Mittuniversitetet
MID SWEDEN UNIVERSITY

Course Syllabus:

Electrical Engineering BA (B), Metrology, 6 Credits

General data

Code	ET044G
Subject/Main field	Electrical Engineering
Cycle	First cycle
Progression	B
Credits	6.00
Progressive specialisation	First cycle, has less than 60 credits in first-cycle course/s as entry requirements
Answerable department	Faculty of Science, Technology and Media
Established	2007-11-22
Date of change	2015-03-04
Version valid from	2013-08-15

Aim

The course aims to provide students with a knowledge of the basic concepts and a deeper understanding of modern electrical measurement techniques. The measuring system being studied consists of the transformation from arbitrary physical quantities into electrical signals, analogue amplifiers and filters, the conversion to digital signals with subsequent signal manipulation to improve the signal to noise ratio.

Course of objectives

After the course the student should be able to:
• develop a basic measurement system after specified signal to noise ratio, sensors, accuracy and dynamic behavior,
• know different methods to improve signal to noise ratio in a measurement system,
• know the fenomenon of channel leakage in DFT-analysis and of windowing,
• know and name different factors affecting measurement uncertanty,
• know principles for how noise is transfered and rejected in measurement systems,
• know basic princibles for measurement of non-electrical measurands,
• know principles and limits when time continuous signals are sampled,
• know basic principles for time contious and time discret filters.

Content

The course covers:
Sensors, Amplifiers, sampling of time-continous singals, conversion between analogue and digital signals, frequency analysis, averaging, correlations, signal manipulation, measurement uncertanity, noise in electrical measurement systems, filters, dynamic properties of measurement systems, electrical instruments, LabView and computer based measurement systems.

Entry requirements

Mathematics, BA(A) 18 credits, including differential and integral calculus including transform theory and basic mathematical statistics.
Electrical Engineering BA(A), 30 credits, including basic Electricity, analogue electronics and digital electronics.

Selection rules and procedures

The selectionprocess is in accordance with the Higher Education Ordinance and the local order of admission.

Examination form

Course modules,

4 hp Practical work
2 hp Theory

The theoretical part is examined using written exams. The practical work is examined with a written report and alternatively semindars and written report.

The grading scale for the course/modules is A,B,C,D,E (pass levels), Fx and F (fail levels).

The grading criteria is available at www.miun.se/betygskriterier.

Grading system

The grades A, B, C, D, E, Fx and F are given on the course. On this scale the grades A through E represent pass levels, whereas Fx and F represent fail levels.

Course reading

Required literature

John P. Bentley, Principles of Measurements Systems, England alternativt,, Pearson, Edinburgh Gate Harlow, Fouth Edition or later, 0-13-043028-5

Lars Bengtsson, Elektriska mätsystem och mätmetoder, 91-44-02903-9

Reference literature

G.R. Cooper and C.D McGillem, Probabilistic Methods of Signal and System Analysis, New York, Oxford University Press, Third edition or later, 0-19-512354-9

Comment: Engelsk referenslitteratur inom stokastisk signal-analys och behandling.

M.L Meade and C.R. Dillon, Signals and Systems, Chapman & Hall, Second Edition or later, 0-412-40110-x

Comment: Engelsk referenslitteratur inom deterministisk signal-analys och behanling.