr>
<td>Student obligations</td>
<td>Attending lectures and exercises.</td>
</tr>
<tr>
<td>Exam</td>
<td>The exam is taken in a written form.</td>
</tr>
<tr>
<td>Assessment (1)</td>
<td>Preliminary exams (70%), written exam (30%).</td>
</tr>
<tr>
<td>Essential:</td>
<td>Notes taken at the classes.</td>
</tr>
<tr>
<td>Literature</td>
<td>Recommended:</td>
</tr>
</tbody>
</table>
**Course:** MECHANICS I

<table>
<thead>
<tr>
<th>Course Code: TM-147</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The course consists of:</td>
<td>lectures: 30  exercises: 30  seminars: 0</td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td>ECTS: 5.5</td>
<td></td>
</tr>
</tbody>
</table>

**Course objectives**

1. To understand the laws of rigid-body statics under the action of 2D and 3D central and general force systems.
2. To learn how to apply these laws in order to determine the reactions and cross-sectional forces and moments in simple beam-like structures.
3. To acquire the necessary skills for the courses Mechanics 2 and Strength of Materials.

**Syllabus**

- 2D and 3D central force systems.
- Equilibrium of the central force system; equilibrium of the material particle.
- 2D and 3D general force systems. The moment of force.
- Parallel forces. Force couple. Reduction of a system to the force and moment at a given point.
- Equilibrium of the general force system; equilibrium of a rigid body.
- Basic types of structures. Supports and reactions.
- Trusses and forces in truss members.
- Beams. Constant distributed load.
- Cross-sectional forces and their diagrams. Statically determinate and indeterminate systems.
- Beams and frames with hinges and diagrams of cross-sectional forces in such structures.
- Relations between the cross-sectional forces and the maximum bending moment.
- Coulomb’s friction.
- Introduction to the principle of virtual work.

**Student obligations**

Understanding of the course material is periodically checked via preliminary exams, the results of which are being added to the results of the written exam.

**Exam**

The exam is taken in written form.

**Assessment (1)**

Preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**

**Recommended:**
<table>
<thead>
<tr>
<th>Course:</th>
<th>COMPUTERS AND INFORMATION SCIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>M-179</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>The course consists of: lectures exercises seminars</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>60 lectures: 30 exercises: 25 seminars: 5</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
</tbody>
</table>

**Course objectives**

The course gives a systematic overview of some important fields of computer and information science, students gain the ability to use networked computers autonomously as the tools to solve engineering problems.

**Syllabus**

- history of computers
- computer architecture
- computer operating systems - definition, basic functions, comparison of operating systems, computer networks
- computer communications and network services - local and global networks, Internet
- Universal software tools in Windows environment (text processor, spread sheet, presentation software)
- programming languages - machine languages, assemblers, high level languages, compilers, algorithm, program documentation, HTML, JAVA
- software packages for engineers
- computers in civil engineering: present state of and future trends

Exercises: practical work on computers, the examples relating to the teaching materials are presented.

**Student obligations**

All of the given tasks on the computer and seminar must be made.

**Exam**

The exam is taken in written form.

**Assessment** *(1)*

Preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**
1. course materials presented on the web site www.gradri.hr/~informatika
2. the relevant web site addresses presented on the course web site

**Recommended:**
Course: CONSTRUCTIVE GEOMETRY

<table>
<thead>
<tr>
<th>Course code: M-180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
</tr>
<tr>
<td>Hours of Active Classes: 90</td>
</tr>
<tr>
<td>lectures: 45 exercises: 15 seminars: 30</td>
</tr>
<tr>
<td>Course status: mandatory</td>
</tr>
<tr>
<td>The course consists of: lectures exercises seminars</td>
</tr>
<tr>
<td>ECTS: 6.0</td>
</tr>
</tbody>
</table>

Course objectives
- to develop space perception ability
- to learn fundamental principles of computer graphics in 3D and descriptive geometry
- to develop constructive problem solving skills in 3D and representing in projections
- to introduce geometrical thinking and creative approach to the use of CAD in 3D
- to acquire fundamental principles of geometric computer modelling

Syllabus
- introduction to visual communication; basic elements in geometry and graphics
- Monge’s-projection and descriptive geometry; use in CAD-systems
- additional views in classic and CAD technology: metric and position-problem solving, the use of 3D computer graphic
- geometric transformations
- conics - properties and use
- rotating 2D objects (plane figure) in 3D space (use of affine transformation and CAD)
- geometric forms of solids; regular polyhedra, 3D- primitives in CAD
- irregular solids. Tangent plane.
- axonometry, use in CAD
- solid -cutting plane. Intersections of line and solid.
- basic of solid-intersections and Boolean operations on 3D primitives
- basics of quoted projections; terrains

Student obligations
- course attendance
- active collaboration - seminars
- accepted project work before the end of the term

Exam
Written and oral exam. Part of the exam can be taken using the computer.

Assessment (1)
Seminar, presentation of seminar, programme work and preliminary exams (70%), written exam (30%).

Literature

**Essential:**
1. Pletenac, Lidija: Konstruktivna geometrija u CAD-u, elektronički udžbenik-skripta
4. Internet stranice http://master.grad.hr/nastava/geometrija/ http://gradri.hr/~pletenac/

**Recommended:**
2. Giering, Dr. Osvald; Seybold, Dr. Hans: Konstruktive Ingenieurgeometrie, Carl Hanser Verlag, München, Wien, 1987.
5. Priručnik za DesignCAD (on line)
<table>
<thead>
<tr>
<th>Course:</th>
<th>PHYSICS</th>
</tr>
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<tbody>
<tr>
<td><strong>Course code:</strong></td>
<td>FD-198</td>
</tr>
<tr>
<td><strong>Pre-requisites:</strong></td>
<td>The course consists of:</td>
</tr>
<tr>
<td><strong>Hours of Active Classes:</strong></td>
<td>ECTS:</td>
</tr>
<tr>
<td>lectures: 45</td>
<td>4.5</td>
</tr>
<tr>
<td>exercises: 15</td>
<td></td>
</tr>
<tr>
<td>seminars: 0</td>
<td></td>
</tr>
<tr>
<td><strong>Course status:</strong></td>
<td>mandatory</td>
</tr>
<tr>
<td><strong>ECTS:</strong></td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td>The main goal of the course is to help understanding in basic physical laws in which the knowledge of computer use will be required.</td>
</tr>
<tr>
<td><strong>Student obligations</strong></td>
<td>Students are obliged to attend lessons and take preliminary exams.</td>
</tr>
<tr>
<td><strong>Exam</strong></td>
<td>The exam is written in which, apart from solving problems, the knowledge of theory is required.</td>
</tr>
<tr>
<td><strong>Assessment (1)</strong></td>
<td>Preliminary exams (70%), written exam (30%).</td>
</tr>
</tbody>
</table>
| **Literature** | **Essential:**
**Recommended:**
**Course:** STRENGTH OF MATERIALS I

<table>
<thead>
<tr>
<th>Course code: TM-145</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises seminars: 0</td>
<td></td>
</tr>
<tr>
<td>ECTS: 5.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course objectives**

1. To understand the physical meaning of stresses and strains and their role in uniaxial and simple states of equilibrium and kinematics of deformable media.
2. To learn how to solve such problems in mechanics of deformable media where uniaxial or simple stress states take place.
3. To acquire necessary skills for the courses Strength of Materials 2, Structural Mechanics 1, Materials 1, Steel Structures, Concrete Structures and Timber Structures.

**Syllabus**

1. Uniaxial stress-strain state. Linear elasticity.
4. Force-induced bending. 3D bending.
5. Bending due to axial force.
7. Differential equation of deformation of a bent beam.
8. Beam on elastic foundation.
13. Buckling.
15. Elastic-plastic bending.

**Student obligations**

Understanding of the course material is periodically checked via preliminary exams, the results of which are added to the results of the written exam.

**Exam**

The exam is taken in written form.

**Assessment**

Preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**
1. Šimić, V. Otpornost materijala 1 i 2, Školska knjiga, Zagreb, 1992, 2002

**Recommended:**
1. Alfirević, I. Nauka o čvrstoći I, Tehnička knjiga, Zagreb, 1995
2. Bazjanac, D. Nauka o čvrstoći, Tehnička knjiga, Zagreb, 1973
<table>
<thead>
<tr>
<th>Course:</th>
<th>MECHANICS II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>TM-148</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>The course consists of:</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>60 lectures: 30 exercises: 30 seminars: 0</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>ECTS:</td>
<td>5.5</td>
</tr>
</tbody>
</table>

**Course objectives**

1. To understand Newton’s laws of dynamics in cases of motion of particles and rigid bodies.
2. To learn fundamental principles of Lagrange’s analytical dynamics.
3. To learn how to apply these principles to simple problems of engineering dynamics and theory of oscillation.
4. To acquire necessary skills as a pre-requisite for the course Hydromechanics.

**Syllabus**

Newton’s laws of dynamics. Equations of motion.
Kinematics of a particle. Position, velocity and acceleration as vectors.
Kinematics of curvilinear motion. Choice of the observer and the co-ordinate system.
Dynamics of curvilinear motion of the material particle. Central force system.
Impulse of the force and momentum. Angular momentum. Work and power.
Laws of dynamics as applied to rigid bodies. Euler’s equations and moments of inertia.
2D motion of the rigid body. Angular momentum around a principal axis of inertia.
3D motion of the rigid body. Euler’s angles and rotation of the Earth.
Free and forced undamped and damped oscillations of the material particle.
Dynamics of the systems of material particles. Eigenvalue problem.
Principle of virtual work in dynamics. Action integral and Hamilton’s principle.
Lagrange’s equations and their application to the systems of concentrated masses and springs.
Introduction to the dynamics of deformable bodies. Cauchy’s equations of motion.

**Student obligations**

Understanding of the course material is periodically checked via three preliminary exams, the results of which are being added to the results of the written exam.

**Exam**

The exam is taken in written form.

**Assessment**

Preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**

**Recommended:**
6. Jecić, S.: Mehanika II -- Kinematika i dinamika, Tehnička knjiga, Zagreb
Course: GEODESY

<table>
<thead>
<tr>
<th>Course code: P-164</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 45 lectures: 30 exercises: 15 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises -</td>
<td>ECTS: 3.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course objectives</th>
<th>Understanding and learn basic terminology of land surveying</th>
</tr>
</thead>
</table>

**Syllabus**

1. basic concepts of surveying  
2. vertikal control  
3. distance  
4. angles  
5. position  
6. control surveys  
7. satellite positioning

**Student obligations**

Course attendance. Obligatory project work.

