



# COURSE SYLLABUS

## Adaptiv signalbehandling

### Adaptive Signal Processing

7,5 ECTS credit points (7,5 högskolepoäng)

**Course code:** ET2432  
**Educational level:** Advanced level  
**Course level:** A1N  
**Field of education:** Technology  
**Subject group:** Electrical Engineering

**Subject area:** Electrical Engineering  
**Version:** 2  
**Applies from:** 2009-09-01  
**Approved:** 2009-11-01  
**Replaces course syllabus approved:** 2009-09-01

#### 1 Course title and credit points

The course is titled Adaptive Signal Processing/Adaptiv signalbehandling and awards 7,5 ECTS credits. One credit point (högskolepoäng) corresponds to one credit point in the European Credit Transfer System (ECTS).

#### 2 Decision and approval

This course is established by School of Engineering 2009-06-17. The course syllabus was revised by School of Engineering and applies from 2009-09-01. Dnr ING56-12-2009. This course replaces the Theory part of ET2415.

#### 3 Objectives

The student will acquire the background to and knowledge of adaptive and optimal systems. The student will also acquire insights into and experiences of applied signal processing problems of which these systems form part.

#### 4 Content

Central items of the course are:

##### Stochastic signals

Discrete stochastic processes, correlation, spectral density, cross spectrum, models for stochastic signals.

##### Optimal signal processing

Estimation, least square error, the normal equations, least square filter, prediction, inverted filtration.

##### Adaptive signal processing

Introduction of the adaptive concept, iterative solution, the adaptive LMS filter, stability, convergence. Applications such as noise reduction, signal improvement and echo extinction.

Algorithms, variants of the LMS.

##### Laboratory work

Software based laboratory work.

#### 5 Aims and learning outcomes

On completion of the course the student will be able

to:

- design and implement the Wiener filter
- recognize situations where adaptive systems may provide a good solution

#### 6 Generic skills

The following generic skills are trained in the course:

- Capacity for applying knowledge in practice.
- Capacity for analysis and synthesis
- General knowledge in the subject area of the studies.

#### 7 Learning and teaching

The teaching consists of lectures, exercises, home assignments, and laboratory work. The home assignments are compulsory and must be done individually. During arithmetical problems the exercise instructor illustrates how the theory that has been learnt should be applied on signal processing problems. In order to further explain the theory and its applications there is a compulsory laboratory work. The laboratory work may be carried out individually or in groups.

The teaching language is English.

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#### 8 Assessment and grading

##### Examination of the course

Code	Module	Credit	Grade
	Written examination[1]	6 ECTS	F/P/3/4/5
	Laboratory work + written assignment	1.5 ECTS	U/G

<sup>1</sup> Determines the final grade for the course, which will only be issued when all components have been approved.

The course will be graded Fail, Pass, 3, 4 or 5. The examination is done through a written exam together with an account of the compulsory home assignments, and the laboratory work assignments.

Grading of the laboratory work assignments is done with the grades Pass or Fail, with the grade of Pass required for obtaining a final grade of the course. This final grade will be the same as the examination grade.  
On request grades according to ECTS will be given.

#### **9 Course evaluation**

The course coordinator is responsible for systematically gathering feedback from the students in course evaluations and making sure that the results of these feed back into the development of the course.

#### **10 Prerequisites**

Required courses for admission to this course:  
ET1303 Signal Processing II and  
MS1101 Mathematical Statistics

#### **11 Field of education and subject area**

The course is part of the field of education and is included in the subject area Electrical Engineering.

#### **12 Restrictions regarding degree**

The course cannot form part of a degree with another course, the content of which completely or partly corresponds with the contents of this course.

#### **13 Additional information**

The course MS1102 Stochastic Processes is recommended as previous knowledge but does not constitute a formal requirement.

#### **14 Course literature and other teaching material**

Monson H. Hayes *Statistical Digital Signal Processing and Modeling*, Wiley 1996. ISBN 0-471-59431-8.  
Material from the department.

