CURRICULUM
UNDERGRADUATE UNIVERSITY STUDY OF ELECTRICAL ENGINEERING

Rijeka, March 2015
1. CURRICULUM DESCRIPTION

1.1. The list of compulsory and elective courses with the number of active classes required for their performance and ECTS credits

### 1. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics I</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fundamentals of Electrical Engineering I</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Introduction to Computer Engineering</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Engineering Graphics and Documenting</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L - lectures, aT – auditory tutorials, IT – laboratory tutorials, dT – design tutorials,

### 2. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Mathematics II</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Physics II</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fundamentals of Electrical Engineering II</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Programming</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Materials Technology</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
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</tr>
</tbody>
</table>

### 3. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Mathematics for Engineers EE</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Measurements in the Electrical Engineering</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Electronics I</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Electrical Circuits</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Foreign Language I¹</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ elective: English or German - free choice
### 4. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Digital Logic</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Electronics II</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Fundamentals of Automatic Control</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Elective Subject(^2)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Foreign Language II(^1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Practice I</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^2\) Enroll one subject

### Elective Subject

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Mechanics and Structural Elements</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Thermodynamics and Energy Engineering</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Fundamentals of Engineering Design</td>
<td>2</td>
<td></td>
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<tr>
<td><strong>TOTAL</strong></td>
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### 5. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Electrical Machines</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Power Electronics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Signals and Systems</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Elective Project(^3)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Subject from elective group Automation:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elements of Plant Automation</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Subject from elective group Power Engineering:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Power Networks</td>
<td>3</td>
<td>1</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
</tr>
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</table>

## 6. semester

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Electrical Drives</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Organization and Economics of Business Systems</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Free Elective Subject 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subject from elective group Automation:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Control</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Subject from elective group Power Engineering:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Plants</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>16</td>
<td></td>
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</tbody>
</table>

4 election from list of offered subjects

## Free Elective Subjects

<table>
<thead>
<tr>
<th>Subject title</th>
<th>Hours / week</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>aT</td>
</tr>
<tr>
<td>Computer Simulations in Engineering</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Introduction into Finite Element Method</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Energy Sources</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Processes of Heat Treatment</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Small Craft Building and Maintenance UN</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Technology Processes of Shipbuilding</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Basic Ship Dynamics</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Energy Systems</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>System Modelling and Simulation</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Environment Protection</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical and Health Education 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 Subject can be enrolled as additional free elective subject

## UNDERGRADUATE UNIVERSITY STUDY OF ELECTRICAL ENGINEERING TOTAL

<table>
<thead>
<tr>
<th>Hours</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>180</td>
</tr>
</tbody>
</table>
1. COURSE DESCRIPTION

1.1. Course objectives

The aim of the subject is adopting of theoretical and simulation knowledge from the automation field. Training students to simulate individually in Matlab with application of different control methods. Developing skills of individual and group work and results presentation.

1.2. Course enrolment requirements

Fundamentals of Automatic Control.

1.3. Expected course learning outcomes

Define basic terms and definitions in automation control field. Describe basic control structures and characteristics. Analyse linear control systems in time and frequency domain. Analyse stability of linear control systems. Apply PID regulator and other regulators developed from the PID regulator. Compare time and frequency domain graph-analytical and analytical control system design methods. Apply cascade control. Synthesise linear control systems in state space. Analyse controllability and observability of linear control systems.

1.4. Course content

Basic terms and definitions. Basic control structures and characteristics. Analysis of linear control systems in time and frequency domain. Stability of linear control systems. PID regulator and other regulators developed from the PID regulator. Time and frequency domain conventional and modern control system design: graph-analytical and analytical methods, cascade control - technical and symmetrical optimum, state space synthesis of linear control systems. Controllability and observability of linear control systems.

1.5. Teaching methods

☒ lectures
☒ seminars and workshops
☒ exercises
☒ long distance education
☐ fieldwork

☒ individual assignment
☐ multimedia and network
☐ laboratories
☐ mentorship
☐ other

1.6. Comments

1.7. Student’s obligations

Course attendance, activity, simulation exercises, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral exam</td>
<td>1</td>
<td>Essay</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge</td>
<td>2</td>
<td>Report</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Simulation exercises</td>
<td>1.5</td>
<td>Practice</td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Written or oral explanation of simulation exercises, continuous knowledge testing (two partial exams), written or oral final exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)
1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. Perić: Automatic control, Fakultet elektrotehnike i računarstva, Zagreb, 2001. (in Croatian)</td>
<td>0 (Internet)</td>
<td>42</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
Basic description

Course title | Basic Ship Dynamics
---|---
Study programme | Undergraduate University Study of Electrical Engineering
Course status | optional
Year | 3.
ECTS credits and teaching | ECTS student’s workload coefficient 4
| Number of hours (L+E+S) 30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives
Introduction to basic methods of dynamic analysis of the ship. Understanding stochastic processes and their application in the ship dynamics. Developing the ability to work in small groups (teamwork).

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Specify the methods of dynamic analysis of the ship. Properly explain, and interpret the basic parameters of the waves as a random process and make a simple statistical analysis of random processes. Explain the energy spectrum and the autocorrelation function and describe the application of Fourier series in the analysis of stochastic dynamic response. Define and solve linear oscillating model of rigid floating bodies motion with one degree of freedom on the sea waves. Itemize and explain the consequences of excessive motion of the ship. Define the types and causes of ship vibrations.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student’s obligations
Course attendance, activity, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>1.5</th>
<th>Activity/Participation</th>
<th>0.5</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>0.5</td>
<td>Oral exam</td>
<td>Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>1.5</td>
<td>Report</td>
<td></td>
</tr>
<tr>
<td>Portfolio</td>
<td>Homework</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, seminar paper, activity, continuous knowledge testing (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Prpić-Oršić J.: Basic Ship Dynamics, Faculty of Engineering University of Rijeka, Fintrade &Tours, 2009. (in Croatian)

1.11. Optional/ additional reading (at the time of proposing study programme)

Senjanović, I.: Ship vibrations I, University of Zagreb, 1974. (in Croatian)
1.12. *Number of assigned reading copies with regard to the number of students currently attending the course*

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prpić-Oršić J.: Basic ship dynamics, Faculty of Engineering University of Rijeka, Fintrade &amp;Tours, 2009. (in Croatian)</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

1.13. *Quality monitoring methods which ensure acquisition of output knowledge, skills and competences*

Through the Institution's quality assurance system.
## Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Computer Simulations in Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
<td>optional</td>
</tr>
<tr>
<td>Year</td>
<td>3.</td>
</tr>
<tr>
<td>ECTS credits and teaching</td>
<td></td>
</tr>
<tr>
<td>ECTS student’s workload coefficient</td>
<td>4</td>
</tr>
<tr>
<td>Number of hours (L+E+S)</td>
<td>30+15+0</td>
</tr>
</tbody>
</table>

## 1. COURSE DESCRIPTION

### 1.1. Course objectives


### 1.2. Course enrolment requirements

None.

### 1.3. Expected course learning outcomes

Correctly explain the methodology of mathematical modeling. Classify mathematical models typical of technical systems. Identify basic types of numerical network. Classify commercial software for numerical modeling. Explain the entire process of applying computer simulation in solving engineering problems. Perform a simulation of a simple problem of mechanical design, in available software.

### 1.4. Course content


### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

### 1.6. Comments

- 

### 1.7. Student's obligations

Attendance, class participation, individual assignment.

### 1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing, seminar paper.

### 1.10. Assigned reading (at the time of the submission of study programme proposal)

I-DEAS, CATIA, FLUENT User Manuals.

### 1.11. Optional / additional reading (at the time of proposing study programme)

-
### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-DEAS, CATIA, FLUENT User Manuals.</td>
<td>online copies</td>
<td>50</td>
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</table>

### 1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Digital Logic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
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<td>Year</td>
<td>2.</td>
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<td>ECTS credits and teaching</td>
<td>ECTS student’s workload coefficient  6</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S) 30+30+0</td>
</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Understanding basic concepts of digital logic and operation of logic circuits. Understanding basic methods for analysing and designing combinational and sequential digital circuits and systems. Developing the ability of analysing, synthesizing and solving problems.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Defining logical levels and basic characteristics of digital signals. Applying various number systems. Using various codes to express digital data. Defining the Boolean algebra axioms and basic theorems. Minimizing logical functions. Distinguishing AND-OR, AND-OR complement, XOR and NOR logic. Using various combinational logic circuits and functions. Explaining operational principles and applications of sequential logic circuits.

1.4. Course content

Basic digital concepts: digital and analog quantities, logic levels, digital signals, digital systems. Number systems and operations: decimal, binary, octal and hexadecimal system, complement of number. Error detection and correction codes; weighted and unweighted codes, Hamming code. Boolean Algebra; axioms and theorems, Boolean functions, standard form of function, truth table. Minimization of logic functions: Karnaugh map, Quine–McCluskey algorithm. Combinational logic circuits; AND-OR, AND-OR complement, XOR and exclusive NOR. Universal properties of NAND and NOR logic gates. Functions of combinational logic; adders, comparators, coders, decoders, multiplexors, demultiplexors. Latches: S-R latch, J-K latch and edge triggered flip-flops, applications. Counters: asynchronous, synchronous, design of counters, applications. Shift registers; basic and bidirectional registers, applications.