**Exam**

Written and oral exam

**Assessment (1)**

Preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**

1. Macarol, S.: Praktična geodezija, Tehnička knjiga, Zagreb,  

**Recommended:**

1. Janković, M.: Inženjerska geodezija I i II  
2. Kapetanović N., Selesković F.: Geodezija, Univerzitetska knjiga, Sarajevo  
## Course: CIVIL ENGINEERING STRUCTURES

<table>
<thead>
<tr>
<th>Course code: OA-157</th>
<th>Pre-requisites: The course consists of: lectures exercises seminars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours of Active Classes: 45 lectures: 30 exercises: 15 seminars: 0</td>
</tr>
</tbody>
</table>

### Course status: mandatory

### Hours of Active Classes: 45

- lectures: 30
- exercises: 15
- seminars: 0

### ECTS: 4.0

### Course objectives

Development of general and specific knowledge in the field of design and construction of buildings.

### Syllabus

1. Project descriptive documentation, detailed drawings
2. Foundations
3. Hidro and thermo isolations
4. Walls of stone, brick, composite walls
5. Floors (concrete, wood, iron)
6. Roofs of wood, concrete, prefabricated
7. Doors and windows
8. Elements of final sistemation works

### Student obligations

Attendance to the course has to be in accordance to the University/Faculty regulations.
Practical - project work.

### Exam

Written and oral exam

### Assessment (1)

- Active participation in class, making of programme and preliminary exams (70%).
- Written and oral exam (30%).

### Literature

**Essential:**

3. M. Mitag: Građevinske konstrukcije
4. Proizvodni programi građevinske opreme
5. Katalog detalja za studente pripremljen kao skripte.

**Recommended:**

1. Novi proizvodni programi, izvor: internet..
<table>
<thead>
<tr>
<th>Course Code:</th>
<th>THE ENGLISH LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
<td>Hours of Active Classes: 60</td>
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<tr>
<td>Lectures: 30</td>
<td>Exercises: 0</td>
</tr>
<tr>
<td>Seminars: 30</td>
<td></td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td>ECTS: 3.5</td>
</tr>
</tbody>
</table>

**Course objectives**

The student is expected to develop communicative competence, namely the ability to understand and produce English in speech and writing.

**Syllabus**

Grammar themes (the general grammar rules of the English language, the grammar structures specific to the language of the engineering profession and the similarities and differences in grammar structures between English and Croatian) at the levels of:
- word-formation
- morphology (parts of speech, morphological changes)
- syntax (sentence types, sentence elements, word order; use and sequence of tenses; active-passive relation; infinitive and participle clauses).

Lexical themes:
- general vocabulary
- technical and vocational terminology (mathematics, information technology, geodesy, construction materials, building construction, soil mechanics, foundations, transportation engineering, bridges, tunnels, hydraulic works).

**Student obligations**

- Attendance to the course as defined by the Faculty regulations.
- Two written tests and one oral test. The scores obtained at the tests are added together (each written test is worth 30% and the oral test 40% scores). The condition for obtaining credits is 40% of total points.

**Exam**

none

**Assessment (1)**

Activity in class, homework, preliminary exams (100%).

**Literature**

**Essential:**
1. Texts used in lectures and exercises
2. Any grammar of English language

**Recommended:**
### Course: THE GERMAN LANGUAGE

<table>
<thead>
<tr>
<th>Course code: FD-196</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>lectures: 30 exercises: 0 seminars: 30</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course status: mandatory</th>
<th>The course consists of:</th>
<th>ECTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lectures - seminars</td>
<td>3.5</td>
</tr>
</tbody>
</table>

#### Course objectives
The student is expected to develop communicative competence, namely the ability to understand and produce German in speech and writing.

#### Syllabus
Grammar themes:
- Broadening prior knowledge of general grammar rules of the German language.
- Teaching the grammar structures specific to the language of the engineering profession.
- Dealing with grammar problems at the levels of word-formation, morphology (parts of speech, morphological changes) and syntax (sentence types, sentence elements, word order; use and sequence of tenses; active-passive relation; infinitive and participle clauses).
- Defining the similarities and differences in grammar structures between German and Croatian.

Lexical themes:
- general vocabulary
- technical and vocational terminology (mathematics, information technology, geodesy, construction materials, building construction, soil mechanics, foundations, transportation engineering, bridges, tunnels, hydraulic works).

#### Student obligations
- Attendance to the course as defined by the Faculty regulations.
- Two written tests and one oral test. The scores obtained at the tests are added together (each written test is worth 30% and the oral test 40% scores). The condition for obtaining credits is 40% of total points.

#### Exam
none

#### Assessment (1)
Activity in class, homework, preliminary exams (100%).

#### Literature
**Essential:**
1. Texts used in lectures and exercises
2. Any grammar of German language

**Recommended:**
<table>
<thead>
<tr>
<th>Course:</th>
<th>PHYSICAL TRAINING AND HEALTH CULTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>FD-793</td>
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<tr>
<td>Pre-requisites:</td>
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<tr>
<td>Hours of Active Classes:</td>
<td></td>
</tr>
<tr>
<td>lectures:</td>
<td>exercises:</td>
</tr>
<tr>
<td>Course status:</td>
<td>optional</td>
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<tr>
<td>The course consists of:</td>
<td></td>
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<tr>
<td>-</td>
<td>exercises</td>
</tr>
<tr>
<td>ECTS:</td>
<td>1.0</td>
</tr>
<tr>
<td>Course objectives</td>
<td>Objective of the Course is to provide by physical training such an educational which will stimulate student's curiosity, improve their intellectual development and prepare them for their professional competence. Physical training develops their abilities to be successful in various scientific fields.</td>
</tr>
<tr>
<td>Syllabus</td>
<td>Group or individual exercises (fitness, tennis, swimming, climbing etc), but depending on the material and financial possibilities of the Faculty to provide necessary and adequate means.</td>
</tr>
<tr>
<td>Student obligations</td>
<td>Presence to the activities to be recorded by lecturer's signature</td>
</tr>
<tr>
<td>Exam</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Assessment (2)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Literature</td>
<td>Essential:</td>
</tr>
<tr>
<td></td>
<td>Not obligatory</td>
</tr>
<tr>
<td></td>
<td>Recommended:</td>
</tr>
<tr>
<td></td>
<td>Literature related to the sports specified in Syllabus</td>
</tr>
</tbody>
</table>
Course: MATHEMATICAL ANALYSIS II

<table>
<thead>
<tr>
<th>Course code:</th>
<th>M-181</th>
<th>Pre-requisites:</th>
<th>Mathematical analysis I</th>
</tr>
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<tbody>
<tr>
<td>Course status:</td>
<td>mandatory</td>
<td>The course consists of:</td>
<td>lectures exercises -</td>
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<tr>
<td>Hours of Active Classes:</td>
<td>90</td>
<td></td>
<td>lectures: 45 exercises: 45 seminars: 0</td>
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<tr>
<td>ECTS:</td>
<td>7.5</td>
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</tr>
</tbody>
</table>

**Course objectives**
The main goal of the course is to help students understanding in differential equations and basic principals of statistics.

**Syllabus**
- Arc length. Multiple integrals with applications.
- Wave equation. Diffusion equation. Variation princip.
- Stochastic processes. Correlations function.
- Statistical tests with applications.

**Student obligation**
Students are obliged to attend lessons and to make seminar.

**Exam**
The exam is written in which, apart from solving problems, the knowledge of theory is required.

**Assessment (1)**
Preliminary exams (70%), written exam (30%).

**Literature**
**Essential:**

**Recommended:**
# STRENGTH OF MATERIALS II

<table>
<thead>
<tr>
<th>Course code:</th>
<th>TM-146</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Pre-requisites:</td>
<td>Strength of Materials I</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>60 lectures: 30 exercises: 30 seminars: 0</td>
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<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>The course consists of:</td>
<td>lectures exercises -</td>
</tr>
<tr>
<td>ECTS:</td>
<td>5.5</td>
</tr>
</tbody>
</table>

## Course objectives

1. To understand tensorial character of stress and strain and behaviour of a linear elastic material in 2D and 3D states of stress and strain.
2. To learn how to solve 2D and 3D problems in mechanics of deformable media.
3. To acquire necessary skills for the courses, Structural Mechanics 2, Soil and rock mechanics, Fluid mechanics, Steel Structures, Concrete Structures and Timber Structures.

## Syllabus

1. Introduction to 2D and 3D stress states. Stress vector.
2. Equilibrium equations. Stress tensor.
3. Principal stresses. Mohr’s circle.
5. Constitutive equations. Linear elastic material.
6. Shear stresses in beams.
7. General state of stress in beams.
8. Timoshenko’s theory of beams.
10. Shear stresses in thin-walled cross-sections. Shear centre.
11. Strain energy. Maxwell and Betti theorems.
12. Castigliano’s theorems.
14. Equivalent stress according to different theories.
15. Yield-state design.

## Student obligations

Understanding of the course material is periodically checked via preliminary exams, the results of which are added to the results of the written exam.

## Exam

Written exam.

## Assessment (1)

Preliminary exams (70%), written exam (30%).

## Literature

**Essential:**
1. Šimić, V. Otpornost materijala 1 i 2, Školska knjiga, Zagreb, 1992, 2002

**Recommended:**
1. Alfirević, I. Nauka o čvrstoći I, Tehnički knjiga, Zagreb, 1995
2. Bazjanac, D. Nauka o čvrstoći, Tehnički knjiga, Zagreb, 1973
## Course: **APPLIED GEOLOGY**

<table>
<thead>
<tr>
<th>Course code: G-104</th>
<th>Pre-requisites: Constructive geometry</th>
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<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises -</td>
</tr>
<tr>
<td>Hours of Active Classes: 35 lectures: 30 exercises: 5 seminars: 0</td>
<td>ECTS: 3.0</td>
</tr>
</tbody>
</table>

### Course objectives
Preparing students for basic understanding geological fabric and dynamic of the Earth and aspects of geology that are relevant in civil engineering. Students should be able to identify and describe common rocks and soil. The course prepares students for supplementary courses in geotechnics, hydrotechnics and environmental protection.

