

## Sensor Based Measurement Systems (E032322)

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

Credits 3.0 Study time 90 h Contact hrs 30.0 h

Course offerings and teaching methods in academic year 2019-2020

|                |         |                   |        |
|----------------|---------|-------------------|--------|
| A (semester 2) | English | lecture           | 15.0 h |
|                |         | project           | 15.0 h |
| B (semester 2) | Dutch   | project           | 15.0 h |
|                |         | guided self-study | 15.0 h |

Lecturers in academic year 2019-2020

De Smet, Herbert TW06 lecturer-in-charge

Offered in the following programmes in 2019-2020

|  | crdts | offering |
|--|-------|----------|
| <a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>  | 3     | A        |
| <a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>       | 3     | A        |
| <a href="#">Bridging Programme Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a> | 3     | A        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)</a>               | 3     | B        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>                     | 3     | A        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)</a>                     | 3     | B        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Maritime Engineering)</a>                             | 3     | B        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>                          | 3     | A        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Construction)</a>                          | 3     | B        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a>                    | 3     | A        |
| <a href="#">Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)</a>                    | 3     | B        |
| <a href="#">Master of Science in Computer Science Engineering</a>  | 3     | A        |
| <a href="#">Master of Science in Computer Science Engineering</a>  | 3     | A        |

Teaching languages

Dutch, English

Keywords

Sensors, measurements, data-acquisition, microcontrollers

Position of the course

This course covers the electronic measurement of several physical quantities, using sensors, data acquisition and signal processing. This course is divided into two parts. Part 1 describes the general characteristics of a measurement system: principles of signal conditioning (sensor principles, data transmission, data acquisition and signal processing) and characterisation (static and dynamic). Part 2 describes examples for measuring strain, pressure, gasses, temperature, humidity, displacement, power consumption, acceleration,... Attention is paid to sensors made by MEMS technology.

## Contents

- Part 1: signal conditioning, characterisation
- Part 2: analogue sensors, digital sensors
- Part 3: introduction of the lab projects

## Initial competences

Electronic systems and instrumentation (or equivalent)

## Final competences

- 1 Understand and describe the operation of sensors and signal conditioners
- 2 Dealing with inaccurate measurement data in a judicious way; eliminate or take into account interferences and digitizing artifacts.
- 3 Programming of microcontrollers for data acquisition and programming in LabView or Python to process measurement data.
- 4 Collaborate in a small group on a project to design and realize a practical sensor based measurement system.

## 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

Guided self-study, lecture, project

## Extra information on the teaching methods

Classroom lectures; Lab sessions

## Learning materials and price

Complete syllabus and slide set in English, available through the electronic learning environment

## References

- E.U. Doebelin "Measurement Systems", Mc Graw-Hill, 4th. Ed., New York (1990)

## Course content-related study coaching

4 researchers

## 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

Assignment, report

## Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

## Extra information on the examination methods

During examination period: oral closed-book exam with written preparation; interrogation about lab work. If the number of students is more than 65, the option of a written exam with closed book will be considered. This decision will be announced well in advance of the exam.

Year work: assessment of group work (possibly including peer assessment), deliverables (including hard and software), final report.

## Calculation of the examination mark

50% exam + 50% year work