1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork

individual assignment
multimedia and network
laboratories
mentorship
other

1.6. Comments

-

1.7. Student’s obligations

Course attendance, laboratory exercises, individual studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>2</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>1</td>
<td>Oral exam</td>
<td>Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>Sustained knowledge check</td>
<td>1.5 Report</td>
<td>Practice 1.5</td>
</tr>
<tr>
<td>Portfolio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Sustained knowledge check (tests), laboratory exercises, written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. P. Godse and D. A. Godse: Digital Logic Circuits, Technical Publications, 2011.</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>U. Peruško i V. Glavinić: Digital Systems, Školska knjiga, 2005. (in Croatian)</td>
<td>5</td>
<td>75</td>
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</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance system.
## Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Elective Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
<td>optional</td>
</tr>
<tr>
<td>Year</td>
<td>3.</td>
</tr>
</tbody>
</table>
| ECTS credits and teaching | ECTS student’s workload coefficient 5  
|                       | Number of hours (L+E+S) 0+45+0                        |

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Application of acquired knowledge and skills to solve practical problems in the field of associated course from which the project is elected.

#### 1.2. Course enrolment requirements

Enrolled course from which the project is elected.

#### 1.3. Expected course learning outcomes

Apply the knowledge and skills from professional content of the associated course. Solve practical task. Acquire competence for individually solving specific professional tasks.

#### 1.4. Course content

Chosen chapter of associated course from which the project was elected.

#### 1.5. Teaching methods

- Lectures
- Seminars and workshops
- Exercises
- Long distance education
- Fieldwork
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

#### 1.6. Comments

#### 1.7. Student’s obligations

Attending the consultation, individually solving task and writing the project report.

#### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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</thead>
<tbody>
<tr>
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<td>Oral exam</td>
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<td>Research</td>
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<tr>
<td>Project</td>
<td>2</td>
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<td>Report</td>
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<tr>
<td>Portfolio</td>
<td>Individual task solving</td>
<td>3</td>
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</tr>
</tbody>
</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Assesses and evaluates the accuracy and completeness of the project task solution and its presentation.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)

References listed for the associated course from which the project is elected.

#### 1.11. Optional / additional reading (at the time of proposing study programme)

References listed for the associated course from which the project is elected.

#### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<thead>
<tr>
<th>Title</th>
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<th>Number of students</th>
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<tr>
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</table>
1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
## Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Electrical Circuits</th>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
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<td>Year</td>
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<td>ECTS credits and teaching</td>
<td>ECTS student ‘s workload coefficient</td>
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<tr>
<td></td>
<td>Number of hours (L+E+S)</td>
</tr>
</tbody>
</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Understanding of relationship between electrical parameters in electrical circuits. Ability of solving circuits and behaviouring determination of electrical circuits. Ability of solving given problem to determinate state in electrical circuits. From basic competencies ability of analysis and basic computing skills will be developed.

#### 1.2. Course enrolment requirements

Mathematics I.

#### 1.3. Expected course learning outcomes

After passing of exam, student is able to do following:

#### 1.4. Course content


#### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

#### 1.6. Comments

#### 1.7. Student’s obligations

Course attendance, homework, written exam.

#### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>3 Report</td>
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<tr>
<td>Portfolio</td>
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</tbody>
</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, homework, continuous knowledge testing, written exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)


#### 1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tbody>
<tr>
<td>Study programme</td>
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<td>ECTS credits and teaching</td>
<td>ECTS student ‘s workload coefficient 5</td>
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<td></td>
<td>Number of hours (L+E+S) 30+30+0</td>
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</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Understanding the requirements of electrical drives. Specific qualities of different machines in electrical drives. Universal criteria in evaluation of suitability: cost of purchase and maintenance, the complexity of application and control of the machine and accompanying devices.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Description of the physical working principle of drives, Description of characteristic types of drives and loads, Definition of the static characteristic of standard drives, Comparison of qualities between different machines in electrical drives. Comparison of advantages and drawbacks between different control systems for particular drive types. Reasoned selection of a particular drive in accordance with the customers requirements.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Course attendance, activities in class, writing laboratory reports, studying

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tr>
<td>Project</td>
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<td>Portfolio</td>
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</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activities in class, sustained knowledge checks (two tests), written and oral exam

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)
W. Leonhard: Control of Electrical Drives, Springer Verlag, 1996.
V. Ambrožič: Modern control of AC drives, Fakulteta za elektrotehniko, Ljubljana, 1996. (In Slovenian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<thead>
<tr>
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<tr>
<td>B. Jurković: Electrical Drives, Školska knjiga, Zagreb, 1986. (In Croatian)</td>
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<td>W. Leonhard: Control of Electrical Drives, Springer Verlag, 1996.</td>
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<td>V. Ambrožič: Modern control of AC drives, Fakulteta za elektrotehniko, Ljubljana, 1996. (In Slovenian)</td>
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1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance systems.
## Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tbody>
<tr>
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<td>Undergraduate University Study of Electrical Engineering</td>
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<td>compulsory</td>
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<tr>
<td>Year</td>
<td>3.</td>
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</tbody>
</table>
| ECTS credits and teaching | ECTS student ‘s workload coefficient 6  
|                    | Number of hours (L+E+S) 45+30+0                          |

## 1. COURSE DESCRIPTION

### 1.1. Course objectives

Understanding the basic concepts and basic operation of electrical machines and transformers. Ability to define steady state characteristics using the mathematical and substitutional models. The ability to work in small groups in the laboratory and writing reports.

### 1.2. Course enrolment requirements

None.

### 1.3. Expected course learning outcomes

Analyze the magnetic circuit. Explain the theory of transformers. Describe the concept of the fundamental equation of torque, rotating and oscillation fields. Apply the theory of electromechanical energy conversion. Describe the operation of electrical generators and motors. Apply the concept of equivalent circuits. Describe and explain the concept of spatial vectors. Describe the structural design of electrical machines. Apply simpler testing of electromechanical devices. Describe the fundamental equation of a electrical machine. Distinguish different types of electrical machines. Compare the operation of different types of electrical machines. Analyze the simpler tasks related to the operation of electrical machines. Explain the external characteristics of a electrical machine. Describe the temperature class of insulation. Introduce technological course of production of power transformers.

### 1.4. Course content


### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

### 1.6. Comments

Lectures, exercises, studying.

### 1.7. Student’s obligations

Lectures, exercises, studying.

### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Activity/Participation</th>
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<td>Portfolio</td>
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</tbody>
</table>

### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, continuous knowledge testing, report on experimental work, fieldwork, written and oral exam.

### 1.10. Assigned reading (at the time of the submission of study programme proposal)


### 1.11. Optional / additional reading (at the time of proposing study programme)

1.12. **Number of assigned reading copies with regard to the number of students currently attending the course**

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>R. Wolf: Fundamentals of Electrical Machines, Školska knjiga, Zagreb,</td>
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<td>1991. (In Croatian)</td>
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</tbody>
</table>

1.13. **Quality monitoring methods which ensure acquisition of output knowledge, skills and competences**

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

The course is a basic professional discipline for all the students of the electric power system studies. The goal is to introduce the students to plants and elements for generation, transmission and distribution of electric energy in industry and electroenergetics.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Classification and basic characteristics of high voltage and low voltage electrical plants in industry and electroenergetics. Description and performance of electrical plants. Methods for calculation of short circuit currents and calculations used for definition of the characteristics of necessary equipment for electrical plants, generation plants and power system in general.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Course attendance, activity, seminar paper, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tbody>
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<td>Oral exam</td>
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<td>Research</td>
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<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
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</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, seminar paper, continuous knowledge testing (three mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)

1.12. *Number of assigned reading copies with regard to the number of students currently attending the course*

<table>
<thead>
<tr>
<th>Title</th>
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</table>

1.13. *Quality monitoring methods which ensure acquisition of output knowledge, skills and competences*

Through the Institution's quality assurance system.
Basic description

Course title | Electrical Power Networks
Study programme | Undergraduate University Study of Electrical Engineering
Course status | optional
Year | 3.
ECTS credits and teaching | ECTS student’s workload coefficient: 7
| Number of hours (L+E+S): 45+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining physical understanding of electrical parameters in electrical power networks and their correlation under different operating conditions. The ability to model, analyse and determine electrical conditions in electrical power networks. The ability to solve problems with a goal of analysis or optimal development of electrical power networks.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes


1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork

- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student’s work

Course attendance | 2.5
Activity/Participation | Seminar paper | Experimental work
Written exam | 1 | Oral exam | 0.5 | Essay | Research
Project | 1 | Sustained knowledge check | 2 | Report | Practice
Portfolio

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, homework – construction projects, continuous knowledge testing (three mid-term exams, four unannounced tests), written and oral exam.
1.10. Assigned reading (at the time of the submission of study programme proposal)
Course materials in electronic form.

1.11. Optional / additional reading (at the time of proposing study programme)
B. Debs: Modern Power System Control and Operation, DSI, Atlanta, 1996.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
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<th>Number of students</th>
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1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences
Through the Institution's quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
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<tr>
<td>Year</td>
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</tr>
<tr>
<td>ECTS credits and teaching</td>
<td>ECTS student's workload coefficient 6</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S) 45+15+0</td>
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</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Understanding of physical relations in semiconductors and application on semiconductors' elements. Describe and analyse operation of semiconductors' elements based on its structure and operating region as well as construct proper substitute model for different area of operation. Acquiring basic knowledge of technology used in semiconductors' production.

1.2. Course enrolment requirements

Fundamentals of Electrical Engineering I.

1.3. Expected course learning outcomes

After passing of exam, student is able to do following:

Describe semiconductors' characteristics: type, electron charge, charge low injection, charge life times, generation and recombination, thermal balance. Describe and analyse physical processes and operation principles of semiconductors' elements for small signals. Apply recombination speeds and optical generations in optoelectronic elements: LED, photodiode and photo-cell. Describe technology process used in semiconductors' production. Define incremental parameters of linear models for semiconductors' elements (pn diode, bipolar transistor, field-effect transistors JFET and MOSFET) operating in small signal mode. Distinguish incremental linear models of semiconductors' elements operating in small signal mode for low and high frequencies. Describe different voltage and current amplifiers for basic operating modes for both, bipolar and field-effect transistors. Analysis of operating mode for nonlinear elements based on parameters' values of incremental linear models of semiconductors' elements. Apply pn diode, bipolar and field-effect transistors.

1.4. Course content

Physical characteristics of semiconductors. Currents in semiconductors. Fermi energy. Physical and electrical characteristics of semiconductors' PN junctions, diodes, optoelectronic elements: photo-resistance, LED, photodiode, photo-cell; bipolar transistors, field-effect transistors: MOSFET and JFET. Secondary effects, transient analysis, analysis of small signals. Developing of models for semiconductors' components for high and small signals. Using incremental models of semiconductors' components in analysis and design of bipolar transistors as well as transistors with field effect with emphasis on MOS components. Technology process used in semiconductors' production.

1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student's obligations

Course attendance, homework, laboratory work, written exam.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
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</tbody>
</table>

1.9. Assessment and evaluation of student's work during classes and on final exam
Course attendance, project assignment, laboratory work, continuous knowledge testing, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<th>Title</th>
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<td>P. Biljanović, Semiconductor Electronics’ Elements, Školska knjiga</td>
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<td>Zagreb, 2004. (in Croatian)</td>
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<tr>
<td>J. Šribar, J. Divković-Pukšec, Electronics’ Elements, problem</td>
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<td>collection, I i II part, Element, Zagreb, 1996. (in Croatian)</td>
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<tr>
<td>M. Sze, Physics of Semiconductor Devices, New Jersey: J. Wiley &amp;</td>
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<td>A. S. Sedra, K. C. Smith, Microelectronic Circuits, 5th edit, N.</td>
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</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Students will be able to describe and analyse transistor circuits in typical configurations.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Analyze the transistor using the large signal model. Analyze the transistor using the small signal model. Analyze different transistor amplifier configurations. Analyze amplifier's frequency response. Describe amplifiers with feedback loop. Analyze operational amplifier. Describe and analyze CMOS logic circuits.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

-

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

<table>
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<tr>
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<td>Portfolio</td>
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</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, project work, continuous knowledge testing (three mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Ž. Butković: Elektronics 2, Zagreb 2010. (in Croatian)

1.11. Optional/additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<td>70</td>
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</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
Introducing to basic categories of plant automation elements, gaining the theoretical and practical knowledge to analyse systems and solve problems in the scope of automation and practical application of computers and programmable logic controllers in simple systems.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Defining and distinguishing the basic categories of plant automation elements. Explaining the principles of implementation and mathematical analysis of physical phenomena in plant automation elements. Defining and analysing the static and dynamic characteristics of plant automation elements. Applying the experimental methods to define the parameters of plant automation elements. Defining the transfer functions of plant automation elements. Describing the implementation and operation of computers in plant control. Applying the computers and programmable logic controllers (PLC) to automation of simple systems.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student’s obligations
Course attendance, activity, laboratory exercises, individual studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>2</th>
<th>Activity/Participation</th>
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</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Course attendance, activity, laboratory exercises, sustained knowledge check (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
D. Matika: Elements of Plant Automation – lectures script (available on the course web site) (in Croatian)
E. Prpić: Elements of Plant Automation - auditory tutorials script (available on the course web site) (in Croatian)
Laboratory tutorials script and associated presentations (available on the course web site) (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)
1.12. *Number of assigned reading copies with regard to the number of students currently attending the course*

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
</table>

1.13. *Quality monitoring methods which ensure acquirement of output knowledge, skills and competences*

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge in the field of energy engineering. Acquiring the basic knowledge required for attending lectures in the field of thermal and energy engineering.

1.2. Course enrolment requirements

Basic knowledge of thermodynamics.

1.3. Expected course learning outcomes

Describe the energy conversion and compare conventional energy sources. Describe ways of electricity production. Describe the use of nuclear energy and interpret the operation of nuclear power stations. Define and describe the types of renewable energy sources. Describe the basic characteristics of hydro power usage. Describe the basic characteristics and ways to use the solar energy. Describe the basic characteristics of wind energy. Describe the basic characteristics of geothermal energy and biomass energy. Describe and compare ways of using environmental heat by heat pumps. Describe how to obtain and utilize the hydrogen as an energy source. Define and describe the basic principles of energy planning and energy policy.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Course and fieldwork attendance, seminar work, studying.

1.8. Evaluation of student's work

Course attendance 1.5 Activity/Participation Seminar paper 0.5 Experimental work

<table>
<thead>
<tr>
<th>Written exam</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral exam</td>
<td></td>
<td>1 Essay</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>1 Report</td>
<td></td>
</tr>
<tr>
<td>Portfolio</td>
<td>Homework</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course and fieldwork attendance, continuous knowledge testing (two mid-term exams), seminar work, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Several authors: Renewable Energy Sources, Energetika marketing, Zagreb, 2002. (in Croatian)
1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several authors: Renewable Energy Sources, Energetika marketing, Zagreb, 2002. (in Croatian)</td>
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<td>62</td>
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</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Energy Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
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<tr>
<td>Year</td>
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<td>ECTS credits and teaching</td>
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<td>ECTS student’s workload coefficient</td>
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<td>Number of hours (L+E+S)</td>
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</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Acquisition of theoretical knowledge and develop the skills needed to solve technical problems in the design phase, construction and management of energy systems. Developing competencies for project management in the energy sector.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe the changes of the working fluid states in energy processes. Draw diagrams of state changes in energy processes. Define and analyze energy and energy losses in energy processes. Calculate the energy losses and efficiency of the process. Calculate the size of the main energy processes. Develop a basic scheme of energy systems. Define the basic operating parameters and sizes of power systems. Analyze and explain the influential parameters of energy processes. Calculate and explain the operating costs of power plants. Describe ways of increasing the efficiency of energy systems. Describe the sources and ways to reduce environmental pollution in energy plants.

1.4. Course content


1.5. Teaching methods

| X lectures |
| X exercises |
| X long distance education |
| X fieldwork |
| ☐ individual assignment |
| ☐ multimedia and network |
| ☐ laboratories |
| ☐ mentorship |
| ☐ other |

1.6. Comments

1.7. Student’s obligations

Course attendance, Activity, Studying

1.8. Evaluation of student’s work

| Course attendance | 2 | Activity/Participation | Seminar paper | Experimental work |
| Written exam | 1 | Oral exam | Essay | Research |
| Project | Sustained knowledge check | 1 | Report | Practice |
| Portfolio | |

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, continuous knowledge testing (2 mid-term exams), written or oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
Prelec, Z.: Written lectures of the course (pdf. on Faculty web)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's system of quality assurance.
1. COURSE DESCRIPTION

1.1. Course objectives
The development of the ability to produce and communicate technical documentation in standard drafting formats, by use of traditional and computer techniques.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Interpret and apply traditional and CAD techniques for the development of engineering graphics. Compare and distinguish the methods of shape description. Compare 3D primitives and interpret the emergence of complex objects. Note the role of the standardization and standards. Recognize and implement the kinds of electrical documentation. Interpret engineering graphics. Organize engineering documentation in accordance with the standards. Estimate personal contribution and the contribution of lecturer to the acquisition of contents.

1.4. Course content
The significance and possibilities of graphical communications. The design process and the role of design model. Traditional, 2D and 3D CAD techniques for the development of documentation. The shape description. Standardization and standards. Technical documentation graphics. Drawn and textual electrical documentation.

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork

- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student's obligations
Course attendance and activity (lectures, exercises), constructive works, continuous knowledge testing, homework, studying.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Oral exam</td>
<td>Essay</td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>0.5</td>
<td>Report</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Homework</td>
<td>1</td>
<td>Constructive work</td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student's work during classes and on final exam
Course attendance, homework, 2 constructive works, continuous knowledge testing (2 exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)
1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
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<th>Number of students</th>
</tr>
</thead>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
Students should be able to use general purpose English as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level).

