

## Electronic Systems and Instrumentation for Biomedical Engineers (E032510)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits** 6.0                      **Study time** 180 h

**Course offerings in academic year 2023-2024**

A (semester 2)                      Dutch                      Gent

**Lecturers in academic year 2023-2024**

Doutreloigne, Jan	TW06	lecturer-in-charge
Bauwens, Pieter	TW06	co-lecturer

**Offered in the following programmes in 2023-2024**

	<b>crdts</b>	<b>offering</b>
<a href="#">Bachelor of Science in Engineering (main subject Biomedical Engineering)</a>	6	A

**Teaching languages**

Dutch

**Keywords**

Electronic instrumentation, analog and digital circuits, sensors and actuators, control systems, data acquisition, system analysis, bio-electronics

**Position of the course**

The course provides a general introduction into the analysis of electronic instrumentation. The course covers the analysis of electronic circuits (digital and analog), principles of electronic measurements, sensors, data acquisition and signal processing of measurement data. These principles are applied to simple systems from bioelectronics.

**Contents**

- Overview of electronic components and building blocks: active and passive components, analog building blocks, digital building blocks
- Analysis of analog and digital electronic circuits: transistor circuits, opamp circuits, combinational and sequential digital circuits
- Analysis of complete openloop and closedloop electronic instrumentation systems
- Principles of bio-electronics: biopotentials, electrodes on the human body, conduction of living tissue, safety, isolation

**Initial competences**

Electrical circuits and networks

**Final competences**

- 1 Understand the operation of the basic electronic components
- 2 Analyze basic analog and digital electronic circuits and think about them in a conceptual, analytical and systemoriented way.
- 3 Have the skills to perform numerical simulations on electronic circuits using standard models and methods, in particular PSpice.
- 4 To be able to build and experimentally evaluate analog and digital circuits at breadboard level with the required accuracy, perseverance and critical reflection.
- 5 Have the skills to communicate about your own electronic system design via written text and graphs.
- 6 Have insight in the acquisition of biopotentials such as in ECG or EEG systems.

**Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Lecture

**Extra information on the teaching methods**

Classroom lectures: theoretical lectures

Lab sessions: build and experimentally evaluate electronic circuits, to be carried out in groups of 2 or 3 students

**Learning materials and price**

Extensive set of detailed PowerPoint slides that can be downloaded for free from the Ufora website

**References****Course content-related study coaching****Evaluation methods**

end-of-term and continuous assessment

**Examination methods in case of periodic evaluation during the first examination period****Examination methods in case of periodic evaluation during the second examination period****Examination methods in case of permanent evaluation**

Skills test

**Possibilities of retake in case of permanent evaluation**

examination during the second examination period is possible

**Extra information on the examination methods**

During examination period: written exam, partly closed-book theory, and partly closed-book exercises.

Permanent evaluation: individual closed-book lab exam at the end of the semester (calculations + circuit building + experimental evaluation of the circuit).

**Calculation of the examination mark**

During examination period: written exam that represents 2/3 of the total score.

Permanent evaluation: lab exam that represents 1/3 of the total score.