1. Course title: ELECTRONICS AND MEASUREMENTS
2. Course code EiM


4. Level of studies: BSc programme

5. Mode of studies: intramural studies

6. Field of study: COMPUTER SCIENCE (AEI)

7. Profile of studies: general academic

8. Programme: 

9. Semester: 2, 3

10. Faculty teaching the course: FACULTY OF AUTOMATIC CONTROL, ELECTRONICS AND COMPUTER SCIENCE, Institute of Electronics

11. Course instructor: Zdzisław Filus, PhD, DSc, professor of SUT

12. Course classification: common subjects

13. Course status: compulsory

14. Language of instruction: English

15. Pre-requisite qualifications: Course attendants have to possess basic knowledge in calculus, algebra, physics and circuit theory

16. Course objectives: The objective of the course is to make students familiar with the most important features of basic semiconductor devices and with the principles of operation of the elementary circuits realized with the use of such components, to make them acquire principles of measurement of basic electrical quantities and understand links between computer science and electronics.

17. Description of learning outcomes:

<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>The student will know principles of operation, parameters and characteristics of basic semiconductor devices</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W03, K1A_W05</td>
</tr>
<tr>
<td>2.</td>
<td>The student will know structures and principles of operation of basic analog electronic circuits</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W07</td>
</tr>
<tr>
<td>3.</td>
<td>The student will know simple methods of description and analysis of analog linear and nonlinear DC circuits and basic small-signal amplifiers</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W06</td>
</tr>
<tr>
<td>4.</td>
<td>The student will know the principles of measurement of voltage and current, circuits for digital measurement of time and frequency and basic structures and features of digital-to-analog and analog-to-digital converters</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W04, K1A_W07</td>
</tr>
<tr>
<td>5.</td>
<td>The student will be able to use the learnt methods and mathematical models in the DC analysis of elementary, linear and nonlinear, analog electronic circuits</td>
<td>tests, examination</td>
<td>class</td>
<td>K1A_U08, K1A_U13</td>
</tr>
<tr>
<td>6.</td>
<td>The student will be able to use the learnt methods and small-signal mathematical models for the determination of characteristic parameters of simple linear electronic circuits</td>
<td>tests, examination</td>
<td>class</td>
<td>K1A_U12</td>
</tr>
</tbody>
</table>
7. The student will be able to use properly chosen methods and equipment for measurement of parameters and electrical characteristics of analog electronic circuits. Laboratory exercises, tests laboratory K1A_U13

8. The student will be able to elaborate documentation including a discussion on the results of a realized laboratory exercise. Laboratory reports laboratory K1A_U03

9. The student will be able to work in a team and take responsibility for a jointly realized task. Laboratory exercises and reports laboratory K1A_K02

18. Teaching modes and hours
Lecture / BA / MA Seminar / Class / Project / Laboratory
Sem 2 - Lecture 30 h, Class 15 h, Sem 3 – Laboratory 30 h

19. Syllabus description:

Lecture

Class
Small-signal analysis – idea, creation of the equivalent circuit diagram of a circuit, small-signal model of the bipolar transistor („h” and „y”). Determination of basic small-signal parameters of amplifiers (voltage gain, input and output resistance). Frequency response of transistor amplifiers.

Laboratory
1. Semiconductor diodes
2. Bipolar transistor (CE)
3. Unipolar transistor
4. Semiconductor optoelectronic devices
5. Rectifier circuits
6. Sinewave oscillators
7. Transistor power amplifier
8. Nonsinusoidal generators
9. Linear voltage regulators
10. Measurement of parameters of operational amplifiers

20. Examination: semester 3 (problems and theory in a written form)
21. Primary sources:
Gążyński W. E.: Elektronika analogowa w zadaniach, t.1, 3. 4. Wydawnictwo Politechniki Śląskiej, Gliwice 2009-2010
Laboratorium elektroniki I: Elementy półprzewodnikowe i układy podstawowe. Praca zbiorowa pod red. Krzysztofa Ziolo; Wydawnictwo Politechniki Śląskiej, skrypt nr 2322, Gliwice 2003
Laboratorium elektroniki II: Podstawowe układy analogowe, impulsowe i cyfrowe. Praca zbiorowa pod red. Krzysztofa Ziolo; Wydawnictwo Politechniki Śląskiej, skrypt nr 2323, Gliwice 2003

22. Secondary sources:
Filipkowski A.: Układy elektroniczne analogowe i cyfrowe. WNT, Warszawa 2006

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>45/15</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>15/15</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>30/30</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>BA/ MA Seminar</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>10/40</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>100/100</td>
</tr>
</tbody>
</table>

24. Total hours: 200

25. Number of ECTS credits: 7

26. Number of ECTS credits allocated for contact hours: 5

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 3

26. Comments:

Approved:

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