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Students should be able to use general purpose English as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level). They should be able to: compare general with technical English on the basis of selected texts and topics; recognize and explain grammatical structures and principles typical of the university jargon from examples (Word Formation; Nouns; Compound Nouns; Definite and Indefinite Article; Perfect, Continuous and Passive Aspects; Modals; Comparison of Adjectives; Collocations); implement grammatical structures and aspects in written exercises; recognize terminology, key words and/or information in selected texts as well as differentiate and analyse relevant elements in them; describe and interpret accurately simple diagrams, charts, figures and mathematical formulae; write summaries, arguments and definitions.

1.4. Course content

1.5. Teaching methods
- Lectures
- Seminars and workshops
- Exercises
- Long distance education
- Fieldwork
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

1.6. Comments

1.7. Student’s obligations
Attendance, activity in class and independent learning.

1.8. Evaluation of student’s work

<table>
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<tr>
<th>Course attendance</th>
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<th>Experimental work</th>
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<td>Project</td>
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</tr>
<tr>
<td>Portfolio</td>
<td></td>
<td>Report</td>
<td>Practice</td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Attendance, presentation/report, various assignments and continuous evaluation of knowledge (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
1.11. Optional / additional reading (at the time of proposing study programme)

Selected vocational articles and texts at the upper intermediate level of the Cambridge and Longman University Press.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
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<tbody>
<tr>
<td>Bartolić Lj.: Technical English in Electronics and Electrical Power Engineering, Školska knjiga, Zagreb.</td>
<td>1</td>
<td>70</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s Quality Assurance System.
1. COURSE DESCRIPTION

1.1. Course objectives
Students should be able to use professional jargon independently, namely communicate with other experts in the field of the engineering profession and in an international environment, at the B2 level of the Common European Framework of Reference for Languages.

1.2. Course enrolment requirements
Attended course English Language I.

1.3. Expected course learning outcomes
Students should be able to use professional jargon like experts in Electrical Engineering who spend the most of their time in the plant, i.e. in the field, and to a lesser extent in the office, at the B2 level of the Common European Framework of Reference for Languages. Students should be able to: recognize and explain grammatical structures typical of the university jargon (Participles, Relative Clauses, Sequence of Tenses, Direct and Indirect Speech, Conditional Clauses, Final Clauses); implement grammatical structures in written exercises; analyse and differentiate terminology and relevant elements in texts; paraphrase certain relevant parts in the text; write summaries of the text, arguments and definitions; analyse and describe complex diagrams, charts, figures, processes, experiments and mathematical formulae; defend orally their own positions as well as critically evaluate individual solutions of a problem.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations
Attendance, activity in class and independent learning.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
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<tbody>
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<thead>
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<table>
<thead>
<tr>
<th>Project</th>
<th>Sustained knowledge check</th>
<th>1.5 Report/Presentation</th>
<th>Practice</th>
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<tbody>
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<table>
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<tr>
<th>Portfolio</th>
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</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Attendance, presentation/report, continuous evaluation of knowledge (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
Mance, K.: Grammar File II. MudRi.

1.11. Optional / additional reading (at the time of proposing study programme)

Selected vocational articles and texts at the upper intermediate level of the Cambridge and Longman University Press.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<td>70</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s Quality Assurance System.
Basic description

Course title | Environment Protection
---|---
Study programme | Undergraduate University Study of Electrical Engineering
Course status | optional
Year | 3.
ECTS credits and teaching | ECTS student’s workload coefficient | 4
Number of hours (L+E+S) | 45+0+0

1. COURSE DESCRIPTION

1.1. Course objectives
Define the basic concepts of ecology and environmental protection. To analyze the impact of the technological aspects of the environment. Describe the processes that affect pollution. Compare technologies and their impact. Distinguish the development of sustainable development. Argue the importance of sustainable development. Describe the current problems of global pollution. Distinguishing the basic concepts of ecology and environmental protection. Understanding the impact of technology on the environment.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Developing the skills of analysis and synthesis and creativity in solving problems. Developing the ability to adapt to new situations. Developing the ability to work in an interdisciplinary team, and communication with experts in other fields. Developing the ability to create and project management in the field of environmental protection.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student’s obligations
Attendance, activity, class participation, research and search the literature sources, making self-employment, consulting, independent learning, presentation of work.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>1.5</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
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<tr>
<td>Portfolio</td>
<td></td>
<td>Homework</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Course attendance, activity, continuous knowledge testing, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

<table>
<thead>
<tr>
<th>Title</th>
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1.12. Number of assigned reading copies with regard to the number of students currently attending the course

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

The Final Work is an individual assignment and verification of student expertises, which should show the appropriate level of engineering skills for individually solving specific professional task.

1.2. Course enrolment requirements

Enrolled course from which the Final Work is selected.

1.3. Expected course learning outcomes

Apply acquired knowledge, expertises and skills of the content of Final Work associated course. Solve practical task. Acquire competence for individually solving specific professional task.

1.4. Course content

The content of the Final Work is based on the application of acquired knowledge from educational programs at the undergraduate university studies. Final thesis can be specified from a particular course specific professional content and exceptionally from course that belongs to the group of shared content, when it represents a broader entity with a particular course specific content of the studies. Student enrollers the Final Work by enrolling the last semester. Thesis of the Final Work is establishes by Commission for Final Works, based on suggestion of teacher who will mentor the Final Work.

1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student's obligations

Attending the consultation, individually solving task and writing the Final Work report.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Individual task solving</td>
<td>8</td>
<td>Final work in written form</td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Assesses and evaluates the accuracy and completeness of a given task solving process, the Final Work written report, and its oral presentation

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course
<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
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<td></td>
<td></td>
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<tr>
<td>1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences</td>
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Through the Institution's quality assurance system.
### Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Fundamentals of Automatic Control</th>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
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<tr>
<td>Course status</td>
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<td>Year</td>
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<td>ECTS credits and teaching</td>
<td>ECTS student’s workload coefficient 6</td>
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<td></td>
<td>Number of hours (L+E+S) 30+30+0</td>
</tr>
</tbody>
</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Acquiring theoretical fundamentals and practical knowledge for solving problems in area of automatic control. Usage of program tools for solving control problems.

#### 1.2. Course enrolment requirements

Mathematics II, Fundamentals of Electrical Engineering II

#### 1.3. Expected course learning outcomes

After the passed test, the student will be able to: Describe fundamental characteristics of control loops and the principles of regulation. Define, analyse and compare mathematical models of similar mechanic and electric linear continuous systems. Define the transfer function and step response characteristic of basic dynamic components. Calculate the transfer function of complex dynamic systems. Define the amplitude-phase frequency characteristic of basic dynamic components. Draw the amplitude-phase frequency characteristic of complex systems. Define the stability of control systems. Analyze the stability using analytical and graphical-analytical methods. Describe and calculate the quality indicators of control systems. Define a control system using state space variables. Apply analytical and numerical functions from Matlab/Simulink toolboxes for analysis and problem solving.

#### 1.4. Course content


#### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

#### 1.6. Comments

#### 1.7. Student’s obligations

Course attendance, activities in class, individual attending of laboratory exercises, studying

#### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>2</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
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<tr>
<td>Written exam</td>
<td>1</td>
<td>Oral exam</td>
<td>Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>Sustained knowledge check</td>
<td>2.5 Report</td>
<td>Practice 0.5</td>
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<td>Portfolio</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activities in class, writing laboratory exercise reports, sustained knowledge checks (two tests), written exam

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matika, D. and Brnobić, D.: Basics of Automatic Control, Mimeographed Notes, Technical Faculty Rijeka, Croatia, 2004 (in Croatian)</td>
<td>12</td>
<td>60</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance systems.
1. COURSE DESCRIPTION

1.1. Course objectives
Introduction to basic electrical quantities, concepts and principles. Ability to solve numerical problems in the field of electrical engineering. Perform experiments and qualitative analysis of established or measured values.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Correctly interpret and use basic concepts and quantities of the electrostatic and electromagnetic fields. Describe and explain the laws of electromagnetic and electrostatic fields (induction, self-induction, the law of flow, potential, Coulomb force ...). Apply the basic laws of electrostatic and electromagnetic fields. Develop and interpret basic calculations of simple magnetic circuits and electrostatic fields. To construe and interpret the basic concepts and the quantities of the DC circuits. Explain and apply basic laws circuits (Kirchhoff's laws, superposition theorem, Thvenin's theorem, method of loop currents, ...) in the calculations of DC circuits. Design and analyze calculations of current, voltage and power in simple DC circuits. Measure electrical quantities in DC circuits.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- individual assignment
- multimedia and network
- laboratories
- mentorship
- fieldwork
- other

1.6. Comments

1.7. Student’s obligations
Course attendance, activity, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<td>Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Laboratories</td>
<td>0.5 Final exam</td>
<td>1.5</td>
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</table>

1.9. Assessment and evaluation of student's work during classes and on final exam
Course attendance, measuring of electric quantities, continuous knowledge testing (mid-term exams, tests), final exam (written and oral exam).
1.10. Assigned reading (at the time of the submission of study programme proposal)

Pinter, V.: Fundamentals of electrical engineering I, Tehnička knjiga, Zagreb, (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
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<tbody>
<tr>
<td>Pinter, V.: Fundamentals of electrical engineering I, Tehnička knjiga, Zagreb, (in Croatian)</td>
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</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Fundamentals of Electrical Engineering II</th>
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<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
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<tr>
<td>Year</td>
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<td>ECTS student’s workload coefficient 7</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S) 45+45+0</td>
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</table>

1. COURSE DESCRIPTION

1.1. Course objectives
Introduction to basic electrical quantities, concepts and principles. Ability to solve numerical problems in the field of electrical engineering. Performing experiments and qualitative analysis of established or measured values.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
To explain the emergence of a sinusoidal waveform AC voltage concepts, concepts of periods, frequency, current and maximum values and the initial phase shift. Apply the characteristic quantities of the maximum, effective and average values of the current and voltage in the vector and numerical analysis of AC circuits. Distinguish and describe the basic physical models of working and reactive (inductive and capacitive) resistance in the AC circuit. Analyze and explain the vector diagrams and calculations of AC circuits with serial and parallel connection of working and reactive resistance. Explain the fluctuations of working and reactive energy of electric field in condenser and magnetic field in coil. Explain and use the two-dimensional complex numbers in numerical analysis of two-component of working-reactive AC circuits. Apply the basic laws and methods of calculations of AC circuits. Describe the three-phase electrical system and rotating magnetic field. Measure electrical quantities in AC circuits.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- individual assignment
- multimedia and network
- laboratories
- mentorship
- fieldwork
- other

1.6. Comments

1.7. Student's obligations
Course attendance, activity, studying.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Laboratories</td>
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</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Course attendance, measuring of electric quantities, continuous knowledge testing (mid-term exams, tests), final exam (written and oral exam).
1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<tr>
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1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
### Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tr>
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</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Acquiring knowledge about topics related to machine elements: loads, stresses, types, functions, designs, materials and calculations.

#### 1.2. Course enrolment requirements

None.

#### 1.3. Expected course learning outcomes

Differentiate types of loads and stresses. Define formulae for the calculation of stresses and allowable stresses. Differentiate machine elements. Describe and analyze the calculation of machine elements. Sketch machine elements. Apply acquired knowledge in solving design problems.

#### 1.4. Course content


#### 1.5. Teaching methods

- X lectures
- X seminars and workshops
- X exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network laboratories
- mentorship
- other

#### 1.6. Comments

–

#### 1.7. Student’s obligations

Course attendance, activity, solving of design problems, studying.

#### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Portfolio</td>
<td></td>
<td></td>
<td>Practice</td>
</tr>
</tbody>
</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, 2 mid-term exams, design project, final oral exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Students should be able to use general purpose German as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level).

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Students should be able to: compare general with technical German on the basis of selected texts and topics from the field of mechanical engineering, naval architecture and electrical engineering; recognize and explain grammatical structures and principles typical of the vocational jargon from examples (Tenses; Modals, Compounds, Word Formation, Dependent Clauses, Passive Structures); implement grammatical structures and aspects in written exercises; recognize key words and/or information in selected texts as well as differentiate and analyse relevant elements in them; describe and interpret accurately simple diagrams, charts, figures and mathematical formulae.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Attendance, activity in class, independent learning.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
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<th>Experimental work</th>
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<td>Portfolio</td>
<td></td>
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<td>Practice</td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Attendance, seminar paper, continuous evaluation of knowledge (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Grujoski / Kovačić: Texts, exercises ans assignments in German language for electrical engineering. Školska knjiga Zagreb. (in Croatian)

Lardšnajder, R.: Texts, exercises ans assignments in German language for mechanical engineering. Školska knjiga, Zagreb. (in Croatian)
1.11. Optional / additional reading (at the time of proposing study programme)


Selected texts.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
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<th>Number of students</th>
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<tr>
<td>Štambuk / Marinič: Deutsch und Technik. Školska knjiga 1993</td>
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<td>3</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s Quality Assurance System.
1. COURSE DESCRIPTION

1.1. Course objectives

Students should be able to use professional jargon independently, namely communicate with other experts in the field of the engineering profession and in an international environment, at the B2 level of the Common European Framework of Reference for Languages.

1.2. Course enrolment requirements

Attended course German Language I.

1.3. Expected course learning outcomes

Students should be able to: recognize and explain grammatical structures typical of the vocational jargon (Conditional Clauses, Infinitive Forms, Present and Past Participle); implement grammatical structures in written exercises; differentiate and analyse relevant elements in the text; paraphrase certain relevant parts in the text; write summaries of the text; analyse and describe complex diagrams, charts, figures, processes and mathematical formulae; defend orally their own positions as well as critically evaluate individual solutions of a problem.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student's obligations

Attendance, activity in class, independent learning.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Sustained knowledge check</td>
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<td>Portfolio</td>
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<td>1.25</td>
<td></td>
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</table>

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance, activity in class, continuous evaluation of knowledge (two tests), seminar paper, written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Grujoski / Kovačić: Texts, exercises ans assignments in German language for electrical engineering. Školska knjiga Zagreb. (in Croatian)
Lardšnajder, R.: Texts, exercises ans assignments in German language for mechanical engineering. Školska knjiga, Zagreb. (in Croatian)
Optional / additional reading (at the time of proposing study programme)


Number of assigned reading copies with regard to the number of students currently attending the course

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</table>

Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's Quality Assurance System.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Introduction into Finite Element Method</th>
</tr>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
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<td>Year</td>
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<td>ECTS student’s workload coefficient 4</td>
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<td></td>
<td>Number of hours (L+E+S) 30+15+0</td>
</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills to solve practical problems with the finite element analysis of solids.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes


1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

-

1.7. Student's obligations

Course attendance, activity, homework, seminar paper, studying.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Homework</td>
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<td></td>
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</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, homework, seminar paper, written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)

### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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</table>

### 1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Understanding the elements of computer systems, connection between hardware and software. Understanding the principles of software development and using application programs.

1.1. Course enrolment requirements

None.

1.2. Expected course learning outcomes

Know and being able to describe elements of information-communication system. Using basic commands of operational systems Windows and Linux. Understand connection between computer software and hardware. Understand basic principles of software development.

1.3. Course content

Computer and information technology. Coding of information and storage of data in a computer. Basic building blocks of a computer. Operating systems. Computer networking. Introduction to programming and programming language C.

1.4. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.5. Comments

Course attendance, activity, homework, studying.

1.6. Student’s obligations

1.7. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tr>
<td>Portfolio</td>
<td></td>
<td>Homework</td>
<td>Practice</td>
</tr>
</tbody>
</table>

1.8. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, continuous knowledge testing (two mid-term exams), written and oral exam.

1.9. Assigned reading (at the time of the submission of study programme proposal)


1.10. Optional / additional reading (at the time of proposing study programme)


1.11. Number of assigned reading copies with regard to the number of students currently attending the course

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</tr>
</thead>
</table>

| 1.12. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences |

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
Student will be familiar with the fundamentals of materials science. Student will be skilled for appropriate materials selection in electrical engineering practice. Moreover, student will acquire basic methods of manufacturing processes.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Compare the basic material groups in electrical engineering. Analyse the material microstructure. Analyse the relation between microstructure and material properties. Define basic material properties. Analyse the basic manufacturing processes of materials. Proper material selection on the basis of construction and technological requirements.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student’s obligations
Course attendance, homework preparation, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<td>Portfolio</td>
<td>Homework</td>
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<td></td>
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</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Course attendance, homework, sustained knowledge check (two mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)
### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
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### 1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
### Course Title
Mathematics for Engineers EE

### Study Programme
Undergraduate University Study of Electrical Engineering

### Course Status
Compulsory

### Year
2.

### ECTS Credits and Teaching
<table>
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<td>Number of Hours (L+E+S)</td>
<td>30+45+0</td>
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</table>

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#### 1. COURSE DESCRIPTION

1. **Course Objectives**

Acquiring basic knowledge and skills in Fourier analysis, Laplace transforms, and vector analysis. Acquiring basic notions about complex functions and statistics.

2. **Course Enrolment Requirements**

Mathematics I, Mathematics II

3. **Expected Course Learning Outcomes**

Define and correctly interpret basic notions from Fourier analysis and Laplace transforms, specify basic properties of Fourier and Laplace transformations. Compute Fourier series, Fourier transforms and Laplace transforms of some functions, determine solutions of differential equations by using Laplace transforms. Define and interpret correctly basic notions from vector analysis. Give physical interpretation for gradient of scalar fields, directional derivative, divergence and rotor of vector fields; apply these differential operators when solving problems from vector analysis. Define and give physical interpretation of curve and surface integrals, express the basic integral theorems and give their physical meaning. Compute some curve and surface integrals and apply integral theorems. Define and interpret correctly basic notions from complex functions. Evaluate derivatives and some integrals of complex functions. Define basic terms in descriptive statistics, analyze statistical data.