### Syllabus
- Origine, structure and dynamics of the Earth
- Minerals and their physical and chemical properties
- Igneous, sedimentary and metamorphic rocks
- Deformation of rock: folding and faulting
- Earthquakes and seismotectonic activity
- Geologic time and stratigraphic geology
- Geological fabric of Republic of Croatia
- Groundwaters and their dynamics
- Weathering of rocks and soil formation
- Geomorphological processes
- Using of rock and soils in construction
- Site investigations and geological mapping

### Student obligations
- Course attendance
- Preliminary exam

### Exam
The exam is taken in written form.

### Assessment (1)
Preliminary exams (70%), written exam (30%).

### Literature
**Essential:**
1. Lectures in Applied Geology, www.gradri.hr

**Recommended:**
### Course:

<table>
<thead>
<tr>
<th>Course code:</th>
<th>TM-150</th>
</tr>
</thead>
</table>

### Pre-requisites:

- Mechanics I

### Hours of Active Classes:

- Lectures: 45
- Exercises: 30
- Seminars: 0

### Course status:

- Mandatory

### Course objectives

At the end of the course unit the student is expected to be able to prepare statical calculation of line statically determinate constructions of engineering structures under unmovable and movable loads.

### Syllabus


### Student obligations

- Course attendance: min. 70% hours of lectures and exercises
- Preliminary exams: obligatory
- Accepted project work before the oral exam

### Exam

Written exam and oral exam.

### Assessment

- Preliminary exams, project work, lectures’ attendance (70%), written exam (30%).

### Literature

**Essential:**
2. Kozulić, V.: Separati s predavanja (WEB stranica predmeta)

**Recommended:**
Course: | STRUCTURE AND CHARACTERISTICS OF MATERIALS
--- | ---
**Course code:** MK-123 | **Pre-requisites:**
**Course status:** mandatory | Hours of Active Classes: 30
lectures: 30 exercises: 0 seminars: 0

ECTS: 2.5

| Course objectives | Students are introduced to the principles of materials science, which deals with structure of materials and its relation to properties of materials, and the behaviour of materials under mechanical loads.


| Student obligations | Participation in all lectures and exercises.
Preliminary exams.

| Exam | The exam is taken in written form.

| Assessment (1) | Preliminary exams (70%), written exam (30%).

| Literature | **Essential:**

**Recommended:**
## Course: HYDROLOGY

<table>
<thead>
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<th>Pre-requisites:</th>
<th>Hours of Active Classes: 45</th>
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<tbody>
<tr>
<td></td>
<td>The course consists of:</td>
<td>lectures: 30 exercises: 15 seminars: 0</td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td></td>
<td>ECTS: 3.0</td>
</tr>
</tbody>
</table>

### Course objectives
- To provide that students during the course adopt basic knowledge and concepts of hydrological processes and regularities
- To present students basics of statistic procedures and their application as well as the application probability theory. Enabling students for independent performance of elementary hydrologic calculations in hydrotechnics.

### Syllabus
- History and definition. Water distribution and water cycle. Hydrometry (measurements of hydrologic parameters, measurement instruments and equipment, judgement of measurement errors)
- Meteorologic and hydrologic parameters (precipitation, temperature, evaporation, humidity, water level, runoff, suspended and drawled sediment, water temperature...). Definition of runoff curves, curces of duration and frequency of detected parameters
- Water catchment and river hydrography, relation between precipitations and runoffs, hydrologic balance
- Low and middle waters. Analysis of runoff hydrograms, basic parametric calculations of high waters - empiric and rationale methods, IDR and HDR curves. Hydrograms.

### Student obligations
- Attendance to lectures and exercises as defined by the faculty regulations.
- Attendance to the demonstrational field exercise in hydrometry.
- Preparing and delivering of a program from exercises (application of statistic and parametric methods in hydrologic calculations)

### Exam
The exam is taken in written form.

### Assessment (1)
Preliminary exams (70%), written exam (30%).

### Literature
**Essential:**
1. Žugaj, R.: Hidrologija, RGN fakultet, Zagreb, 2002;
2. Bonacci, O.: Meteorološke i hidrološke podloge, Priručnik za hidrotehničke melioracije, Društvo za odvodnjavanje i navodnjavanje Hrvatske, Zagreb, 1984,
3. Pauše, Ž. Uvod u matematičku statistiku, Školska knjiga Zagreb, 1993..

**Recommended:**
<table>
<thead>
<tr>
<th>Course</th>
<th>SOIL AND ROCK MECHANICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>G-106</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>Inscribed Applied Geology</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>75 lectures: 45 exercises: 20 seminars: 10</td>
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<td>Course status:</td>
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<td>The course consists of:</td>
<td>lectures: 45 exercises: 20 seminars: 10</td>
</tr>
<tr>
<td>ECTS:</td>
<td>5.5</td>
</tr>
</tbody>
</table>

### Course objectives

The student is expected to acquire a basis knowledge and understanding of the behaviour of soils and rocks. Enable to identify and classify soils and rocks, learn fundamental principles of strength, deformability and others properties of soils and rocks. Prepare students for Geotechnical Engineering and others applied courses.

### Syllabus

1. Physical and mechanical properties of soils and rocks
2. Classifications and indentifications of soils and rocks
3. Laboratory and in situ testings of soils and rocks
4. Water in soils and rock masses
5. Strength of soils, rocks and rock masses
6. Stress in soils and rock masses
7. Bearing capacity of soils and rock masses
8. Deformability of soils, rocks and rock masses
9. Consolidation in soils
10. Lateral earth pressure

### Student obligations

- Lecture course attendance
- Exercise course attendance
- Seminar course attendance

### Exam

Written and oral exam. Positively marked written exam is a condition for the oral exam. Written exam consist of theoretical and numerical part.

### Assessment

Preliminary exams, seminar (70%), written exam (30%).

### Literature

**Essential:**

**Recommended:**
### Course: STRUCTURAL MECHANICS II

<table>
<thead>
<tr>
<th>Course code: TM-149</th>
<th>Pre-requisites: Inscribed Structural Mechanics I</th>
<th>Hours of Active Classes: 75 lectures: 45 exercises: 30 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises</td>
<td>ECTS: 6.5</td>
</tr>
</tbody>
</table>

#### Course objectives

At the end of the course unit the student is expected to acquire a basis theoretical knowledge and practical methods of calculation of statically indeterminate constructions of engineering structures under the static loads.

#### Syllabus


#### Student obligations

- course attendance: min. 70% hours of lectures and exercises
- preliminary exams: obligatory
- accepted project work before the oral exam

#### Exam

Written exam and oral exam.

#### Assessment (1)

Preliminary exams (70%), written exam (30%).

#### Literature

**Essential:**

**Recommended:**
Course: **FLUID MECHANICS**

| Course code: H-115 | Pre-requisites: Mechanics II | Hours of Active Classes: 60 lectures: 30 exercises: 30 seminars: 0 |

Course status: mandatory

The course consists of:
- lectures
- exercises
- ECTS: 5.5

Course objectives
- To provide that during the course students adopt basic elements of engineers foreseeing, conclusion making and elementary hydrotechnical tasks solving from the domain of fluid mechanics
- Enabling students for independent realisation of basic tasks from the domain of fluid mechanics.

Syllabus

Student obligations
- Attendance to lectures and exercises as defined by the faculty regulations.
- Colloquies

Exam
The exam is taken in written and oral form.

Assessment (1)
- Preliminary exams, course attendance (70%), written exam (30%).

Literature
**Essential:**

**Recommended:**
## Course: INTRODUCTION TO ROAD DESIGN

<table>
<thead>
<tr>
<th>Course code: P-165</th>
<th>Pre-requisites: Geodesy</th>
<th>Hours of Active Classes: 60 lectures: 30 exercises: 30 seminars: 0</th>
<th>ECTS: 4.5</th>
</tr>
</thead>
</table>

### Course status: mandatory

<table>
<thead>
<tr>
<th>The course consists of: lectures exercises seminars</th>
<th></th>
</tr>
</thead>
</table>

### Course objectives

The student is expected to become familiar with basic design of roads in rural areas and it's elements.

### Syllabus

- History of road design and construction
- Road classification
- Basic elements in road design and constructions
- Traffic loading
- Theory of vehicle
- Horizontal elements in road design, elements of horizontal road line
- Vertical elements in road design
- Road cross-sections
- Basis of flexible pavement design (standards)
- Materials for construction of road subbase and pavement
- Basis of road drainage
- Basis of road intersections

### Student obligations

- accepted project work (project for road in rural area) until specified date, oral preliminary exam

### Exam

The exam is taken in written form.

### Assessment (1)

Project work, preliminary exams, seminar work (70%), written exam (30%).

### Literature

**Essential:**

2. Dragčević, V., Korlaet, Ž.: Osnove projektiranja cesta, Sveučilište u Zagrebu Građevinski fakultet, Zagreb
3. Pravilnik o osnovnim uvjetima kojima javne ceste izvan naselja i njihovi elementi moraju udovoljavati sa stajališta sigurnosti prometa, Narodne novine br.110/01

**Recommended:**

2. Drugi Hrvatski kongres o cestama 1999, Zbornik priopćenja, Hrvatsko društvo za ceste-Via Vita, Cavtat 1999
<table>
<thead>
<tr>
<th>Course:</th>
<th>ENGINEERING MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>MK-124</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>Physics</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>60</td>
</tr>
<tr>
<td>Lectures:</td>
<td>30</td>
</tr>
<tr>
<td>Exercises:</td>
<td>30</td>
</tr>
<tr>
<td>Seminars:</td>
<td>0</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>The course consists of:</td>
<td>ECTS: 5.0</td>
</tr>
<tr>
<td>ECTS:</td>
<td>-</td>
</tr>
</tbody>
</table>

| Course objectives | Students will get a basic knowledge about the materials used in civil engineering and their technology and they will be introduced to testing methods and standards for construction materials. |

| Syllabus | Particulate Composites.  
Portland Cement Concrete (Portland Cement, Admixtures, Cement Replacement Materials, Aggregates for Concrete).  
Properties of Fresh and Early Age Concrete.  
Deformation of Concrete.  
Strength and Failure of Concrete.  
Concrete Mix Design.  
Non-destructive Testing of Hardened Concrete.  
Inorganic and Mineral Binders.  
Wood.  
Polymers and Plastics.  
Fiber-reinforced Composites. |

| Student obligations | Participation in all lectures and scheduled group laboratories.  
Submit a final laboratory reports.  
Preliminary exams. |

| Exam | The exam is taken in written form. |

| Assessment (1) | Preliminary exams, laboratory exercises (70%), written exam (30%). |

| Literature | Essential:  
1. Balabanić G., Materijali 2 - skripta  
Recommended:  
### Course: BASICS OF CONCRETE STRUCTURES

<table>
<thead>
<tr>
<th><strong>Course code:</strong> NK-135</th>
<th><strong>Pre-requisites:</strong> Strength of Materials I, Structural Analysis II</th>
<th><strong>Hours of Active Classes:</strong> 75 lectures: 45 exercises: 30 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course status:</strong> mandatory</td>
<td><strong>The course consists of:</strong> lectures exercises -</td>
<td><strong>ECTS:</strong> 6.0</td>
</tr>
</tbody>
</table>

#### Course objectives
Students will acquire basic knowledge of the properties of the constitutive materials, the rules of design and construction of concrete structures. Students will be able to design simple concrete structures, to assist in the design of complex structures and to participate in the building of concrete structures. The acquired knowledge is also the basis for future technical and scientific education in the field of concrete structures and load-bearing structures in general.

