1. **Course title**: FUNDAMENTALS OF ELECTRICAL ENGINEERING
2. **Course code**: AEI
3. **Validity of course description**: 2018/2019
4. **Level of studies**: BSc programme
5. **Mode of studies**: intramural studies
6. **Field of study**: COMPUTER SCIENCE
7. **Profile of studies**: general academic
8. **Programme**: 
9. **Semester**: 1, 2
10. **Faculty teaching the course**: Institute of Electronics, RAu3
11. **Course instructor**: prof. zw. dr hab. inż. Jerzy Rutkowski
12. **Course classification**: common subjects
13. **Course status**: compulsory
14. **Language of instruction**: English
15. **Pre-requisite qualifications**: It is assumed that before starting the course, the student has preparation in the field of: mathematics (including the ability to solve algebraic equations, actions on complex numbers, differentiation and integration of basic functions), basic physics (knowledge of elementary concepts and laws, among others in the field of electrostatics, familiarity with basic units of measurement, in particular electric quantities).
16. **Course objectives**: PE I: The aim of the course is to present theoretical foundations of the science of linear and non-linear DC circuits. The lecture should create the basis for the analysis of these circuits and, subsequently, the basis of the AC analysis. 
PE II: The aim of the course is to familiarize students with the basic concepts of AC circuits and methods of analysis of these circuits in the case of transient analysis under aperiodic stimulation and in the case of analysis of sinusoidal circuits in steady state.
17. **Description of learning outcomes**:

<table>
<thead>
<tr>
<th>No</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>W1</td>
<td>The student knows the basic laws of electrical circuits</td>
<td>Exam</td>
<td>Lectures</td>
<td>K1A_W03</td>
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<tr>
<td>W2</td>
<td>The student knows the methods of analysis of linear and nonlinear DC circuits as well as linear circuits of alternating current</td>
<td>Exam</td>
<td>Lectures</td>
<td>K1A_W05</td>
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<tr>
<td>W3</td>
<td>The student has a basic knowledge of a long line in a transient state and three-phase circuits</td>
<td>Exam</td>
<td>Lectures</td>
<td>K1A_W06</td>
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<td>U1</td>
<td>Student is able to analyze linear and non-linear circuits</td>
<td>mid-term exam</td>
<td>Classes</td>
<td>K1A_W07</td>
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<tr>
<td>U2</td>
<td>The student is able to determine the frequency characteristics of the basic cross pieces</td>
<td>mid-term exam</td>
<td>Classes</td>
<td>K1A_U12</td>
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</tbody>
</table>

18. **Teaching modes and hours**

**Lecture / BA / MA Seminar / Class / Project / Laboratory**

Lecture 30 h, Class 30 h

19. **Syllabus description**:

**Lectures**:

**PE I**
1. Basic concepts and definitions
2. Methods for analyzing linear circuits
   Generalized methods of Kirchhoff's laws. The node potential method.
3. Theorems / principles of linear circuits
4. Multiplés
Description of multipolars.
5. Methods of analysis of nonlinear circuits
Graphic method, segment linearization method.
6. Equations of elements in the field of time
Capacitor. Coil.

PE II
1. Analysis of transient states
2. Analysis of sinusoidal circuits
3. Long line
Analysis of a transient state in a long line.
4. Three-phase circuits
Ways of mating three-phase circuits. Measurement of power transmitted to a three-phase receiver.

Classes:

PE I
2. DC circuits with real sources. Ammeter and voltmeter - perfect and real.
3. Complex linear circuits. The node potential method.

PE II
7. Circuits with non-zero initial conditions.
8. Transient states in response to aperiodic extortion.
11. Frequency characteristics. Filters. The phenomenon of resonance.
12. Circuits with fixed constants (long line). Transients in the long line.

20. Examination: Yes, test

21. Primary sources:

22. Secondary sources:
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>15/20</td>
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<tr>
<td></td>
<td>Total number of hours</td>
<td>90/80</td>
</tr>
</tbody>
</table>

24. Total hours: 170

25. Number of ECTS credits: 8

26. Number of ECTS credits allocated for contact hours: 4

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

26. Comments:

Approved:

(date, Instructor’s signature)  (date, the Director of the Faculty Unit signature)