4. **Course Content**

- Series of functions, Fourier series, Fourier integral and Fourier transformation.
- Laplace transformation, basic properties and application.
- Vector analysis, scalar and vector fields, gradient, divergence, curl, potential.
- Curve integrals, surface integrals, triple integrals, applications.
- Integral theorems, formulas of Green-Gauss, Stokes and Ostrogradsky.
- Functions of complex variables, derivatives, integrals.
- Bases of statistical analysis, samples and confidence intervals.

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#### 1.5. Teaching Methods

- [ ] Lectures
- [ ] Seminars and workshops
- [ ] Exercises
- [ ] Long distance education
- [ ] Fieldwork
- [ ] Individual assignment
- [ ] Multimedia and network laboratories
- [ ] Mentorship
- [ ] Other

#### 1.6. Comments

- 

#### 1.7. Student's Obligations

Course attendance, activity, mid-term exams, tests.

#### 1.8. Evaluation of Student's Work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Activity/Participation</th>
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<tr>
<td>Portfolio</td>
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</table>

#### 1.9. Assessment and Evaluation of Student's Work during Classes and on Final Exam

Course attendance, activity, continuous knowledge testing (mid-term exams, quizzes, tests), written and oral exam.
1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)

Črnjarić-Žic N.: Internal lecture notes about statistics and samples.
Črnjarić-Žic N., Štefan Trubić M., Internal lecture notes about Laplace transforms.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<td>Štefan Trubić M., Črnjarić-Žic N: Mathematics for Engineers, book of solved problems, e-lectures</td>
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</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring basic knowledge and skills in linear algebra and calculus.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define and correctly interpret basic notions in linear algebra, single-variable functions, and single-variable calculus. State and correctly interpret basic results in linear algebra and single-variable calculus. Carry out basic computations with matrices, vectors, determinants; determine solutions of systems of linear equations. Apply vector operations to compute some areas, volumes; determine equations of planes and lines. Compute limit values and derivatives of single-variable functions. Apply integration rules and evaluate indefinite and definite integrals of some function.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

-

1.7. Student’s obligations

Course attendance, activity/participation, mid-term exams, and tests.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
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<th>Experimental work</th>
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<td>Portfolio</td>
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</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity/participation, sustained knowledge check (mid-term exams, tests), and written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

### 1.11. Optional / additional reading (at the time of proposing study programme)

- Demidović, B. P.: Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)
- Devide, V. i oth.: Solved Problems in mathematics, 1-4, Školska knjiga Zagreb, 1990 (in Croatian)

### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<tr>
<th>Title</th>
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</tr>
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<tr>
<td>Slapničar I.: Mathematics 1, Sveučilište u Splitu FESB, Split 2002, online book (in Croatian)</td>
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### 1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tbody>
<tr>
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</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring basic knowledge and skills in application of calculus for single-variable functions, calculus for multi-variable functions, and ordinary differential equations.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Correctly interpret and apply single-variable calculus. Define and correctly interpret basic notions of multi-variable calculus and ordinary differential equations (ODE). Compute derivatives and some integrals of multi-variable functions, and solutions of some ODE. Compute polynomial approximations; find local extremes of single-variable and multi-variable functions by applying differential calculus. Compute some lengths, areas, and volumes by applying integral calculus. Model vibrations in simple mechanical and electrical systems by applying ODE.

1.4. Course content

Applications of single-variable calculus. Multi-variable functions. Partial derivatives, differential calculus for two-variable functions and applications (approximations, local extremes, optimal control problems). Double integral and applications. First order ODE. Higher order ODE. Systems of ODE. Applications of ODE.

1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

-

1.7. Student’s obligations

Course attendance, activity/participation, mid-term exams, and tests.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Seminar paper</th>
<th>Experimental work</th>
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1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity/participation, sustained knowledge check (mid-term exams, tests), and written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Demidović, B. P.: Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)
1.11. Optional / additional reading (at the time of proposing study programme)

Kamenarović, I.: Mathematics in Engineers 1, Tehnički fakultet Sveučilišta u Rijeci, 1997, (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<thead>
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1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.
Basic description

<table>
<thead>
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<th>Measurements in the Electrical Engineering</th>
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<tr>
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<tr>
<td></td>
<td>Number of hours (L+E+S)</td>
</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Objectives of the course are to prepare the students to understand measurements, characteristics of electrical and electronic measurement instruments and measurement methods, to perform measurements independently and to apply optimal measurement method, to develop ability to work in a small group (team work) and to present results of measurements.

1.2. Course enrolment requirements

Fundamentals of Electrical Engineering I

1.3. Expected course learning outcomes

After passing the exam, student is able to do following:

1. Interpret and explain measurement uncertainty
2. Apply the model of measurement uncertainty at simple examples
3. Analyze a measurement problem and determine sources of systematic and random errors
4. Apply measures to eliminate errors in measurements
5. Describe measurements methods for measurements of electrical quantities
6. Apply measurements methods for measurements of electrical quantities
7. Describe working principles of measurement instruments (electrical and electronic)
8. Apply measurements instruments for measurements of electrical quantities
9. Describe transducers for measurements of non-electrical quantities
10. Write complete measurement report, analyze and interpret measurement data

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Course attendance, activity during course lectures, preparation for and attendance of laboratory exercises and studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Experimental work</th>
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<td>Portfolio</td>
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</tbody>
</table>
### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Assessment and evaluation of student’s work will be based on sustained knowledge checks, laboratory exercises and final exam.

### 1.10. Assigned reading (at the time of the submission of study programme proposal)


### 1.11. Optional / additional reading (at the time of proposing study programme)


### 1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
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<th>Title</th>
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</thead>
</table>

### 1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Ability to establish the equilibrium equations for rigid and deformable bodies (structures). Ability to determine the resultant of forces in different kinds of force systems. Understanding the relations between internal forces and determine the internal forces in planar structures. Ability to determine the dimensions and materials of bearing structures or its individual parts under external load.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define the concept of force and force system. Determine the momentum for the point, for the axis and for the couple of forces. Define the Coulomb friction law. Reduce the given system of forces to the simplest form and to the reduction point. Determine the equilibrium conditions of a given force system. Determine the reaction forces and the distribution of internal forces in trusses and beam structures. Calculate the geometric characteristics of the straight beam sections. Define the concept of stress and strain. Distinguish between basic and complex shapes of beam structures load cases. Calculate the stress and strain for the axial load, shear, torsion and bending of structures. Analyse the free body diagrams. Define the equilibrium states. Calculate the critical buckling force for compressive loaded rod. Check the dimensions of structure.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student's obligations

Course attendance, class participation, laboratory exercises, final exam, independent learning.

1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
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</table>

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance. Continuous knowledge testing (two mid-term exams). Laboratory exercises. Written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)
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<tr>
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<td>Brnić, J.: &quot;Statics&quot;, University of Rijeka, Faculty of Engineering, Rijeka, 2004.</td>
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**1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences**

Through the Institution's quality assurance system.
## Basic description

<table>
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<tr>
<th>Course title</th>
<th>Organization and Economics of Business Systems</th>
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<tr>
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<td>Undergraduate University Study of Electrical Engineering</td>
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</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Assuming theoretical concepts and knowledge of the organization and business economics.

#### 1.2. Course enrolment requirements

None.

#### 1.3. Expected course learning outcomes

- Explain the concept of business systems and building the business system. Define the basic principles of the organization. Define the management of systems and information in the enterprise. Analyze the types of organizational structures. Analyze the evaluation of jobs. Distinguish the ownership, the management and the leadership. Define the principles of management and leadership. Analyze the teamwork. Define the business policies. Describe the principles and methods of planning. Define the long-term and operational plans. Analyze network planning technique. Define the plant as an economic system. Analyze income and expenses. Distinguish the Income Statement and Balance Sheet. Define the effects of the business.

#### 1.4. Course content


#### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

#### 1.6. Comments

Attendance, class participation, independent learning.

#### 1.7. Student’s obligations

Attendance, class participation, independent learning.

#### 1.8. Evaluation of student’s work

<table>
<thead>
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<th>Course attendance</th>
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<td>Portfolio</td>
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</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Attendance, class participation, continuous assessment (two mid-term exams), written exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
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</tr>
</thead>
</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
The general objective of the educational field of Physical and Health Education is to satisfy man’s biosocial need for movement through appropriate kinetic activities, thus satisfying this general need by increasing the adaptive and creative capabilities in contemporary life and work conditions.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Through appropriate kinetic activities satisfy man’s biosocial need for movement.

1.4. Course content
The course content of the educational field of Physical and Health Education shall be implemented through regular (field athletics, football, basketball, volleyball, handball, swimming and water-polo, fitness) and optional (skiing, sailing, rowing, trekking, tennis and rafting) programmes.

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations
Course attendance.

1.8. Evaluation of student’s work

<table>
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<td>Portfolio</td>
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</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Regular course attendance.