#### Syllabus

#### Student obligations
Course attendance, project work, preliminary exams.

#### Exam
The exam is taken in written form.

#### Assessment (¹)
Course attendance, project work, preliminary exams (70%), written exam (30%).

#### Literature
**Essential:**
1. Materijali s predavanja i vježbi (objavljeni na web stranici predmeta)

**Recommended:**
Course: INTRODUCTION TO STEEL STRUCTURES

Course code: NK-136
Pre-requisites: Structural Mechanics I
Hours of Active Classes: 60
lectures: 30  exercises: 30  seminars: 0
Course status: mandatory
The course consists of:
lectures  exercises  seminars
ECTS: 5.0

Course objectives
Ability to identify, formulate and solve engineering problems in the field of design of steel-framed structures.

Syllabus
Need for and use of steel structures; Types of steel structures; Manufacturing from molted iron to steel in the past; Definition of basic steel characteristics (weldability of steel, brittle fracture, imperfections); Quality of steel in civil structural engineering; Loads, actions and partial safety factors; Safety concept: Ultimate Limit States and Serviceability Limit States; Dimensions, properties and classification of cross-sections; Resistance of cross-sections: compression, moment and shear resistance; Interactions; Resistance of members: buckling resistance and lateral torsional buckling; Members subjected to axial compression force and bending after Eurocode 3; Joints and connections: column to beam and column to foundation; Bolted and welded connections; Welding technologies; Design and construction of Single-storey, one way spanning buildings; Problems in construction and operations; Computer Aided Design and suitable software.

Student obligations
Obligatory attendance to the course. Accepted project work before the end of the term.

Exam
The exam is taken in written form.

Assessment (1)
Preliminary exams (70%), written exam (30%).

Literature
Essential:

Recommended:
### Course: INTRODUCTION TO HYDRAULIC ENGINEERING

<table>
<thead>
<tr>
<th>Course code: H-118</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites: Fluid Mechanics</td>
</tr>
<tr>
<td>Hours of Active Classes: 60</td>
</tr>
<tr>
<td>lectures: 30 exercises: 30 seminars: 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course status: mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>The course consists of: lectures exercises -</td>
</tr>
<tr>
<td>ECTS: 5.0</td>
</tr>
</tbody>
</table>

### Course objectives
To provide that during the course students adopt basic elements of engineers foreseeing, conclusion making and elementary hydrotechnic tasks solving from the domain of water supply, drainage and regulation constructions
Enabling students for independent solving of basic tasks from the domain of water supply, drainage and water bed regulation

### Syllabus
- Water and water resources (basic concepts, water distribution in hydrosphere, water quality, water managerial systems and surroundings, structural and non-structural measures in water management)
- Water supply systems (water demands, water conditioning, elements of water supply systems, basics of planning, constructioning and maintaining of water supply systems)
- Systems of the drainage of sewage and precipitation water (dimmensioning quantities, elements of the drainage systems, sewage water purification, recipient characteristics, protection from water pollution, basics of planning, constructioning and maintaining of water drainage systems)
- River bed regulations (morphology of the river bed, floods, sediment, longitudinal and transversal constructions in water bed, basics of planning, constructioning and maintaining of constructions)

### Student obligations
Attendance to lectures and exercises as defined by the faculty regulations.
Preparing and delivering of a program from exercises (designing of the idea solution for water supply system, sewage system and/or water bed regulation)
Preliminary exams.

### Exam
The exam is taken in written form.

### Assessment
Project work, course attendance, preliminary exams (70%), written exam (30%).

### Literature
**Essential:**
4. Karleuša, B. i Rubinić, J.: Materijali s predavanja (dostupni na web stranici kolegija)

**Recommended:**
**Course:** CONSTRUCTION MANAGEMENT AND TECHNOLOGY

<table>
<thead>
<tr>
<th>Course code: OA-147</th>
<th>Pre-requisites: Structure and Characteristics of Materials</th>
<th>Hours of Active Classes:</th>
<th>Lectures: 45</th>
<th>Exercises: 30</th>
<th>Seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises seminars: 0</td>
<td>ECTS: 6.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course objectives**
Acquiring technological and organisational knowledge and skills required to manage and lead construction.

**Syllabus**
1. Construction technics and technology
2. Earthworks technology
3. Technology of ready-mixed concrete and mortar
4. Steel bending works technology
5. Transports – cargo lifting and transfer
6. Scaffolds and formworks
7. Technology of asphalt works
8. Introduction to construction organisation
9. System and project, the basics of project management
10. Design of construction organisation
11. Organisation of construction processes
12. Site organisation
13. Construction planning
14. Organisation of participants in building process;
15. Safety at work

**Student obligations**
Attendance to the course according to the Faculty regulations
Accepted project work before the end of the term

**Exam**
The exam is taken in written and oral form.

**Assessment**
Project work, preliminary exams (70%), written exam (30%).

**Literature**
**Essential:**
2. Lončarić, R.: Organizacija izvedbe graditeljskih projekata

**Recommended:**
4. www.grad.hr.-djelatnici-dr.sci.Zdravko Linarić-Dokumenti raspoloživi za download-
5. Leksikon osnovne građevinske mehanizacije
6. Učinak građevinskih strojeva
7. Postrojenja za proizvodnju gradiva, I dio-Drobilane, Tvornice betona(betonare), Asf. baze
# Course: GEOTECHNICAL ENGINEERING

<table>
<thead>
<tr>
<th>Course code:</th>
<th>G-107</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
<td>Soil and Rocks Mechanics</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>75 lectures: 45 exercises: 30 seminars: 0</td>
</tr>
</tbody>
</table>

## Course status: mandatory

### Course objectives

The student is expected to acquire a basis knowledge of geotechnical engineering. The main objective of this course is to educate future engineers in basic geotechnical analysis and develop competences in design of foundations and other geotechnical structures. Prepare students for others applied courses.

### Syllabus

- Spread foundations
- Deep foundations: piles and slurry walls
- Deep foundations: caissons, pneumatic caissons and box
- Retaining constructions
- Sheet-pile walls
- Slope stability: triggering mechanisms and stability analysis
- Slope stability: stabilization of slopes
- Earth structures
- Construction methods of tunnel, shafts and underground structures
- Underground excavation instability mechanisms
- Stabilization principles of the underground excavation

### Student obligations

Lecture course attendance. Exercise course attendance. Seminar course attendance.

### Exam

Written and oral exam.

### Assessment (1)

Preliminary exams, seminar work (70%), written exam (30%).

### Literature

**Essential:**

**Recommended:**
**Course:** CONSTRUCTION ECONOMICS

<table>
<thead>
<tr>
<th>Course code: OA-148</th>
<th>Pre-requisites: inscribed Construction Management and Technology</th>
<th>Hours of Active Classes: 45 lectures: 30 exercises: 15 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises -</td>
<td>ECTS: 4.0</td>
</tr>
</tbody>
</table>

**Course objectives**
Acquiring knowledge required for costs analysis and construction works price calculation

**Syllabus**
1. Construction standards
2. Construction standards for particular works – preliminaries, earthworks, carpenters works, steel bending works, concrete works, masonry works, transfers, craftsmanly works
3. Machine works standards
4. Structure of cost in construction – material costs, costs of labour, machine work costs, machine amortization, direct and indirect costs, structure of indirect site costs, company administration costs, additional calculation, calculated factor, price analysis, construction works price calculations

**Student obligations**
Attendance to the course according to the Faculty regulations
Accepted project work before the end of the term

**Exam**
Written and oral exam.

**Assessment** (1)
Project work, preliminary exams (70%), written exam (30%).

**Literature**

Essential:

Recommended:
1. www.grad.hr-djelatnici-dr.dci.Zdravko Linarić-Dokumenti raspoloživi za download-Troškovi strojnog rada u građenju
<table>
<thead>
<tr>
<th>Course:</th>
<th>FIELDWORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>OA-149</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>120 ECTS achieved</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>The course consists of:</td>
<td>exercises</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>30 lectures: 0 exercises: 30 seminars: 0</td>
</tr>
<tr>
<td>ECTS:</td>
<td>3.0</td>
</tr>
<tr>
<td>Course objectives</td>
<td>Introduction with the practical application of managerial and technological knowledge solving the particular site problems.</td>
</tr>
<tr>
<td>Syllabus</td>
<td>Fieldwork at the selected building or civil engineering construction site with construction diary operating and organizational and technological program assignment solution.</td>
</tr>
<tr>
<td>Student obligations</td>
<td>Fieldwork at the selected building or civil engineering construction site (5 days x 3 hours) with construction diary operating and organizational and technological program assignment solution. Discussing the chosen solution by individual consultations. • Making written survey. Oral survey presentation. Seminar paper on a given topic</td>
</tr>
<tr>
<td>Exam</td>
<td>None.</td>
</tr>
<tr>
<td>Assessment (2)</td>
<td>project work preliminary site practice and project work based exam (100%)</td>
</tr>
<tr>
<td>Literature</td>
<td>Essential: - depending on the programming task</td>
</tr>
</tbody>
</table>
2. Lončarić, R.: Organizacija izvedbe graditeljskih projekata 
<table>
<thead>
<tr>
<th>Course:</th>
<th>FINAL YEAR PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: ZR-PRED</td>
<td>Pre-requisites: The exam can be undertaken only after all other course exams have been passed</td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: - seminars</td>
</tr>
<tr>
<td>ECTS:</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Course objectives**

The successfully passed final year project exam confirms that the student has, in the course of their studies, acquired the necessary skills to produce and present a major seminar work (project plan or a solution to a theoretical or practical civil engineering problem) in the area of planning and design of a simpler civil engineering structure or system.

**Syllabus**

The final year project is to be conducted during the total of 140 hours (ECTS 5), which includes 60 hours of active classes.

The project subject can be practical or theoretical and has to be related to a civil engineering activity and the undergraduate courses. It is chosen by the student and confirmed by the board in charge during the sixth term and not later than 1 May of the running year.

The final year project can be of the following types:

- planning a simpler civil engineering facility (a smaller bridge, a road out of a city, a simpler system of water supply or discharge etc.)
- building organisation project of a simpler facility
- design of a concrete, steel or timber structure
- analytical or numerical analysis of an engineering problem which requires additional theoretical insight

The student collaborates closely with the supervisor, who is normally the teacher of the course thematically associated with the project. If necessary, a co-supervisor may also be nominated.

