Course Specifications
From the academic year 2017-2018 up to and including the
Electrical and Electronic Principles (E610015)

Course size
(nominal values; actual values may depend on programme)
Credits  6.0  Study time  180 h  Contact hrs  60.0 h

Course offerings and teaching methods in academic year 2018-2019
A (semester 2)  Dutch  practicum  24.0 h
lecture  36.0 h
demonstration  2.0 h

Lecturers in academic year 2018-2019
Cottegnie, Wesley  TW08  staff member
Dereyne, Steve  TW08  staff member
Vanwalleghe, Bart  TW08  staff member
Willems, Brecht  TW06  staff member
Stockman, Kurt  TW08  lecturer-in-charge
Beke, Johan  TW06  co-lecturer

Offered in the following programmes in  2018-2019  crdts offering
Bachelor of Science in Industrial Design Engineering Technology  6  A
Bachelor of Science in Bioindustrial Sciences  6  A
Bachelor of Science in Chemical Engineering Technology  6  A
Bachelor of Science in Environmental Engineering Technology  6  A

Teaching languages
Dutch

Keywords
Electrotechnics, electronics, microcontrollers, diodes, programming, electric motor, transformer, design

Position of the course
This course studies the operation of simple electric and electronic applications. The basic building blocks are studied in detail and their application is discussed. Techniques to analyse systems are also studied. Special attention is paid to the study of: Diodes, rectifiers, electric motors, transformers, measurement techniques and safety aspects.
The electric lab sessions focus on simple measurement techniques for energy and electric power. Also contactor schemes are studied.
In the electronic lab, an arduino microcontroller board is used to study the use of digital and analog inputs, outputs, PWM, serial communication, ... After an introductory session, the students build a real project under the supervision of the lab assistants.

Contents
• Introduction
  Safety aspects, electric schemes, block diagrams, timing diagrams
  Analog building blocks: semiconductor technology
    • Construction and operation of diodes and transistors
    • rectifiers
    • transistor used as switch and amplifier
    • special diodes: LED
  Digital building blocks: combinatorial and sequential logic
    • Analog - digital conversion
    • Basic digital logic elements
    • Introduction to Boolean Algebra

(Approved)
• Flip-Flop: digital memory
• Introduction to state diagrams, timing diagrams

**Electronic applications:**
- Light technology: TL lamps

**Electric applications**
- Construction and operation of transformers
- switched power supplies
- Electric motors, inductiom motor and universal motor

Apart from the theoretical lectures, hands-on practicums are organized to increase the students understanding of the theory.

**Initial competences**
Having followed the course on electricity or achieved the intended competences

**Final competences**
1. The student is able to:
   - realize a simple electronic system
2. understand and recognize basic electronic systems
3. understand the operation of electric transformers and electric motors
4. to perform simple energy and electric power measurements
5. to analyse and build contactor schemes
6. to clarify the operation of diodes, LEDs and transistors
7. to explain the operation of diodes and transistors in simple circuits
8. to understand the basics of digital logic and boolean algebra
9. to discuss the operation of digital circuits using state and timing diagrams

**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**
- Demonstration, lecture, practicum

**Learning materials and price**
- *Elektrische en elektronische bouwstenen* Author: K. Stockman, Frederik Declercq (Dutch)
- *Labo elektrische bouwstenen* Author: I. Sweertvaegher, B. Vanwalleghem, S. Dereyne (Dutch)
- *Labo elektronische bouwstenen* Author: W. Cottegnie, B. Willems (Dutch)

A budget of approximately €40 is required to realize the electronic project.

**References**
- Digitale technieken : combinatorische en sequentiële logica, Cuppens Jaak, Brugge : Die Keure, 1985, aanwezig in de bibliotheek (Nederlands)

**Course content-related study coaching**
Questions related to the lectures can be raised after each lecture or an appointment can be made with the professor. Additional explanation is possible after each lab session.

**Evaluation methods**
- end-of-term evaluation and continuous assessment

**Examination methods in case of periodic evaluation during the first examination period**
- Oral examination

**Examination methods in case of periodic evaluation during the second examination period**
- Oral examination

**Examination methods in case of permanent evaluation**
- Written examination with open questions, open book examination, assignment
Possibilities of retake in case of permanent evaluation
    examination during the second examination period is possible in modified form

Extra information on the examination methods
    Oral examination with written preparation for the theory.
    The lab on electric applications is examined by means of a written exam to test practical knowlegde (outside the examination period).
    The lab on electronic applications is examined by means of a written exam based on the lab content (40%) and a presentation of the project work (outside the examination period, 60%).

Calculation of the examination mark

    **Calculation final score**
    Final score (/20) = C1xP1 + C2xP2 + C3xP3

    Cx are coefficients and Px are scores (/20) with:
    P1 : score Theory
    P2 : score Lab electric applications
    P3 : score Lab electronic applications
    C1 = 60%
    C2 = 20%
    C3 = 20%

    3 illegal absences during practical sessions can result in a score AFW (Not Present) for the complete partim.

First and second examination period
    To pass the course at least 8/20 for each partim has to be reached. When this condition is not met, there will be a modification of the calculated number to 9/20, if it is 10 or more.
    The permanent evaluation can not be improved in the second examination. For the lab electronic applications only 40% can be retaken. For the lab electric applications only 80% can be retaken.

Facilities for Working Students
    Please contact the responsible teacher.