1.10. Assigned reading (at the time of the submission of study programme proposal)
Medved, R.: Sports medicine, Medicinska knjiga, Zagreb. (in Croatian)
Tuka, K.: Physiology of sport, Sportska tribina, Zagreb. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<tr>
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</table>

1.13. **Quality monitoring methods which ensure acquisition of output knowledge, skills and competences**

Through the Institution's Quality Assurance System.
1. COURSE DESCRIPTION

1.1. Course objectives
Adoption of theoretical knowledge and develop the ability to differentiate properties and concepts of classical and modern physics. Forming a proper view of the interpretation of physical phenomena and their applications in engineering.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Parsed in physics in classical and relativistic picture. Identify the exact features access to natural phenomena. Define fundamental physical quantities and units of measure. Understand the properties of motion in classical and relativistic picture. Develop and independently argue simpler problems. Apply learned knowledge to problem-solving tasks.

1.4. Course content

1.5. Teaching methods
- Lectures
- Seminars and workshops
- Exercises
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

1.6. Comments
-

1.7. Student’s obligations
Course attendance, activity, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
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<td>Portfolio</td>
<td>Homework</td>
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1.9. Assessment and evaluation of student’s work during classes and on final exam
Course attendance, activity, continuous knowledge testing, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
Dobrinić, J. Mandić, L.: Solved examples in Physics 1, Tehnički fakultet, Rijeka, 2010.(In Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)
Dobrinić, J., Bonato, J.: Physics, Pomorski fakultet, Rijeka, 2009.(In Croatian)
1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<td>Dobrinić, J., Mandić, L.: Physics 1, Tehnički fakultet, Rijeka, 2002. (In Croatian)</td>
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<td>Dobrinić, J. Mandić, L.: Solved examples in Physics 1, Tehnički fakultet, Rijeka, 2010. (In Croatian)</td>
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1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
## Basic description

<table>
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<th>Course title</th>
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<tr>
<td></td>
<td>Number of hours (L+E+S)</td>
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</tbody>
</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Adoption of theoretical knowledge and develop the ability to differentiate properties and concepts of classical, relativistic and quantum physics. Forming a proper view of the interpretation of physical phenomena and their applications in engineering.

#### 1.2. Course enrolment requirements

None.

#### 1.3. Expected course learning outcomes


#### 1.4. Course content


#### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

#### 1.6. Comments

- 

#### 1.7. Student's obligations

Course attendance, activity, studying.

#### 1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
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<th>Activity/Participation</th>
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<td>Homework</td>
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</table>

#### 1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing, written and oral exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)


#### 1.11. Optional / additional reading (at the time of proposing study programme)

1.12. *Number of assigned reading copies with regard to the number of students currently attending the course*

<table>
<thead>
<tr>
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1.13. *Quality monitoring methods which ensure acquirement of output knowledge, skills and competences*

Through the Institution’s quality assurance system.
**Basic description**

<table>
<thead>
<tr>
<th>Course title</th>
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<tbody>
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<td>Number of hours (L+E+S) 30+45+0</td>
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</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Presentation of power electronic converters from the theoretical and practical view, preparation for their design.

#### 1.2. Course enrolment requirements

None.

#### 1.3. Expected course learning outcomes


#### 1.4. Course content


#### 1.5. Teaching methods

- Lectures
- Seminars and workshops
- Exercises
- Long distance education
- Fieldwork
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

#### 1.6. Comments

Lectures are frequently improved by new laboratory models.

#### 1.7. Student’s obligations

Course attendance, working reports for laboratory exercises

#### 1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>2.5</th>
<th>Activity/Participation</th>
<th>0.5</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tbody>
<tr>
<td>Written exam</td>
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<td>Essay</td>
<td>Research</td>
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<tr>
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<td>Practice</td>
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<tr>
<td>Portfolio</td>
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</tbody>
</table>

#### 1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, activity, homework, continuous knowledge testing (three mid-term exams), written and oral exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)


#### 1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.G. Kassakian, M.F. Schlecht, G.C. Verghese: Fundamentals of power</td>
<td>6</td>
<td>62</td>
</tr>
<tr>
<td>electronics, 1. Part Topologies and power converter functions, Graphis,</td>
<td></td>
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<tr>
<td>Zagreb, 2000. (in Croatian)</td>
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</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Processes of Heat Treatment</th>
</tr>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
<td>optional</td>
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<tr>
<td>Year</td>
<td>3.</td>
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<tr>
<td>ECTS credits and teaching</td>
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<tr>
<td>ECTS student’s workload coefficient</td>
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</tr>
<tr>
<td>Number of hours (L+E+S)</td>
<td>30+15+0</td>
</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

Student will be familiar with the processes of heat treatment and surface engineering.

1.2. Course enrolment requirements

Attended courses: Materials Technology.

1.3. Expected course learning outcomes

Analyze the basic knowledge related to the heat treatment. Analyse the transformations and basic processes of heat treatment of steel. Analyse the basic processes of heat treatment of non-ferrous metals. Analyse the surface heat treatment processes of alloys. Analyse the processes of surface engineering. Define the processes of heat treatment and surface engineering on the basis of construction and technological requirements.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

- 

1.7. Student’s obligations

Course attendance, homework preparation, preparation for participation in teaching, studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
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<tbody>
<tr>
<td>1.5</td>
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<td>Essay</td>
<td>Research</td>
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<tr>
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</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Course attendance, homework, preparation for participation in teaching, sustained knowledge check (two mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)
1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
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<tbody>
<tr>
<td>Smoljan, B., Heat treatment of steel, gray and ductile iron castings,</td>
<td>4</td>
<td>46</td>
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<tr>
<td>Zagreb: Hrvatsko društvo za toplinsku obradbu i inženjerstvo površina,</td>
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<td>Udžbenici Sveučilišta u Rijeci, 1999. (in Croatian)</td>
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<td>Smoljan, B., Fundamentals of heat treatment of steel, Rijeka: Sveučilište</td>
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<td>u Rijeci, Pedagoški fakultet, 1997. (in Croatian)</td>
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<td>Krumes, D., Heat treatment, Strojarski fakultet u Slavonskom Brodu,</td>
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<td>46</td>
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<tr>
<td>Slavonski Brod 2000. (in Croatian)</td>
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</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
Basic description

Course title | Professional Practice I
Study programme | Undergraduate University Study of Electrical Engineering
Course status | compulsory
Year | 2.
ECTS credits and teaching | ECTS student’s workload coefficient 5
| Number of hours (L+E+S) | -

1. COURSE DESCRIPTION

1.1. Course objectives

Student verifies and complements his own expertise, along with a comprehensive view of the work process.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Apply acquired knowledge and skills from studied courses professional content. Gain working process experience. Develop and further improve competence for solving specific professional engineering problems.

1.4. Course content

Industrial practice within Undergraduate University Study of Naval Architecture is carried out individually in work organization that is engaged in the student’s field of study, and with activities in accordance with the Industrial Practice Rules and Study Program curriculum. Within such practice, student is familiarized with the corresponding jobs that are studied through programs of education, with the task of verifying and complementing their own expertise, along with a comprehensive view of the work process.

1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork

- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student’s obligations

Conducting professional practice in duration of 15 working days, or 120 hours, and writing the corresponding report.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tbody>
<tr>
<td>Written exam</td>
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<td>Research</td>
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<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>1 Practice</td>
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<tr>
<td>Portfolio</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam

Assesses and evaluates student work and dedication, and written report.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Learning about the process of writing and debugging a program in C programming language.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes


1.4. Course content


1.5. Teaching methods

- Lectures
- Seminars and workshops
- Exercises
- Long distance education
- Fieldwork
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, homework, individual study.

1.8. Evaluation of student's work

<table>
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<tr>
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<th>Experimental work</th>
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<td>Essay</td>
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<td>Report</td>
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<td>Portfolio</td>
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1.9. Assessment and evaluation of student's work during classes and on final exam

1.10. Assigned reading (at the time of the submission of study programme proposal)


1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
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### 1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
Basic description

<table>
<thead>
<tr>
<th>Course title</th>
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<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
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<td>Course status</td>
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<td>Year</td>
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<tr>
<td>ECTS credits and teaching</td>
<td>ECTS student’s workload coefficient</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S)</td>
</tr>
</tbody>
</table>

1. COURSE DESCRIPTION

1.1. Course objectives

The course is designed to provide the student with basic knowledge in quality assurance topics. Through exercises students are introduced with practical application of several course objectives.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

To interpret the meaning and importance of quality assurance. Explain the basic concepts of quality assurance and quality control. Classify quality characteristics of products, processes and services. Quality cost analysis. Interpret basic requirements of ISO 9001 standard. Apply basic quality tools. Assess results of statistical process control. Analyse R%R of measurement system. Measure process reliability and select acceptance sampling.

1.4. Course content

Definitions of quality. Quality of products, processes and services.
Control charts. Specification limits and tolerances.

1.5. Teaching methods

- Lectures
- Seminars and workshops
- Exercises
- Long distance education
- Fieldwork
- Individual assignment
- Multimedia and network
- Laboratories
- Mentorship
- Other

1.6. Comments

1.7. Student’s obligations

Course attendance, active participation in the course, attendance at laboratory exercises, homework and independent learning.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<th>Oral exam</th>
<th>Essay</th>
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Project

<table>
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<tr>
<th>Sustained knowledge check</th>
<th>Report</th>
<th>Practice</th>
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</table>

Portfolio

1.9. Assessment and evaluation of student’s work during classes and on final exam

Sustained knowledge check (three midterm exams) and final written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)
1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
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</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
Understanding time and frequency analysis and processing methods of continuous and discrete-time signals, as well as basic input-output relationships of linear time-invariant systems. Development of analysis, synthesis, and problem solving skills.