**Student obligations**

The student is expected to submit the working version of the project to the supervisor as a condition for the confirmation of the course. The final version of the project should be submitted to the supervisor and the General Office (two copies) at least seven working days before the tentative presentation date. The public exam (presentation) take place during the exam periods and the General Office notifies about the actual dates.

**Exam**

The exam is conducted orally, through a public presentation of the project in front of the supervisor.

**Assessment (1)**

70% for the written project, 30% for the exam (presentation).

**Literature**

**Essential:**
Depending on the subject

**Recommended:**
Depending on the subject
<table>
<thead>
<tr>
<th>Course</th>
<th>ENGINEERING GEOMETRY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course code:</strong></td>
<td>M-182</td>
</tr>
<tr>
<td><strong>Pre-requisites:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hours of Active Classes:</strong></td>
<td>30</td>
</tr>
<tr>
<td>lectures: 10</td>
<td>exercises: 0</td>
</tr>
<tr>
<td><strong>Course status:</strong></td>
<td>optional</td>
</tr>
<tr>
<td><strong>ECTS:</strong></td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Course objectives</strong></td>
<td></td>
</tr>
<tr>
<td>- to acquire the knowledge about quadric surfaces and methods for constructive elaboration</td>
<td></td>
</tr>
<tr>
<td>- interdisciplinary approach to geometry in engineering, computer graphics and object -shapes</td>
<td></td>
</tr>
<tr>
<td>- to acquire the problem-oriented exercises, using computer graphics</td>
<td></td>
</tr>
<tr>
<td>- to develop ability to identify, formulate and solve complex engineering geometric problems</td>
<td></td>
</tr>
</tbody>
</table>

| **Syllabus** | |
| - Computer graphics and CAGD -Computer Aided Geometric Design |
| Perspective projection and it's use in CAD |
| Surfaces on objects. Introduction to theory of surfaces. Quadrics. Surface modelling in CAD. |
| Intersection of a quadric and a plane. Constructive methods in virtual 3D-space on computer. |
| Intersection of quadrics. Space quartic curves. Solid-modelling, transformations of primitives and constructive solid geometry |
| Tangent plane and normal in the regular point of the surface. Main and gaussian curvature of surfaces. 3D constructions using CAD. |
| Geometry of roofs |

| **Student obligations** | |
| - course attendance |
| - active collaboration- seminars |
| - accepted project work before the end of the term |

| **Exam** | none |
| **Assessment (**1**)** | Course attendance, tasks, preliminary exams (100%). |

| **Literature** | |
| **Essential:** |
| 1. Pletenac, Lidija: Inženjerska geometrija u CAD- u, elektronički udžbenik-skripta, |
| 2. Babić; Gorjanc; Sliepčević; Širomas: Konstruktivna geometrija, IGH, Zagreb, 2000. |

| **Recommended:** |
| 6. Giering, Dr. Osvald; Seybold, Dr. Hans: Konstruktive Ingenieurgeometrie, Carl Hanser Verlag, München |
**Course:** COMPUTER APPLICATIONS

<table>
<thead>
<tr>
<th>Course code: M-184</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The course consists of: lectures exercises seminars</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lectures: 10 exercises: 10 seminars: 10</td>
</tr>
</tbody>
</table>

**Course status:** optional

**ECTS:** 3.0

**Course objectives**
The student learns to use the software tool for CAD and engineering drafting (Autocad)

**Syllabus**
- Explanation of CAD, CAE, CAM, CAAD, steps in computer design, the examples of CAD tools for civil engineering and architecture, difference between vector and bitmap computer images
- Coordinate systems, types of commands, 2D drafting in Autocad
- Geographical information system: definition of GIS, area of application, attribute and spatial data
- Data organization. Databases. File organization

**Student obligations**
Accepted computer assignments until specified date and one seminar work

**Exam**
none

**Assessment (1)**
Activity in class, assignments and seminars (100%)

**Literature**

**Essential:**
1. course materials presented on the web site www.gradri.hr/~informatika
2. the relevant web site addresses presented on the course web site
3. manuals related to the software presented during the lessons- literature is regularly renewed

**Recommended:**
- Stated at http://www.gradri.hr/?rijeka=class1,123
Course: INTRODUCTION TO PROGRAMMING

<table>
<thead>
<tr>
<th>Course code: M-177</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>lectures: 10  exercises: 20  seminars: 0</td>
</tr>
</tbody>
</table>

Course status: optional

The course consists of:

<table>
<thead>
<tr>
<th></th>
<th>lectures</th>
<th>exercises</th>
<th>ECTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
</tbody>
</table>

Course objectives

The goal of the course is to achieve an overview of information technologies which can be used in the professional field. The student will learn how to approach and solve specified problem with a computer. The student will learn to create simple VBA programs in Excel and will get familiar with databases.

Syllabus

- Programming, program languages and their classification, specialized languages (DSL), script languages, compilers and interpreters, algorithms, steps in programming: from defining a program to application maintenance, object oriented programming, VBA – Visual Basic for Applications, VBA for Excel

Student obligations

- Accepted computer assignments until specified date and one seminar work

Exam

- none

Assessment (1)

- Activity in class, assignments and seminars (100%)

Literature

- Essential:
- Recommended:
Course: **COMMUNICATION SKILLS**

<table>
<thead>
<tr>
<th>Course code: FD-193</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 30</th>
<th>ECTS: 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The course consists of:</td>
<td>lectures 15</td>
<td>exercises 15</td>
</tr>
<tr>
<td>Course status:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>optional</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course objectives**
The course goal is to provide understanding of fundamental knowledge about interpersonal communication, about verbal and nonverbal communication, and to enhance skills at interpersonal communication.

**Syllabus**

**Student obligations**
Students must be active and participate in class activities.

**Exam**
one

**Assessment (1)**
Activity in class, course attendance (100%)

**Literature**

**Essential:**

**Recommended:**
<table>
<thead>
<tr>
<th>Course: INTRODUCTION TO LANGUAGE CULTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course code:</strong> FD-199</td>
</tr>
<tr>
<td><strong>Course status:</strong> optional</td>
</tr>
<tr>
<td><strong>Hours of Active Classes:</strong> lectures: 15 exercises: 15 seminars: 0</td>
</tr>
</tbody>
</table>

**Course objectives**
The main course objective is mastering the basics of linguistic and grammar norms, in written as well as oral expression. Students will gradually become acquainted with accurate terminology as well as the uses of normative manuals (orthography, grammar, dictionaries, linguistic reference books et al.).

**Syllabus**
Language as system and language as standard (system norms and norms of function); standard language and its norms; standard language realization and functional styles (stylistic norms); elements of grammar (morphological, syntactic) and lexical norm; normative reference books (grammar books, dictionaries, orthographic lexica) and their use.

Written expression; orthographic norm; rules of orthography; spell checking and the use of spell-checkers; forms of written expression and text structure.

Oral expression; orthoepic norms; values of spoken language (syntax melody, diction and accentuation); sentence as a unit of communication (expression); suprasyntactic unity (text, discourse); speech composition; forms of oral expression; rhetoric.

Language in professional use; scientific style as one of the functional styles of standard language; characteristics and layers within styles (professional, popular-scientific, scientific etc.); terminology; terminological lexica; Croatian unilingual dictionaries; organization of scientific/professional text (written and/or spoken).

**Student obligations**
Students are required to take active part in all aspects of course attendance; they will solve linguistic problems individually or in group assignments.

**Exam**
none

**Assessment (1)**
Activity in class, preliminary exams (100%).

**Literature**

**Essential:**
6. Težak, Stjepko – Babić, Stjepan, Gramatika hrvatskoga jezika, Školska knjiga, Zagreb 1992...

**Recommended:**
# Construction History

## Course Code: OA-154

### Course status:
- optional

### Pre-requisites:
The course consists of:
- lectures: 15
- seminars: 15

### Hours of Active Classes:
- Lectures: 15
- Exercises: 0
- Seminars: 15
- ECTS: 2.0

### Course Objectives
Inform students about the historical development of architectural constructions for a better understanding of modern constructional solutions. Expand the knowledge of modern construction possibilities.

### Syllabus
- Prehistory - megalithic menhir, dolmen (Space concept), archetypal hut, column, beam, bearing.
- Egypt, Mesopotamia, stone, brick, tectonics, stereotonic structures, statics authority.
- Greece, beauty canon, ideal proportion (Proportional concept), module. Temple, theatre.
- Antique Rome, arch, tunnel volt, colonnade, arcade, dome, engineering constructions.
- Byzantine dome on pendentives.
- Middle Ages, retardation, fortification, basilica as the typology of a new focus of interest.
- Gothic structuralism, ribs, vaults, supports, perpendicular and floral Gothic.
- Renaissance and baroque renewal of the antique model, renaissance dome.
- Engineering constructions of the 19th century, steel, glass, concrete, world exhibitions, train stations, halls, suspension bridges. Art Nouveau at the turn of the century, Constructivism, Futurism, Modernism of the 20th century.
- Postmodernism, Deconstructivism, High-tech, space shell, grid, suspended and pneumatic constructions.

