

## Electronics II (E620400)

**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

Kortrijk

lecture

practical

**Lecturers in academic year 2023-2024**

Willems, Brecht

TW06

staff member

Lemey, Sam

TW05

lecturer-in-charge

Stroobandt, Dirk

TW06

co-lecturer

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

[Bachelor of Science in Engineering Technology\(main subject Machine and Production Automation\)](#)

**crdts**

6

**offering**

A

[Master of Science in Industrial Design Engineering Technology](#)

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

**Contents**

**Digital electronics**

**Lecture (12u)**

- Boolean algebra: in-depth study of 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 (12u)**

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

**Analog electronics**

**Lecture (24u)**

- Basic circuits with operational amplifiers
- Non-ideal characteristics of operational amplifiers
- 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 (12u)**

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

### **Initial competences**

Successfully having completed the courses 'Electricity' and 'Electronics' 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 Describe and apply the AD and DA interfacing of digital systems
- 5 Describe the fundamental circuits with operational amplifiers
- 6 Design and build circuits with operational amplifiers
- 7 Describe 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**

- English textbook: Electronic devices, conventional current version, Pearson Global Edition, Thomas L. Floyd, 10th edition (ISBN-13: 978-1-29-22299-8)
- Price 81.00 euro
- Slides available on Ufora
- Practicum notes available on Ufora

#### **Digital electronics**

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

### **References**

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

Interactive (during exercises and/or lab sessions) or individual by appointment

#### **Assessment moments**

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

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

Participation, Written assessment, Assignment

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

examination during the second examination period is possible

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

First examination period:

- PGE1: Theory analog electronics: written examination with closed book
- PGE1: Theory digital electronics: written examination with closed book
- NPGE: lab: lab-examination with open book, participation and report.

Second examination period:

- PGE2: Theory analog electronics: written examination with closed book
- PGE2: Theory digital electronics: written examination with closed book
- NPGE: lab: lab-examination with open book and/or report.

### Calculation of the examination mark

- 60% analog electronics (2/3 theory and 1/3 lab) + 40% digital electronics (2/3 theory and 1/3 lab).
- When the student scores less than 8/20 for one of the two parts (part I: theory, part II: 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 or more parts 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.
- The final score for the practical exercises is obtained by multiplying the assessment for the practical exercises (lab-examination) by  $(12-X)/12$ , where X is the number of illegitimate absences. A legitimate absence should not be overtaken.
- For the lab, only 20% can be retaken in the second examination period.