

Analytical Methods in Materials Science

Programme course

6 credits

Materialtekniska analysmetoder

TFFM40

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

Applied Physics, Physics

Course level

Second cycle

Advancement level

A1X

Course offered for

- Applied Physics and Electrical Engineering, M Sc in Engineering
- Physics and Nanoscience, Master's programme
- Materials Science and Nanotechnology, Master's programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Specific information

Exchange students may apply for the course after arrival to LiTH but before it starts. The Faculty coordinators for exchange studies must be contacted before applying.

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

Physics of Condensed Matter and it is desired that the course Physics Laboratory Work II has been completed.

Intended learning outcomes

The objective with the course is to give an in depth knowledge about the principles for modern measurement techniques and to operate advanced instrumentation that is being used in materials science today. The emphasis is directed towards techniques that are used both in industrial and university research and development laboratories. It provides knowledge for a position as a research director in industry or academia.

Course content

The lectures covers the basic physical mechanisms of the interaction between solid matter and electromagnetic radiation, electrons and ions. Also fundamental aspects of diffraction and contrast theory are being covered. In addition the principles and usage of microprobes, electron spectroscopy techniques (AES and XPS), x-ray diffraction, electron microscopy (SEM and TEM), light optical microscopy, Atomic Force Microscopy (AFM) and ellipsometry are described. The course consists of 9 laborations covering the following techniques; Light Optical Microscopy, Ellipsometry, Scanning Electron Microscopy, Transmission Electron Microscopy, Electron Diffraction, X-ray Diffraction, Auger Electron Spectroscopy (AES), X-ray Photo Electron Spectroscopy (XPS), and Microprobe Analyses.

Teaching and working methods

Lectures. Laborations.

The course runs over the entire spring semester.

Examination

UPG1	Laboratory report	1 credits	U, G
LAB2	Laboratory work	3.5 credits	U, G
TEN1	Written examination	1.5 credits	U, 3, 4, 5

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Johansson

Examiner

Fredrik Eriksson

Course website and other links

<http://www.ifm.liu.se/undergrad/fysikgtu/>

Education components

Preliminary scheduled hours: 74 h

Recommended self-study hours: 86 h

Course literature

PEJ Flewitt and RK Wild: Physical Methods for Materials Characterization.
Laborations-PM. Föreläsningsanteckningar.

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.