### Student Obligations
- Course attendance
- Visits to sites and theme exhibitions
- Seminar work

### Exam
- None

### Assessment
- Course attendance, seminars (100%).

### Literature

**Essential:**

**Recommended:**
**Course:** BUILDING AND CONSTRUCTING ENGLISH

<table>
<thead>
<tr>
<th>Course code:</th>
<th>FD-197</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lectures: 15 exercises: 10 seminars: 5</td>
</tr>
</tbody>
</table>

**Course status:** optional

**The course consists of:** lectures exercises seminars

**ECTS:** 2.0

**Course objectives**
Language competence perfection in written and oral form, drawing of reports and papers in English.

**Syllabus**

Grammar section (specific grammar patterns):
- Grammar constructions typical for ESP, their application in written forms

Language section (general vocabulary, vocational and profession-related terminology):
- Vocabulary extension in relation to specific Civil Engineering fields
- Idioms and phrases used in everyday communication whose literal meaning is related to Civil Engineering
- Writing a CV, business correspondence, job applications

**Student obligations**
- Attendance to the course as defined by the Faculty regulations.
- Two written tests and one oral test. The scores obtained at the tests are added together (each written test is worth 30% and the oral test 40% scores). The condition for obtaining credits is 40% of total points

**Exam**
none

**Assessment (1)**
Course attendance, activity in class, seminars (100%).

**Literature**

**Essential:**
- Texts used in lectures and exercises
- Any grammar of English language

**Recommended:**
### Course: INTRODUCTION TO SPATIAL PLANNING

<table>
<thead>
<tr>
<th>Course code: OA-144</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 45</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The course consists of:</td>
<td>lectures: 30 exercises: 0 seminars: 15</td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td></td>
<td>ECTS: 3.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course objectives</th>
<th>Familiarising of students with theory an practise of urban and regional planning and standard types of urban studies and plans, so they can understand and participate in process of planning and management of urban spaces.</th>
</tr>
</thead>
</table>
| Syllabus          | - Basic terms and definitions about urban planning and spatial planning and land use  
|                   | - Urban studies and land use plans: types, characteristics, basic parts  
|                   | - Policy making methodology  
|                   | - Regulations ,institutions and laws in the process of planning and implementation of urban plans  
|                   | - Geographical, functional and economical impacts on the development of urban areas and regions  
|                   | - Analysis and space planning of different activities: residence, work, industry, recreation, green spaces and parks, traffic and other infrastructure systems, tourism, historical and cultural objects and areas  
|                   | - Analysis and space planning of different areas: centre board district, residential areas, rural areas  
|                   | - Basic social, economical and environmental impacts on urban planning. |

| Student obligations | - participating in the class  
|                     | - seminar work |

| Exam | none |

| Assessment (1) | Preliminary exams, seminars, course attendance, activity in class (100%). |

### Literature

**Essential:**
1. Priručni materijal za kolegij izrađen od nositelja kolegija.
4. Zakon o prostornom uređenju i gradnji, drugi zakoni i provedbeni propisi u svezi prostornog planiranja, uređenja i gradnje - Zagreb: Narodne novine RH.

**Recommended:**
7. Prostorno-planska dokumentacija (općina, grad, županija, država, Europska unija).
<table>
<thead>
<tr>
<th>Course:</th>
<th>BUILDING DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code:</td>
<td>OA-143</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td></td>
</tr>
<tr>
<td>Course status:</td>
<td>optional</td>
</tr>
<tr>
<td>The course consists of:</td>
<td>lectures exercises -</td>
</tr>
<tr>
<td>ECTS:</td>
<td>3.0</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>45 lectures: 15 exercises: 30 seminars: 0</td>
</tr>
</tbody>
</table>

**Course objectives**
Inform students about the methodology of planning and qualify them for reading and elaborating the planning documentation.

**Syllabus**
- Elements of historical development. Theoretical basis for evaluating an architectural work.
- Approach to planning, analysis of a location, programme, orientation, physics of a building.
- From a regional plan to an executional project.
- Technical conditions of building, standards, regulations, fire and conservation protection, safety at work.
- Function, construction, design for residential and public buildings.
- Staircases and elevators, installations, heating, cooling and ventilation.
- Modern facades and roof frames.
- Konstruction as the basis of formation - public buildings for special purposes, halls, big sheds, stadiums, theatres, aeroports.

**Student obligations**
- Course attendance
- Visits to building-sites and theme exhibitions
- Project work: Based on the assigned general design, a part of the executional project of a small public building or a part of it.

**Exam**
none

**Assessment**
Class attendance and activity, project work, preliminary exams (100%).

**Literature**

**Essential:**
4. Palinić, N.: Osnove projektiranja I, skripta (u izradi)

**Recommended:**
Course: INTRODUCTION TO BUILDING PHYSICS

<table>
<thead>
<tr>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>The course consists of:</td>
<td>lectures: 20 exercises: 0 seminars: 10</td>
</tr>
<tr>
<td>ECTS:</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Course code: MK-122

Course status: optional

Course objectives
Enabling student to independently solve practical engineering problems from the field of the course.

Syllabus

Student obligations
Course attendance, project work on PC.

Exam
none

Assessment (1)
Preliminary exams, tasks (100%).

Essential:

Recommended:
### Course: ENVIRONMENTAL PROTECTION

<table>
<thead>
<tr>
<th>Course code: G-108</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The course consists of:</td>
<td>lectures: 15  exercises: 0  seminars: 15</td>
</tr>
<tr>
<td>Course status:</td>
<td>ECTS: 2.0</td>
<td></td>
</tr>
<tr>
<td>optional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Course objectives
Preparation for understanding of global ecosystem, importance of biological diversity and biogeochemical cycles, basic principles of environmental protection and possible negative impact of construction works. Students will be prepared for supplementary courses: Geohazards, Traffic and environment and Waste management.

#### Syllabus
- Basic principles of environmental protection,
- Biological diversity and biogeochemical cycles
- Global ecosystem: interaction of geosphere, hydrosphere, atomosphere, biosphere.
- Human activity and environmental change
- Climatic changes
- Air pollution and
- Pollution of surface water and groundwater
- Pollution of seas and oceans
- Pollution of soil
- Construction works and environmental protection
- Nature protection in Republic of Croatia
- Environmental protection in Republic of Croatia
- Planning for sustainable future

#### Student obligations
Course attendance
One seminar during the term of course

#### Exam
none

#### Assessment
Preliminary exams, seminars (100%).

#### Literature
**Essential:**

**Recommended:**
**Course:** MANAGEMENT IN CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Course code: OA-155</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes: 45</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>lectures: 30 exercises: 0 seminars: 15</td>
</tr>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures - seminars</td>
<td>ECTS: 3.0</td>
</tr>
</tbody>
</table>

**Course objectives**

The main objective of course is acquiring basic knowledge of civil engineering companies business.

**Syllabus**

1) Company concept, types and objects
2) Investment characteristics and elements
3) Building companies reproduction process results
4) Production capacity economy. Costs.
5) General management thesis
6) Management role and significance in building companies business
7) Company business policy forming
8) Basis of market business. Law of supply and demand
9) Products planning and developing
10) Prices policy
11) Elasticity in consumption
12) Business decision making. Methods of decision making
13) Business communication and control system

**Student obligations**

Attendance to the course according to the Faculty regulations Activity in class.

**Exam**

Written and oral exam.

**Assessment (1)**

Preliminary exams, seminars (70%), written exam (30%).

**Literature**

**Essential:**

**Recommended:**
Course: CIVIL ENGINEERING REGULATIONS

<table>
<thead>
<tr>
<th>Course code: OA-156</th>
<th>Course status: optional</th>
<th>Hours of Active Classes: 30 lectures: 30 exercises: 0 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
<td>The course consists of:</td>
<td>ECTS: 3.0</td>
</tr>
<tr>
<td></td>
<td>lectures - -</td>
<td></td>
</tr>
</tbody>
</table>

Course objectives

The aim of the course is to provide the students, future civil engineers, with the knowledge of basic legal notions, categories, institutes and law relationships in civil engineering in a broader sense.

Syllabus


Student obligations

Seminar paper, preliminary exam, exam

Exam

Written and oral exam.

Assessment (1)

Preliminary exams, seminars (70%), exam (30%).

Literature

**Essential:**

**Recommended:**
1. Zakon o obveznim odnosima; Zakon o vlasništvu i drugim stvarnim pravima; Zakon o radu; Zakon o zaštiti na radu; Pravilnici po Zakonu o gradnji.
### Course: BRIDGES

<table>
<thead>
<tr>
<th>Course code</th>
<th>Pre-requisites:</th>
<th>Hours of Active Classes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NK-134</td>
<td>Engineering Materials</td>
<td>60 lectures: 30 exercises: 15 seminars: 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course status: mandatory</th>
<th>The course consists of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lectures - seminars</td>
</tr>
</tbody>
</table>

| ECTS: | 5.0 |

### Course objectives
The student is expected to acquire a basic knowledge and understanding of bridge building.

### Syllabus
- History of bridge construction; general information on bridges; bridge types; elements of bridge disposition; traffic conditions and external effects
- Load carrying bridge structures; Substructure; Bridge equipment
- Elements of bridge design
- Bridge construction; Maintenance of bridges; Safety standards for bridges
- Bridges under extreme conditions; Achievements and future developments in bridge construction

### Student obligations
Attendance to the course has to be in accordance to the Faculty regulations. It is compulsory to attend an organized visit to the bridge building sites.

### Exam
The exam is taken in written form.

### Assessment (1)
Preliminary exams, project work seminar (70%), written exam (30%).

### Literature
**Essential:**
1. Štimac, I.: Skripta s predavnjima

**Recommended:**
### Course: INTRODUCTION TO TIMBER STRUCTURES

<table>
<thead>
<tr>
<th>Course code: NK-137</th>
<th>Pre-requisites: Strength of Materials</th>
<th>Hours of Active Classes: 60 lectures: 30 exercises: 30 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises -</td>
<td>ECTS: 5.0</td>
</tr>
</tbody>
</table>

**Course objectives**

The basic knowledge of properties, conditions and ways of timber application enables acquisition of limited competence. A student should be capable, either independently or as a team member, of designing the timber structures of simpler static systems and shorter spans. The course is a base for further education in T.Str. and overall Str. Eng. studies.

**Syllabus**


**Student obligations**

Elaboration of a shortened main project of a timber structure (disposition, static models, mechanical resistance and stability of the entire structure and its elements, design and shaping of details). Realisation of programmes is adjusted to a firmly set dynamics of the auditor (40%) and constructive exercises (60%).

**Exam**

The exam is taken in written form.

**Assessment**

Project work, activity in class, preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**
2. Lecture and practice notes.

**Recommended:**
**Course:** INTRODUCTION TO COASTAL ENGINEERING

<table>
<thead>
<tr>
<th>Course code: H-119</th>
<th>Pre-requisites: Hydraulic Structures</th>
<th>Hours of Active Classes: 60 lectures: 30 exercises: 30 seminars: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: mandatory</td>
<td>The course consists of: lectures exercises seminars: 0</td>
<td>ECTS: 5.0</td>
</tr>
</tbody>
</table>

**Course objectives**

To develop general competences in ocean and coastal engineering field, analysis of coastal processes, design condition analysis, to learn principles of various types of coastal structures (breakwaters, revetments), to develop competencies in their structural sizing, sizing of quay walls and berthing facilities.

**Syllabus**

- Introduction, types of coastal structures, peculiarities of construction in coastal areas
- Coastal processes, waves and currents
- Design conditions, wave transformation in coastal waters
- Breakwaters - general description
- Rubble mound structure design and sizing calculations
- Composite/vertical wall breakwaters, design and sizing calculations
- Revetments - types and sizing calculations
- Design of sheet-pile walls and bulkheads
- Off-shore structures
- Ports and harbors open for public traffic, special-purpose ports
- Mooring and berthing systems, mooring and berthing facilities

**Student obligations**

- course attendance, exercise/project work preparation, representative local coastal structures - site visit

**Exam**

- Written and exam

**Assessment (1)**

- Project work, activity in class, preliminary exams (70%), written exam (30%).

