HÖGSKOLAN I GÄVLE

Sensors and Measurement Technology 7.5cr

Sensorer och mätteknik 7,5hp

Set by Faculty of Engineering and Sustainable Development

Version	**Set at**	**Valid from**
	10/11/13	VT2015
	6/7/16	**HT2016**

Level	A1N
Education level	Second cycle
Course identifier	EEA002
Credits	7.5cr
Main field of study	Electronics
Subject group	Electronics
Disciplinary domain	Technology 100.0%

Learning outcomes

The aim of the course is to give theoretical and practical knowledge and understanding of different types of sensors and the error analysis that is needed in real world scenarios. In a mandatory assignment a sensing system should be designed for a realistic application.

After completion of the course the student shall be able to
1. describe the physical principles of operation of common types of sensors
2. describe the technical and physical limits in the use of common types of sensors
3. state how to select the correct type of sensor for a given requirement
4. make an error analysis using real sensory data
5. explain accuracy, precision, and error propagation
6. describe how to compensate for a sensor's transfer function
7. explain the basics of sensor fusion and how to use it to enhance the quality of sensory data.

Course content

Various types of sensors
- electrical sensors
- optical sensors
- microwave sensors

- thermal sensors
- accelerometers

Error analysis
- error propagation
- accuracy and precision
- quantization error

Compensation
- linearization
- equalization

Sensor fusion
- sensor fusion for obtaining quantities that cannot be directly measured
- sensor fusion for improved accuracy
- sensor fusion for redundancy

Teaching The education is performed as lectures, exercises, and laboratory work/assignments. The laboratory work/assignments is normally performed in groups of two students. Emphasis is put on the student's capability of accomplishing and reporting the work. The lectures and exercises are not mandatory for the student. However, participation in laboratory work and assignment tasks is mandatory.

Prerequisites B.Sc. degree in Electronics, Electrical Engineering or equivalent.

Examination Written examination, Laboratory Exercise and Assignements

Grade A, B, C, D, E, Fx, F

Other regulations Criteria for final grade will be given at the beginning of the course.

Sustainable environment A minor part of the course content deals with sustainable development.

Module

0030	Written examination	3.5cr	Grade: AF
0040	Laboratory exercise	2.5cr	Grade: UG
0050	Assignements	1.5cr	Grade: AF