

## Course: Analogue Electronics 1

credits: 5

**Course code** ELVP19AAE1  
**Name** Analogue Electronics 1  
**Study year** 2020-2021  
**ECTS credits** 5  
**Language** English  
**Coordinator** F. Nascimento Martins

**Modes of delivery** Lecture  
 Practical / Training  
**Assessments** Labs - Skills test  
 Theory 1 - Written, organised by STAD examinations  
 Theory 2 - Written, organised by STAD examinations

### Learning outcomes

The student will be able to:

1. Demonstrate understanding of concepts of Current, Voltage, Ohm's Law, Power and Energy;
2. Calculate voltages, currents and resistances using Ohm's and Kirchhoff's laws in electrical circuits;
3. Explain the operation of ideal and non-ideal current and voltage sources and use both as a DC and/or sinusoidal source (230 V/50 Hz network);
4. Calculate the replacement value of resistors connected in parallel, in series or as a combination of both. Attention is also paid to the concept of resistance tolerance;
5. Calculate equivalent circuits using Superposition, Thevenin's and Norton theorems;
6. Understand a simplified model of diodes (switches/constant voltage source in series with resistor) and apply it to analyze circuits with LED, Zener and ideal diodes;
7. Understand concept of capacitors, apply its model ( $I_c \cdot dt = C \cdot dU$ ) as a charge carrier for rectifier circuits and determine its capacitance;
8. Use linear voltage regulator circuits (such as 78xx and 79xx) in rectifier circuits;
9. Perform calculations on ideal operational amplifier circuits, such as inverting, non-inverting, summing, differential and comparator;
10. Apply the properties and the linear model of bipolar transistors in electrical circuits with fixed value of gain (as amplifier), fixed base-emitter voltage, and fixed collector-emitter voltage (when saturated);
11. Apply the above techniques of circuit analysis to analyze circuits that also contain capacitors, voltage regulators, operational amplifiers, and bipolar transistors;
12. Perform measurements and prepare a measurement report and to analyze and verify electrical quantities considering accuracy.

### Content

During this course you will learn and apply basic principles of network theory to analyze electronic circuits. You will also become proficient in measurement skills of electrical quantities by using lab equipment during the practical assignments and will report your findings at the end of each assignment.

### Included in programme(s)

Electrical Engineering Major Sensor Technology  
 Minor Technology to Create  
 Exchange Technology to Create (autumn)

### School(s)

Institute of Engineering

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