**Literature**

**Essential:**
2. Kolhase, Soren: "Oceanographic and civil engineering basics of port design ", script

**Recommended:**
### Course: WATER RESOURCES AND SYSTEMS

<table>
<thead>
<tr>
<th>Course code: H-114</th>
<th>Pre-requisites: Hydraulic Structures</th>
<th>Hours of Active Classes: 60 lectures: 30 exercises: 0 seminars: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course status: compulsory</td>
<td>The course consists of: lectures exercises seminars</td>
<td>ECTS: 5</td>
</tr>
</tbody>
</table>

### Course objectives
- Developing students comprehension about problems related to protection and use of water resources, and related water management infrastructure systems,
- Preparation of students for solving simpler tasks in the domain of planning and management of water resources and infrastructure systems

### Syllabus
- The dynamics of the hydrological cycle in the natural and anthropogenically changed environments.
- Typology and analysis of the basic characteristics of water resources - springs, streams, lakes, underground aquifers.
- Water resources in karst, coastal karst, the problems of salination of water resources.
- External and storm water - high water problems, flooding and solutions. Structural and non-structural protection measures. Simulation modeling of reservoirs.
- Regulation of watercourses and their revitalization. Aquatic systems and recreation.
- Groundwater in urban areas and associated problems in building.
- The sea as an urban spatial content and recipients of the wastewater.
- Municipal water infrastructure - water supply systems, drainage systems (waste water and storm water), systems for supply of lower quality water. Functional analysis and organization.
- Waste water treatment methods for water reuse.
- Ambient value of water resources. Protected areas. Water resources management.
- Analyzing examples of water resources and systems in the local area - field work with demonstration of measurements of water quantity and quality.

### Student obligations
- Course attendance in accordance to University/Faculty regulations.
- Fieldwork attendance
- Writing and presenting a paper.

### Exam
The exam is taken in written form.

### Assessment
Course attendance, seminar, preliminary exams (70%), written exam (30%).

### Literature
**Essential:**
4. Rubinić, J: Materijal s predavanja (na web stranici predmetnog kolegija)

**Recommended:**
**Course:** URBAN ROADS AND INTERSECTIONS

<table>
<thead>
<tr>
<th>Course code:</th>
<th>P-167</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisites:</td>
<td>Introduction to Road Design</td>
</tr>
<tr>
<td>Course status:</td>
<td>mandatory</td>
</tr>
<tr>
<td>Hours of Active Classes:</td>
<td>60 hours</td>
</tr>
<tr>
<td>lectures:</td>
<td>30</td>
</tr>
<tr>
<td>exercises:</td>
<td>30</td>
</tr>
<tr>
<td>seminars:</td>
<td>0</td>
</tr>
<tr>
<td>ECTS:</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Course objectives**

The goal of the course is to prepare students for elaboration of urban road design and typical solutions of simple traffic problems in the city.

After this course student will be able to:
- Define characteristics of urban traffic
- Define characteristics of urban road network (categories)
- Define characteristics and application of urban intersections
- Define characteristics and solutions for non-motorized traffic in urban context
- Design urban intersection in simple traffic and space conditions, calculate capacity of intersection

**Syllabus**

- Introduction, City traffic characteristics
- Urban road categorisation, analyses of existing urban city plans (Rijeka, Zagreb..)
- Geometrical element of horizontal and vertical road design
- Characteristics of urban intersections
- Non-motorized traffic in the cities (pedestrian, cycling..)
- Capacity of urban roads and intersections (HCM)
- Organisation of parking in the city
- Garage parking facilities (types, design)

**Student obligations**

- Preliminary exams
- Independent tasks
- Making solution of simple intersections and smaller parking lots

**Exam**

The exam is taken in written form.

**Assessment**

Project work, preliminary exams, activity in class (70%), written exam (30%).

**Literature**

**Essential:**

**Recommended:**
2. Časopisi Suvremeni promet i Građevinar
### Course: RAILWAY ENGINEERING

<table>
<thead>
<tr>
<th>Course code: P-163</th>
<th>Pre-requisites: Introduction to Road Design</th>
<th>Hours of Active Classes: 60</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>lectures: 45 exercises: 15</td>
</tr>
<tr>
<td>Course status:</td>
<td>The course consists of:</td>
<td>seminars: 0</td>
</tr>
<tr>
<td>optional</td>
<td>lectures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>exercises</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECTS: 5.0</td>
<td></td>
</tr>
</tbody>
</table>

### Course objectives

Student is trained to participate in railway elaboration and construction process on track bed structure and track substructure.

### Syllabus

- Railway like a mean of transportation
- Historic overview of railway and development
- Classification of railway lines and trains
- Cross section of railway
- Track bed structure and track substructure
- Track construction, rails and sleepers
- Calculation of stresses; dimensioning of rails, sleepers, ballast and formation level
- Basis of rail route design; railway project elements
- Railway maintaining and reconstruction
- Railway stations
- Track device: switch, turntable, rail expansion joint

### Student obligations

- accepted project work before specified date, preliminary exam

### Exam

Written and oral exam.

### Assessment (1)

Project work, preliminary exams (70%), written exam (30%).

### Literature

**Essential:**
1. Marušić, Đ., Projektiranje i građenje željezničkih pruga, GF Split, Split, 1994
2. Pollak, B., Željeznički gornji stroj, FGZ, Zagreb, 1982

**Recommended:**
3.2.2. Explanation of ETCS credits

The number of hours of active classes for all the proposed courses has been calculated on the basis of the assumed average duration of one term of 15 (fifteen) weeks (the average duration of the academic year is 30 weeks). The programme includes three regular examination periods of 4 (four) weeks each.

The proposed duration of the academic year is a total of 42 working weeks: 2x15 weeks of classes and 3x4 weeks of examination periods.

During the academic year the student gains a minimum of 60 ECTS credits for all the proposed programmes. In view of the above mentioned, the calculation of the number of hours that make one ECTS credit would be: 1 ECTS = 42 (weeks) X 40 (working hours per week) / 60 ECTS = 1.680 hours / 60 ECTS = 28 hours.

1 ECTS CREDIT is equivalent to 28 hours of the student's study load.

The number of ECTS credits allocated to the particular courses has been calculated on the basis of the complexity of the course teaching material (syllabus) and the general and specific obligations the student has to fulfill in connection with the course:

- the general obligations include an estimate of: the time needed to attend classes, tutorials, prepare exams, take exams, as well as of the quantity of literature he uses to prepare the exam.
- specific obligations include an estimate of the time needed for: preliminary exams, project work, seminar work, laboratory practice, fieldwork, visiting construction sites etc.

The course load coefficient is determined in proportion to the course share in the workload of the particular term so that the student gains 30 ECTS credits per term.

3.2.3. Quality assurance procedures and course (module) performance indicators

The performance of all the courses will be continuously monitored by different procedures of evaluation and self-evaluation of teachers and students.

The evaluation of the teachers and teaching activities will be carried out by the course lecturers (teachers) and will be organized by the Faculty body responsible for monitoring and identifying actions needed for the improvement of quality of the programme.

Different procedures and methods for monitoring and evaluating the quality of the teaching activities and the course performance will be used:

- conducting research and opinion polls among students on all the aspects of teaching:
  - regular course delivery and organization of the teaching process
  - literature
  - methods for improvement of teaching
  - exams
  - syllabus and methodology of delivery
  - student / teacher relations and collaboration
  - work load – ETCS CREDITS

- publishing the results of research and opinion polls
- analysing the exam results (pass rate, transparency, objectivity and the like).

The quality of the teaching performance of the particular courses will be evaluated twice during the term: for the first time 3-4 weeks after the beginning of the classes and for the second time during the last week the classes are taken. The results of the first evaluation may improve the teaching activities in the current term. All research and questionnaires will be conducted on forms prepared in advance, in which the teachers will be able to adapt the questions to the course curriculum, methodology and other specific demands that the course has to meet.

The course lecturer will, independently and/or in coordination with the responsible persons at the Faculty, work out the plan of measures for better learning results in a particular course.
### 3.3. STUDY STRUCTURE

In the first year of study a student enrolls in courses according to the program as follows:

<table>
<thead>
<tr>
<th>COURSE</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Linear Algebra</td>
<td>30+30+0</td>
<td>Exam</td>
<td>6.0</td>
<td>1st winter</td>
</tr>
<tr>
<td>2 Mathematical Analysis I</td>
<td>45+45+0</td>
<td>Exam</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>3 Mechanics I</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>4 Computers and Information Science</td>
<td>30+25+5</td>
<td>Exam</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>5 Constructive Geometry</td>
<td>45+15+30</td>
<td>Exam</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>360</strong></td>
<td></td>
<td><strong>30.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COURSE</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Physics</td>
<td>45+15+0</td>
<td>Exam</td>
<td>4.5</td>
<td>2nd summer</td>
</tr>
<tr>
<td>2 Strength of Materials I</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>3 Mechanics II</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>4 Geodesy</td>
<td>30+15+0</td>
<td>Exam</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>5 Civil Engineering Structures</td>
<td>30+15+0</td>
<td>Exam</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>6 Foreign Language</td>
<td>30+0+30</td>
<td>Preliminary exam</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>7 Optional course of group I</td>
<td>30</td>
<td>Preliminary exam</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>360</strong></td>
<td></td>
<td><strong>30.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Sport and recreational activities coordinated through the Physical Training and Health Culture (1.0 ECTS) will be organized for students.

- Foreign Language: student chooses one of the offered languages.

<table>
<thead>
<tr>
<th>FOREIGN LANGUAGE</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The English Language</td>
<td>30+0+30</td>
<td>Preliminary exam</td>
<td>3.0</td>
<td>2nd summer</td>
</tr>
<tr>
<td>2 The German Language</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Enrollment in the second and subsequent years of study is defined in Article 34 Decision of Amendments of Regulations on Studies at the University of Rijeka and Prerequisites under Section 3.3.2.1. of this study program.

