



LUNDS UNIVERSITET  
Lunds Tekniska Högskola

*Course syllabus*

## Ellära och elektronik Electromagnetics and Electronics

**EITF90, 7,5 credits, G2 (First Cycle)**

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED E

Date of Decision: 2023-04-11

### General Information

Main field: Technology.

Compulsory for: BME2, F2, N2

Elective Compulsory for: W3

Elective for: Pi4

Language of instruction: The course will be given in Swedish

### Aim

Basically all engineering systems have one or several important parts which may be classified as electronics, some systems are even completely electronic. In particular, most measurement situations are centred round the conversion of a physical quantity to an electric signal. This has brought about a world wide industry and labour market, and most engineers are assumed to have basic knowledge of electronics.

This course is a basic course electronics with a focus on analysis and design of electronic systems.

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to use terms such as, current, voltage, potential, power, impedance, transfer function, amplification, and bandwidth, to describe and discuss ideas, problems and solutions regarding basic components and simple electronic systems for people with professional knowledge of electromagnetics and electronics.

*Competences and skills*

For a passing grade the student must

- be able to construct circuit models for simple electronic systems.
- be able to analyse given linear and nonlinear circuits with a small number of nodes by hand.
- be able to design circuits which attain given specifications, for instance simple passive filters and amplifiers.

#### *Judgement and approach*

For a passing grade the student must

- for an electrical system problem, be able to choose level of modelling and method of analysis in order to answer the question adequately.

## **Contents**

The course consists of circuit theory and electronics. In the circuit theory part, basic tools of analysis, physical components, and their ideal circuit models are treated. The circuit theory is then used in the electronics part to study semiconductor components and electronic systems.

Basic electric quantities: Current, voltage, potential, resistance, conductivity, permittivity, impedance, admittance, and power.

Basic analysis tools: Kirchhoff's laws, calculational methods for linear, time invariant circuits, node analysis, and two-terminal equivalents.

Basic components: Resistors, inductors, capacitors, voltage sources, current sources, transformers, amplifiers, and transmission lines. Modelling: Physical circuits with ideal circuit elements, transfer functions, and filters.

Semiconductor components and electronic systems: operational amplifiers, amplifier circuits, diodes, transistors, integrated circuits, and digital systems.

## **Examination details**

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** Written exam. Non-compulsory home assignments may give bonus points to the written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

## **Admission**

**Assumed prior knowledge:** For N: FMFF20 Mathematical Methods of Nanotechnology. For F: FMAF05 Mathematics - Systems and Transforms. For BME: concurrent participation in BMEA05 Signals and Systems.

**The number of participants is limited to:** No

**The course overlaps following course/s:** ETE115, EITA35, ESS010, ETE022, ETIA01

## **Reading list**

- Sjöberg D, Gustafsson M: Kompendium i Kretsteori, ellära och elektronik.
- Gustafsson M, Karlsson A, Sjöberg D: Exempelsamling i Kretsteori, ellära och elektronik.

## **Contact and other information**

**Course coordinator:** Erik Lind, erik.lind@eit.lth.se

**Course coordinator:** Daniel Sjöberg, daniel.sjoberg@eit.lth.se

**Course homepage:** <http://www.eit.lth.se/course/eitf90>