Organic Electronics 1

Programme course

6 credits

Organisk elektronik 1

TNE103

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Main field of study
Electrical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Electronics Design Engineering, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Basic skills in modern physics (primarily solid state physics), mathematics and electronics. Basic chemistry is useful but not a formal requirement. TNE024 Molecular Physics is recommended, especially for students who also intend to follow Organic Electronics 2.

Intended learning outcomes

After finishing the course, the students should be able to:

- explain charge transport, energy levels, and doping in organic electronic materials, and how they compare to metals and inorganic semiconductors
- exemplify specific organic electronics materials, their properties, and applications
- summarize the optical properties and applications of organic electronic materials, such as in displays and photovoltaic systems
- exemplify the architecture, characterization, and utilization of electronic components based on organic electronic materials (such as conductors,resistors, capacitors, diodes, transistors)
- determine fundamental parameters for the above mentioned components, and explain how these parameters influence the performance of the components
- summarize the electrochemical properties of organic electronic materials, and their applications in devices and systems
- explain and motivate the use of organic electronic materials in biological applications
- summarize device fabrication techniques, especially related to “printed electronics”
- compare commercial applications for organic electronics, and summarize the current market.

Course content

Course lectures will cover topics such as: introduction to organic electronic materials and their basic properties; charge transport and energy structure of organic electronics; case-studies on specific materials used in current research; optical properties (energy levels, color changes, light emission and absorption); organic electronic circuit components (conductors, resistors, capacitors, diodes, transistors); electrochemistry of organic electronic materials, and applications of redox properties; organic bioelectronics (motivation, applications in neuroscience and plant biology); printed electronics (methods, inks, applications); organic electronics photovoltaics (measurement techniques, solar cells); an overview of current applications and commercialization (cost, implementation, environmental consideration).
The discussion sessions (lektioner) will cover the topics above, in a more open discussion format.
The two laboratory exercises, in the Täppan Cleanroom Laboratory and the Printed Electronics Arena, will provide hands-on experience of fabrication and characterization of organic electronics.

Teaching and working methods

Lectures, discussion sessions, and laboratory exercises.

Examination

LAB1	Laboratory work	1 credits	U, G
TEN1	Written examination	5 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Adriana Serban

Examiner

Daniel Simon

Education components

Preliminary scheduled hours: 44 h
Recommended self-study hours: 116 h

Course literature

Additional literature

Articles

Compendia

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.