<table>
<thead>
<tr>
<th>MANDATORY COURSE</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematical Analysis II</td>
<td>45+45+0</td>
<td>Exam</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>2. Strength of Materials II</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>3. Applied Geology</td>
<td>30+5+0</td>
<td>Exam</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>4. Structural Mechanics I</td>
<td>45+30+0</td>
<td>Exam</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>5. Structure and Characteristics of Materials</td>
<td>30+0+0</td>
<td>Exam</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>6. Hydrology</td>
<td>30+15+0</td>
<td>Exam</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>7. Basics of Concrete Structures</td>
<td>45+30+0</td>
<td>Exam</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>8. Introduction to Steel Structures</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>9. Introduction to Hydraulic Engineering</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>10. Construction Management and Technology</td>
<td>45+30+0</td>
<td>Exam</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>11. Geotechnical Engineering</td>
<td>45+30+0</td>
<td>Exam</td>
<td>6.0</td>
<td></td>
</tr>
</tbody>
</table>
### MANDATORY COURSE

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Soil and Rock Mechanics</td>
<td>45+20+10</td>
<td>Exam</td>
<td>5,5</td>
<td>summer</td>
</tr>
<tr>
<td>13. Structural Mechanics II</td>
<td>45+30+0</td>
<td>Exam</td>
<td>6,5</td>
<td>summer</td>
</tr>
<tr>
<td>14. Fluid Mechanics</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5,5</td>
<td>summer</td>
</tr>
<tr>
<td>15. Introduction to Road Design</td>
<td>30+30+0</td>
<td>Exam</td>
<td>4,5</td>
<td>summer</td>
</tr>
<tr>
<td>16. Engineering Materials</td>
<td>30+30+0</td>
<td>Exam</td>
<td>5,0</td>
<td>summer</td>
</tr>
<tr>
<td>17. Construction Economics</td>
<td>30+15+0</td>
<td>Exam</td>
<td>4,0</td>
<td>summer</td>
</tr>
<tr>
<td>18. Fieldwork</td>
<td>0+30+0</td>
<td>Preliminary exam</td>
<td>3,0</td>
<td></td>
</tr>
<tr>
<td>19. Final Year Project</td>
<td>0+0+30</td>
<td>Exam</td>
<td>5,0</td>
<td>summer</td>
</tr>
</tbody>
</table>

### ELECTIVE COURSES

- Elective Courses Groups I-V: the student chooses one of the courses offered within each group of courses, summer or winter semester. The student is required to choose one elective subject from the elective course groups I-V.

<table>
<thead>
<tr>
<th>Group</th>
<th>ELECTIVE COURSES</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Engineering Geometry</td>
<td>10+0+20</td>
<td>Preliminary exam</td>
<td>3,0</td>
<td>summer</td>
</tr>
<tr>
<td></td>
<td>Computer Applications</td>
<td>10+10+10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Programming</td>
<td>10+20+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Communication Skills</td>
<td>15+15+0</td>
<td>Preliminary exam</td>
<td>2,0</td>
<td>winter</td>
</tr>
<tr>
<td></td>
<td>Introduction to Language Culture</td>
<td>15+15+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction History</td>
<td>15+0+15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Building and Constructing English</td>
<td>15+10+5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Introduction to Spatial Planning</td>
<td>30+0+15</td>
<td>Preliminary exam</td>
<td>3,0</td>
<td>summer</td>
</tr>
<tr>
<td></td>
<td>Building Design</td>
<td>15+30+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Introduction to Building Physics</td>
<td>20+0+10</td>
<td>Preliminary exam</td>
<td>2,0</td>
<td>winter</td>
</tr>
<tr>
<td></td>
<td>Environmental Protection</td>
<td>15+0+15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Management in Civil Engineering</td>
<td>30+0+15</td>
<td>Exam</td>
<td>3,0</td>
<td>summer</td>
</tr>
<tr>
<td></td>
<td>Civil Engineering Regulations</td>
<td>30+0+0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Elective Course Group VI: student chooses 3 of the offered 6 courses:

<table>
<thead>
<tr>
<th>Group</th>
<th>ELECTIVE COURSES</th>
<th>Hours of active classes (L+E+S)</th>
<th>Exam / Preliminary exam</th>
<th>ECTS</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI</td>
<td>Bridges</td>
<td>30+15+15</td>
<td>Exam</td>
<td>5,0</td>
<td>summer</td>
</tr>
<tr>
<td></td>
<td>Introduction to Timber Structures</td>
<td>30+30+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Coastal Engineering</td>
<td>30+30+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Resources and Systems</td>
<td>30+0+30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urban Roads and Intersections</td>
<td>30+30+0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Railway Design</td>
<td>45+15+0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3.1 Study Dynamics
Study Dynamics is pursuant to article 3.3

3.3.2 Student Requirements
Student requirements are defined by valid regulations, especially by Regulations on Studies of University of Rijeka and its Amendments and course curricula defined by the study program (article 3.2.1 Course Description). Specific requirements are defined in the Regulation on studies of the Faculty of Civil Engineering of University of Rijeka.

3.3.2.1 Enrollment requirements for the subsequent academic year
Student requirements are defined by valid regulations, especially by Regulations on Studies of University of Rijeka and its Amendments and course curricula defined by the study program. Specific requirements are defined in the Regulation on studies of the Faculty of Civil Engineering of University of Rijeka.

3.3.2.2. Pre-requisites for courses enrolment

<table>
<thead>
<tr>
<th>Course Code</th>
<th>COURSE</th>
<th>PRE-REQUISITES (PASSED EXAM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. M-181</td>
<td>Mathematical Analysis II</td>
<td>Mathematical Analysis I (M-183)</td>
</tr>
<tr>
<td>3. G-104</td>
<td>Applied Geology</td>
<td>Constructive Geometry (M-180)</td>
</tr>
<tr>
<td>4. TM-149</td>
<td>Structural Mechanics I</td>
<td>Mechanics I (TM-147)</td>
</tr>
<tr>
<td>5. G-106</td>
<td>Soil and Rock Mechanics</td>
<td>inscribed Applied Geology *(G-104)</td>
</tr>
<tr>
<td>6. TM-149</td>
<td>Structural Mechanics II</td>
<td>Inscribed Structural Mechanics I* (TM-150)</td>
</tr>
<tr>
<td>8. P-165</td>
<td>Introduction to Road Design</td>
<td>Geodesy (P-164)</td>
</tr>
<tr>
<td>10. NK-135</td>
<td>Basics of Concrete Structures</td>
<td>Strength of Materials I, Structural Mechanics II</td>
</tr>
<tr>
<td>11. NK-136</td>
<td>Introduction to Steel Structures</td>
<td>Structural Mechanics I (TM-150)</td>
</tr>
<tr>
<td>13. OA-147</td>
<td>Construction Management and Technology</td>
<td>Structure and Characteristics of Materials (MK-123)</td>
</tr>
<tr>
<td>15. OA-148</td>
<td>Construction Economics</td>
<td>inscribed Construction Management and Technology *</td>
</tr>
<tr>
<td>16. OA-149</td>
<td>Fieldwork</td>
<td>achieved 120 ECTS *</td>
</tr>
<tr>
<td>17. ZR-PRED</td>
<td>Final Year Project</td>
<td>achieved 120 ECTS *</td>
</tr>
<tr>
<td>18. NK-134</td>
<td>Bridges</td>
<td>Engineering Materials (TM-148)</td>
</tr>
<tr>
<td>19. NK-137</td>
<td>Introduction to Timber Structures</td>
<td>Strength of Materials II (TM-146)</td>
</tr>
<tr>
<td>20. H-119</td>
<td>Introduction to Coastal Engineering</td>
<td>Hydrology (H-117)</td>
</tr>
<tr>
<td>22. P-167</td>
<td>Urban Roads and Intersections</td>
<td>Introduction to Road Design (P-165)</td>
</tr>
<tr>
<td>23. P-163</td>
<td>Railway Design</td>
<td>Introduction to Road Design (P-165)</td>
</tr>
</tbody>
</table>
3.4. LIST OF COURSES THE STUDENTS CAN ENROLL INTO AT OTHER COURSES OF STUDY

Students are allowed to enroll into other courses taught at other courses of study at the Faculty of Civil Engineering in Rijeka or another high education institution. The earned ECTS credits will be accepted pursuant to article 3.6 of this study program.

Committee for Academic Evaluation and Evaluation of Study Duration can allow the student to take the elective course from the list of offered courses carrying up to 5 ECTS credits at another faculty of University of Rijeka.

3.5. LIST OF COURSES THAT CAN BE OFFERED IN FOREIGN LANGUAGE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>COURSE</th>
<th>Foreign language in which the course can be offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. M-178</td>
<td>Linear Algebra</td>
<td>English Language, Italian Language</td>
</tr>
<tr>
<td>2. M-183</td>
<td>Mathematical Analysis I</td>
<td>English Language, Italian Language</td>
</tr>
<tr>
<td>3. TM-147</td>
<td>Mechanics I</td>
<td>English Language</td>
</tr>
<tr>
<td>4. TM-148</td>
<td>Mechanics II</td>
<td>English Language</td>
</tr>
<tr>
<td>5. TM-145</td>
<td>Strength of Materials I</td>
<td>English Language</td>
</tr>
<tr>
<td>6. TM-146</td>
<td>Strength of Materials II</td>
<td>English Language</td>
</tr>
<tr>
<td>7. H-117</td>
<td>Hydrology</td>
<td>English Language</td>
</tr>
<tr>
<td>8. H-119</td>
<td>Introduction to Coastal Engineering</td>
<td>English Language, Italian Language</td>
</tr>
<tr>
<td>9. OA-154</td>
<td>Construction History</td>
<td>English Language, Italian Language</td>
</tr>
<tr>
<td>10. OA-157</td>
<td>Civil Engineering Structures</td>
<td>English Language, Italian Language</td>
</tr>
<tr>
<td>11. MK-122</td>
<td>Introduction to Building Physics</td>
<td>English Language, Italian Language</td>
</tr>
</tbody>
</table>

3.6. CRITERIA AND CONDITIONS FOR TRANSCRIPTION OF ECTS

ECTS credits that the student acquires with enrollment of courses at another faculty of University of Rijeka or any other University during this study, which are not the same as this study courses, will be registered in student’s Diploma supplement.

For transcription of the ECTS acquired on identical courses (the difference in the content of up to 30%) at civil engineering faculties in Croatia (at universities of Zagreb, Split and Osijek), institutions of higher education at the University of Rijeka and those faculties with which the university has signed a cooperation agreement does not require special decisions.

Recognition of exams is regulated by Regulation on studies of the Faculty of Civil Engineering of University of Rijeka.

3.7. COMPLETION OF THE STUDY

Study is completed successfully passed all the programs prescribed exam, satisfied all other obligations to the studio and writing and oral exam (public presentation) final work to the supervisor. It is preferable that other teachers and students attend the final exam (presentation).

3.8. CONDITIONS FOR CONTINUATION OF THE STUDY FOR STUDENTS WHO INTERRUPTED THE STUDY

Students who interrupted the undergraduate university degree study can re-enter within the next five (5) academic years. By re-entering they accept all changes of the program made during their absence from the study. All passed exams and completed courses which are identical to those under the current program are recognised.