SYLLABUS

Name: ***Circuit Theory (IBioAIB>SI3CT23S)***
Name in Polish:
Name in English: ***Circuit Theory***

Information on course:

Course offered by department: Faculty of Biomedical Engineering
Course for department: Silesian University of Technology
Term: Winter semester 2024/2025
Cordinator of course edition: Dr inż. Marcin Rudzki

Default type of course examination report:
EGZ
Language:
English
Course homepage:
https://platforma.polsl.pl/rib/course/view.php?id=227

Information on course edition:

Default type of course examination report:
EGZ
Short description:
Course provides brief introduction to Circuit Theory: basic laws governing electric circuitry (KCL, KVL, Ohm's), methods for calculation of equivalent resistances, Thevenin/Norton's equivalents, superposition principle, nodal voltages. Transients in RC/RL circuits. Practical tasks require diagram understanding, circuit connection, performing measurements and verification with theoretical (calculated) outcomes.
Notes:
Course credit conitions and final grade calculation:
FINAL = (EXAM + LAB) / 2 rounded in 0.5 increments.
EXAM and LAB have to be PASS (3.0 or higher).
Also refer to the Lecture and Laboratory sections!

Details of classes and study groups

lecture (15 hours)

Learning outcomes:
K1A_W01: Knows and understands basic laws governing electric quantities, components and circuits.
K1A_W04: Knows how to assemble and test an electric circuit having its diagram.
Assessment methods and assessment criteria:
Exam (theoretical questions, problems to be solved/calculated).
It is mandatory to have a PASS (3.0 or more) from laboratory to attend the exam.
Classes topics:
1. Basic quantities and laws: KCL, KVL, Ohm's. Circuit diagrams, symbols, arrowing conventions. Active and passive elements. Safety when working with electronic devices, using meters, way of building circuits using breadboards.
2. Connecting resistors in series and in parallel. Voltage and current divider. Wye-Delta transform.
3. Thevenin and Norton equivalents. Superposition principle.
4. Nodal voltages method.
5. Transients (with zero initial conditions) in RC and RL circuits.
6. SPICE-based simulation software.

Study groups details

Group number 1

Class instructors:
Dr inż. Marcin Rudzki

laboratory classes (15 hours)

Learning outcomes:
K1A_U02: Is able to calculate circuit parameters and safely perform current and voltage measurements for low voltage DC circuits.
K1A_U05, K1A_K02: Is ready to work individually or in group, take responsibility for own duties, provide expected outcomes on time.
Assessment methods and assessment criteria:
Short tests from the previous topic or reports from the laboratory exercise. Failed report or test can be corrected twice, however maximal grade is reduced by 0.5 each time (i.e. 1st retake gives max 4.5, 2nd attempt gives max 4.0 grade). All laboratory exercises have to be graded 3.0 or more.
LAB = average(exercise[i]) rounded in 0.5 increments.
Classes topics:
1. Introduction. Safety in electronics laboratory. Using the equipment.
2. Basic concepts. Ohm's law. Calculating equivalent resistance.
3. Kirchoff's laws. Current and voltage dividers. Joule's law.
4. Nodal voltages method.
5. Superposition principle.
6. Thevenin and Norton equivalents.
7. Transients in RC and RL circuits.
8. Retaking.
Teaching methods:
Sections of 2-3 students solve (calculate) tasks given, then assemble circuits, perform required measurements and verify the readings with the theoretical outcomes (explain the differences, especially if significant). Laboratory tasks may require to prepare a report (due max 2 weeks after the lab) or is assessed by a short test at the beginning of the next exercise.

Study groups details

Group number 1

Class instructors:
Dr inż. Anna Filipowska

Element of course groups in various terms:

Course group description	First term	Last term
missing group description in English (IBioAIB>SI-3-23-S)	2024/2025-Z	

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2024/2025-Z	