

## Electronics II (E702040)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2023-2024**

A (semester 1)

Dutch

Gent

lecture

practical

**Lecturers in academic year 2023-2024**

Lambrecht, Stefaan

TW05

lecturer-in-charge

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

[Bachelor of Science in Engineering Technology\(main subject Electromechanical Engineering Technology\)](#)

6

A

[Bachelor of Science in Engineering Technology\(main subject Electronics and ICT Engineering Technology\)](#)

6

A

[Bachelor of Science in Engineering Technology\(main subject Information Engineering Technology\)](#)

6

A

[Linking Course Master of Science in Electrical Engineering Technology\(main subject Automation\)](#)

6

A

[Linking Course Master of Science in Electrical Engineering Technology\(main subject Electrical Engineering\)](#)

6

A

**Teaching languages**

Dutch

**Keywords**

Electronics, digital, operational amplifiers, AD/DA, voltage regulator

**Position of the course**

This course consists of two parts: analog electronics and digital circuits. Both parts consist of a theoretical and a practical part.

Part digital electronics: design of basic digital circuits

Part analog electronics: Basic circuits with operational amplifiers, analog/digital and digital/analog conversion and voltage regulators.

**Contents**

### 1. Digital electronics

#### Lecture

- Boolean algebra: commutative, associative and distributive laws, reduction rules, duality laws of De Morgan, truth table and time sequence diagrams, Karnaugh-Veith diagrams
- Design of combinatorial circuits
- Adders, decoders, comparators, multiplexers
- Sequential circuits: flip flops, counters, shift registers
- Synchronous versus asynchronous design

#### Practical

Sequential and combinatorial digital circuits are designed, implemented and tested.

### 2. Analog electronics

#### Lecture

- Basic circuits with operational amplifiers
- Non-ideal characteristics of OpAmps
- Inverting, non-inverting, integrator, differentiator, instrumentation amplifier
- Static specifications: offset, open loop gain, CMRR, PSRR
- Frequency response of operational amplifiers
- AD/DA conversion

- Voltage regulators

### **Practical**

In the laboratory, a number of basic circuits will be measured and analyzed.

### **Initial competences**

Successfully having completed the courses 'Electricity' and 'Electronics-I' or having acquired the necessary competences in another way.

### **Final competences**

- 1 Knowledge of Boolean algebra and logic gates
- 2 Understand the operation of combinational and sequential basic circuits
- 3 Be able to design and realize basic digital systems
- 4 Knows the AD and DA interfacing of digital systems
- 5 Can describe the fundamental circuits with operational amplifiers
- 6 Can design and build circuits with operational amplifiers
- 7 Understand how voltage regulators work
- 8 Critically approaching of measurement results and linking with theoretical models

### **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, Practical

### **Learning materials and price**

#### **Analog electronics**

- Electronic devices, conventional current version, Global Edition, Thomas L. Floyd, 10th edition (ISBN-13: 978-1-29-222299-8)
- Price 89.00 euro
- Slides available on the electronic learning platform
- Practicum notes available on the electronic learning platform

#### **Digital electronics**

- Digital Fundamentals: Thomas L. Floyd, International edition (ISBN 978-0-138-146446-7)
- Price 81.00 euro
- Slides available on the electronic learning platform
- Practicum notes available on the electronic learning platform

### **Course content-related study coaching**

Interactive (exercises) or individual

### **Assessment moments**

end-of-term and continuous assessment

### **Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

### **Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

### **Examination methods in case of permanent assessment**

Participation

### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is not possible

### **Extra information on the examination methods**

#### **First examination period:**

PGE1: Theory analog and digital electronics: written examination with closed book  
 NPGE: lab: permanent evaluation

#### **Second examination period:**

PGE2: Theory analog and digital electronics: written examination with closed book  
 NPGE: lab: examination during the second examination period is not possible: transfer points first examination period.

### Calculation of the examination mark

- 2/3 theory and 1/3 lab
- When the student scores less than 8/20 for one of the 2 components (theory and lab) he/she can no longer pass the entire course unit. If the total score is a mark of ten or more out of twenty, then this is reduced to the highest failing mark (9/20)
- Students who eschew one part of the evaluation can no longer pass the course. Final scores will be reduced to the highest non-deliberative quotation (7/20) if the final score would be higher than 7/20.
- During the practical exercises students are questioned on the reports of the tests that they have conducted. On this basis, and the performance during the practical exercises there will be a global assessment for this practicum. The final score for the practical exercises is obtained by multiplying the overall assessment for the practical exercises by  $(12-X)/12$ , where X is the number of illegitimate absences. A legitimate absence should not be overtaken.