



# FEO3200 Teori för digital kommunikation 12,0 hp

Foundations in Digital Communications

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

## Fastställande

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## Betygsskala

P, F

## Utbildningsnivå

Forskarnivå

## Särskild behörighet

Mandatory prerequisite for this course is the basic course on digital communications EQ2310 “Digital Communications.”

## Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

## Lärandemål

After the course the student should be able to

1. explain and derive the foundation of digital communication methods,

2. acquire and discuss results related research literature,
3. solve standard problems in detection, modulation, and estimation theory,
4. use the advanced theoretical tools to analyze and design new procedures adapted to specific problems.

## Kursinnehåll

In the first part of the course the following topics are covered:

- A rigorous revisit of basic principles in digital communication,
- Stochastic processes and stationary discrete-time stochastic processes,
- Binary and multi-hypothesis testing problem, sufficient statistics
- Parallelism to estimation theory, composite detection problem
- Uni- and multivariate Gaussian distribution, complex Gaussian and circular symmetry
- Continuous-time stochastic processes
- Detection in white Gaussian noise
- Non-coherent detection and nuisance parameters

In the second part of the course the following topics are covered:

- Signal detection in discrete time: Performance evaluation of procedures, e.g., Chernoff bound, sequential detection, non parametric and robust detection
- Elements of signal estimation
- Signal Detection in continuous time: The detection of deterministic and partly determined signals in Gaussian noise and the detection of random signals in Gaussian noise

## Examination

- EXA1 - Examination, 12,0 hp, betygsskala: P, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

## Övriga krav för slutbetyg

To pass the course the student

- has to hand in every homework. For each homework a minimum number of points must be achieved as well as the sum of all achieved points has to exceed a threshold, and
- has to sign up for presentation of at least one exercise solution for every homework set and has to present successfully at least one solution in one exercise seminar. Those who did not successfully present have to do a presentation of a selected paper.

The thresholds will be adjusted according to the number of achievable points and will be fixed before the course starts.

## Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.