1.2. Course enrolment requirements
Mathematics I and Mathematics II.

1.3. Expected course learning outcomes
Define both elementary signals and basic system properties. Define the impulse response of LTI systems, convolution integral and sum. Use the convolution for the time-domain analysis of LTI systems. Define Fourier series and Fourier transform. Use different Fourier representations in spectral analysis of signals. Define the frequency response of LTI systems. Study LTI systems in the frequency domain. Describe signal sampling and reconstruction procedures.

1.4. Course content
Signals and systems; classification, elementary signals, signal models, operations on signals, system properties. Continuous and discrete LTI systems; impulse response, convolution of signals, properties of LTI systems. Fourier series; line spectrum, systems with periodic inputs. Fourier transform; signal energy, transfer function of ideal filters. Signal sampling; aliasing, reconstruction filter. Discrete Fourier Transform (DFT); signal spectral analysis.

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
-

1.7. Student’s obligations
Course attendance, individual studying.

1.8. Evaluation of student’s work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tr>
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<td>Essay</td>
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<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>Report</td>
<td>Practice</td>
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<tr>
<td>2.5</td>
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<td></td>
</tr>
<tr>
<td>Portfolio</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.9. Assessment and evaluation of student’s work during classes and on final exam
Sustained knowledge check (written tests), final written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)
1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
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<tr>
<td>B. P. Lathi: Linear Systems and Signals, 2/E, Oxford University Press, 2004</td>
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<tr>
<td>S. S. Soliman and M. D. Srinath: Continuous and Discrete Signals and Systems, 2/E, Prentice Hall, 1998</td>
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<td>70</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives
The acquisition of specific competencies dealing with the small craft building and maintenance. Acquiring the skills of independent work and developing the ability to present the achieved results.

1.2. Course enrolment requirements
None.

1.3. Expected course learning outcomes
Distinguish materials for the building of small crafts. Describe the methods for building small crafts of wood and wooden materials, plastics and metals. Describe the installation of propulsion engine with associated systems. Describe the work on the interior and exterior outfitting of small crafts. Describe the works on maintenance and repair of small crafts. Describe the places for building, maintenance and winter storage of small crafts and facilities for retrieving, lifting/launching and hauling of small crafts.

1.4. Course content

1.5. Teaching methods
- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments
Attendance at lectures, seminar work with presentation, self learning.

1.7. Student’s obligations
Attendance at lectures, seminar work with presentation, self learning.

1.8. Evaluation of student’s work
Course attendance 1.5 Activity/Participation Seminar paper 2 Experimental work
Written exam 0.5 Oral exam Essay Research
Project Sustained knowledge check Report Practice
Portfolio

1.9. Assessment and evaluation of student’s work during classes and on final exam
Attendance at lectures, seminar work with presentation, written examination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

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<thead>
<tr>
<th>Title</th>
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<tr>
<td>Pollard, S.F., Boatbuilding with Aluminum, International Marine, Camden, 1993.</td>
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<td>19</td>
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</table>

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.
**Basic description**

<table>
<thead>
<tr>
<th>Course title</th>
<th>System Modelling and Simulation</th>
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<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
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<tr>
<td>Year</td>
<td>3.</td>
</tr>
<tr>
<td>ECTS credits and teaching</td>
<td>ECTS student 's workload coefficient 4</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S) 30+15+0</td>
</tr>
</tbody>
</table>

### 1. COURSE DESCRIPTION

#### 1.1. Course objectives

Mastering the methods and techniques of mathematical modelling and computer simulation of various technical processes. Modelling technical systems analogous to electrical systems.

#### 1.2. Course enrolment requirements

None.

#### 1.3. Expected course learning outcomes

Adopt the basic principles of creating mathematical models of various technical systems (mechanical, thermal, electrical, fluid flow system, etc.). Master basic use of Matlab / Simulink simulation software for model creation, simulation and system analysis. Transform the mathematical model of the system into a graphical representation using block diagrams. Display systems in the state space from the differential equation description, transfer function and block diagram description. Linearize nonlinear equations using Taylor series. Simulate different technical systems using electrical networks with operational amplifiers. Generate analytic functions by using the power series and solving differential equations.

#### 1.4. Course content


#### 1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

#### 1.6. Comments

- 

#### 1.7. Student's obligations

Course attendance, work on laboratory exercises, studying.

#### 1.8. Evaluation of student's work

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>1.5 Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
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<tr>
<td>Portfolio</td>
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<td></td>
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</tbody>
</table>

#### 1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, work on laboratory exercises, continuous knowledge testing (three mid-term exams), written exam.

#### 1.10. Assigned reading (at the time of the submission of study programme proposal)


#### 1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
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<tr>
<th>Title</th>
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<tbody>
<tr>
<td>N.M. Karayanakis: Advanced System Modelling and Simulation With Block Diagram Languages</td>
<td>-</td>
<td>50</td>
</tr>
</tbody>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution’s quality assurance system.
1. COURSE DESCRIPTION

1.1. Course objectives

Introduction to technological processes in shipbuilding, capabilities and techniques of management and organization of preparatory and shipbuilding production processes, and the importance of planning the integration of various processes in shipbuilding, according to defined learning outcomes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Interpret organizational features of shipbuilding processes of preparation and production. Distinguish between various shipyard processes modelling capabilities. Describe the shipbuilding processes and working areas. Interpret shipyard flexibility. To analyze the structural and technological constraints. Define the shipyard throughput. Interpret and explain the characteristics of the ship assembly process. Describe transport techniques, systems and shipyard equipment. Argue the integration of ship production processes. Analyze delivery procedures throughout production phases.

1.4. Course content


1.5. Teaching methods

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, sustained knowledge check, studying.

1.8. Evaluation of student's work

<table>
<thead>
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<th>Course attendance</th>
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</table>

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, sustained knowledge check (two mid-term exams), written and oral exam or their combination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)


1.12. Number of assigned reading copies with regard to the number of students currently attending the course

<table>
<thead>
<tr>
<th>Title</th>
<th>Number of copies</th>
<th>Number of students</th>
</tr>
</thead>
</table>

1.13. Quality monitoring methods which ensure acquisition of output knowledge, skills and competences

Through the Institution's quality assurance system.
### Basic description

<table>
<thead>
<tr>
<th>Course title</th>
<th>Thermodynamics and Energy Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study programme</td>
<td>Undergraduate University Study of Electrical Engineering</td>
</tr>
<tr>
<td>Course status</td>
<td>optional</td>
</tr>
<tr>
<td>Year</td>
<td>2.</td>
</tr>
<tr>
<td>ECTS credits and teaching</td>
<td>ECTS student’s workload coefficient 4</td>
</tr>
<tr>
<td></td>
<td>Number of hours (L+E+S) 45+15+0</td>
</tr>
</tbody>
</table>

### Course Description

1. **Course objectives**

Obtaining theoretical knowledge and develop skills to solve practical problems in the field of thermodynamics. Acquiring the knowledge required for attending lectures in the field of thermal and energy engineering.

2. **Course enrolment requirements**

Attended courses Mathematics I and Mathematics II.

3. **Expected course learning outcomes**

Define and describe the first and second laws of thermodynamics as well as the concept of thermal conditions. Define and describe the equation of state of an ideal gas and gas mixtures. Describe the ideal gas state changes. Describe and compare the thermal cycles. Compare and analyze the reversible and irreversible processes and define work losses due to the irreversibility. Describe state changes during evaporation and condensation. Describe, compare and analyze processes of steam plants. Describe and analyze the thermal behaviour during combustion. Describe and compare the processes of internal combustion engines. Describe and analyze the exchange of energy in the flow through the nozzle. Define, describe and compare basic types of heat transfer and describe the heat transfer within the heat exchanger. Describe and analyze the changes and processes with humid air. Define basic tasks of energy engineering and describe basic forms of energy, energy conversion methods and the impact on the environment. Apply acquired knowledge to solve thermodynamic tasks (practical problems).

4. **Course content**


5. **Teaching methods**

- lectures
- seminars and workshops
- exercises
- long distance education
- fieldwork
- individual assignment
- multimedia and network
- laboratories
- mentorship
- other

6. **Comments**

7. **Student's obligations**

Course attendance, activity, homework, studying.

8. **Evaluation of student's work**

<table>
<thead>
<tr>
<th>Course attendance</th>
<th>Activity/Participation</th>
<th>Seminar paper</th>
<th>Experimental work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written exam</td>
<td>Oral exam</td>
<td>0.5 Essay</td>
<td>Research</td>
</tr>
<tr>
<td>Project</td>
<td>Sustained knowledge check</td>
<td>1 Report</td>
<td>Practice</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Homework</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

9. **Assessment and evaluation of student's work during classes and on final exam**
Course attendance, activity, homework, continuous knowledge testing (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)


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