Course Specifications
Valid as from the academic year 2018-2019

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)  Dutch  practicum  16.0 h
lecture  36.0 h
seminar: coached exercises  8.0 h

Lecturers in academic year 2018-2019

Callens, Ria  TW08  staff member
Cottegnie, Wesley  TW08  staff member
Stockman, Kurt  TW08  lecturer-in-charge
Sweertvaegher, Isabel  TW18  co-lecturer

Offered in the following programmes in 2018-2019

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Teaching languages

Dutch

Keywords

Electrotechnics, magnetism, electrostatics, electric circuits.

Position of the course

This introductory course focusses on the principles of electrotechnical systems.
- Definition of basic electrotechnical components and their behaviour in direct current (DC) and alternating current (AC) supply: sources, resistors, capacitors and inductances.
- Acquiring a good understanding of basic electrostatic and electromagnetic systems and their application.
- Solving electric and electronic circuits.

Contents

**Elektrostatics**
- Electric charge and electric field
- Coulomb's law
- Electric potential
- Forces on electric charges, Bipoles
- Gauss law
- Capacitance
g. Storage of energy

**Direct current theory**
- a. Motion of an electric charge in an electric field
- b. Definition of conductors, isolators and semiconductors
- c. Voltage, Current and resistance, impact of temperature on the resistance
- d. Electric power
- e. Kirchhoff's laws
- f. Methods to solve electric circuits
  - i. Loop impedance method
  - ii. Node admittance method
  - iii. Thevenin and norton

**Magnetism**
- a. Definition of magnetic field, field strength and induction, magnetic flux
- b. Lorentz force
- c. Mutual and self inductance
- d. Definition of inductors
- e. Energy in the magnetic field
- f. Magnetised materials
- g. Magnetic circuits

**Electromagnetics**
- a. Lenz's law
- b. Switching of inductive and capacitive circuits. Charging of capacitors

**Alternating current systems**
- a. Phasor representation of AC signals
- b. Behaviour of R, L and C
- c. Solving AC circuits

During the work colleges, the methods to solve DC and AC circuits are trained. Practical lab sessions allow the students to verify calculations with measurements based on simple circuits. The students learn how to operate basic measurement tools to measure voltages and currents. The measurement results are analysed and communicated by means of a report.

Initial competences
- This course does not require a background on electrotechnics.
- A basic knowledge of mathematics is advisable: linear equations, derivatives, integrals, complex numbers.

Final competences
1. Is able to describe the properties of resistors, capacitors, inductances and electric sources.
2. Can select appropriate methods to solve electric circuits and carry out the calculations.
3. Can analyze DC and AC circuits.
4. Is able to analyze the operation of simple electrostatic and electromagnetic systems.
5. Can perform measurements on electric and electronic circuits and interpret the results in a critical manner.

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, practicum, seminar: coached exercises

Extra information on the teaching methods
The principles of electrotechnics are explained during the lectures. Practical applications based on the basic laws are also discussed during these lectures. Also the methods to solve DC and AC circuits are introduced in the lectures. The lectures are supported by lab sessions and exercise sessions. During the exercise sessions, the student is trained to solve electric circuits. In the lab sessions, the student focuses on the measurement of basic electric variables (voltage and current) by means of basic measurement tools.

Learning materials and price
Theory and exercise textbooks in Dutch.
Cost approximately € 20
Supporting powerpoint slides are electronically available on the Minerva platform.

References
R. Belmans, K. Hameyer, Elektrische energie: fundamenten en toepassingen, Garant,

(Approved)
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

Participation, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

The oral examination contains both theoretical questions and tests on the practical skills of the student. The theoretical part consists of several questions. The student is allowed to prepare the answers on paper, followed by an oral discussion. Also the ability to solve electric circuits is evaluated during the theoretical part of the examination. To evaluate the practical skills, the student performs measurements on a simple electric circuit and analyzes and discussed the results with the examinator.

Calculation of the examination mark

To determine the final score, weighting coefficients are used: Theory 65%, practical skills 17.5%, non periodic evaluation (reports) 17.5%.

To pass the course at least 7/20 for each part has to be reached. When this condition is not met, the final score will be modified to 9/20.

For the determination of the final score for the second examination period, the same coefficients are used. The score for the non periodic evaluation of the first examination period is maintained (cannot be improved).

Illigal absence during two of the practical lab sessions results in a 0/20 for the lab score.

Facilities for Working Students

Students that combine work and studying and who want to obtain additional facilities should contact the lecturer-in-charge.