# COURSE DESCRIPTION

<table>
<thead>
<tr>
<th>Nr</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Know fundamentals laws, theorems and principles of electric circuits (FEC1 and FEC2)</td>
<td>Assessment/Exam</td>
<td>Lectures/Classes</td>
<td>K1A_W05</td>
</tr>
<tr>
<td>2</td>
<td>Know analyses methods for linear electric circuits in DC, time (FEC1) and AC (FEC2) domains</td>
<td>Assessment/Exam</td>
<td>Lectures, Classes</td>
<td>K1A_W05</td>
</tr>
<tr>
<td>3</td>
<td>Can analyze simple electric circuits in DC, time (FEC1), and AC (FEC2) domains</td>
<td>Exam</td>
<td>Lectures, Classes</td>
<td>K1A_U03</td>
</tr>
<tr>
<td>4</td>
<td>Can analyze electric circuits with the use of electric circuit simulation software</td>
<td>Exam</td>
<td>Lecture</td>
<td>K1A_U03</td>
</tr>
<tr>
<td>5</td>
<td>Have the ability to self-education with use of e-teaching materials</td>
<td>Exam</td>
<td>Lecture, Classes</td>
<td>K1A_U09</td>
</tr>
<tr>
<td>6</td>
<td>Can read and understand problems (text and description) in the field of</td>
<td>Assessment/exam</td>
<td>Lecture</td>
<td>K1A_U10</td>
</tr>
</tbody>
</table>
18. Teaching modes and hours
Lecture / BA / MA Seminar / Class / Project / Laboratory
45 h (Lecture), 30 h (Class);

19. Syllabus description:

**Semester 1. Lectures:**

1. Introduction to circuit theory, circuit variables - basic terms and definitions, classification of electric circuit problems, circuit elements: resistor, sources. Passive/active sign convention, circuit diagram, ideal voltmeter/ammeter.
2. Passive two-terminal elements: resistor (Ohm’s law), equivalent resistance, voltmeter, ammeter, practical voltage and current sources, Kirchhoff’s laws, voltage/current dividers
6. Analysis of complex circuits. node voltage (nodal) analysis.
13. Introduction to computer added simulation software - PSpice tutorial – DC & time domain examples.

**Semester 1. Classes:**

1. Simple electric circuits: application of Ohm’s law and Kirchhoff’s laws; equivalent resistance. Examples of voltage and current dividers, current – voltage relationship for passive elements (resistors/receivers) and active elements (voltage and current sources). Ideal/real voltmeter and ammeter.
2. Passive two-terminal elements (current-voltage characteristics): resistor (equivalent resistance), voltmeter, ammeter. Ideal and real sources (current-voltage characteristic). Simple electric circuits (continuation), e.g. voltage adder. Power dissipation in electric circuits – energy and power preservation principles.
4. Equivalent active elements (voltage-current arrows and comparison with sources): Thevenin’s and Norton’s theorems. Calculation of equivalent active elements by: circuit approach, measurements approach and characteristic approach. Maximum power transfer condition.
8. Computer assessment – test 1

**Semester 2. Lectures:**

7. Circuits with distributed parameters. Transient analysis in transmission line.

Semester 2. Classes:
1. Transient analysis in the first order circuits with zero and non-zero initial condition (reminder). Integrator, differentiator – operation amplifier examples.
3. Power in AC domain circuits. Power balance,
5. Resonant circuits and resonant filters. Linear and logarithmic characteristics.

20. Examination: Yes (exam – sem.2)

21. Primary sources:

22. Secondary sources:
1. John M. Santiago Jr., Circuit analysis for Dummies, Publisher: For Dummies; 1 edition (April 22, 2013)

23. Total workload required to achieve learning outcomes

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>45/30</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>30/30</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>0/0</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>0/0</td>
</tr>
<tr>
<td>5</td>
<td>BA/ MA Seminar</td>
<td>0/0</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>0/15</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>75/75</td>
</tr>
</tbody>
</table>

24. Total hours: 150

25. Number of ECTS credits: 8

26. Number of ECTS credits allocated for contact hours: 3

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 0

28. Comments:

Approved: