



LUND
UNIVERSITY

Faculty of Science

MAXM06, Introduction to Synchrotron Radiation Based Science, 7.5 credits

Introduktion till synkrotronljusvetenskap, 7,5 högskolepoäng
Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2008-11-14 and was last revised on 2008-11-14. The revised syllabus applies from 2008-11-14, spring semester 2009.

General Information

The course is included in the Master of Science programme in Synchrotron Radiation Based Science at the Faculty of Science. It is a compulsory second-cycle component of a degree of Master of Science in Synchrotron Radiation Based Science.

Language of instruction: English

Main field of studies

Synchotron Radiation Based Science

Depth of study relative to the degree requirements

A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The objective is that the students, on completion of the course, shall have acquired the following knowledge and skills.

Basic knowledge and understanding of

- the principal structure and function of synchrotron radiation sources
- basic X-ray optics
- the properties of synchrotron radiation sources (bending magnets, undulators, wigglers)
- the structure and function of beamlines
- different experimental techniques at synchrotron radiation facilities
- the special properties of free electron lasers, such as extremely high pulse power and extremely short time structure, and the use of these properties for new research areas

- computer simulation and overview knowledge of examples of simulation software

Ability to perform

- data collection at an experimental station
- standard simulations of simple elements of X-ray optics
- a simple simulation and optimisation of parameters for insertion devices for specified values of photon energy range, photon flux and polarisation and specified performance of the storage ring
- a presentation of knowledge about synchrotron radiation production and synchrotron radiation research
- calculation of photon flux on samples etc.

Overview knowledge of

- future X-ray and radiation sources
- the societal significance and history of synchrotron radiation research

Course content

The course comprises 7.5 credits and consists of one component.

Overview information about the function and structure of storage rings

Overview information about the significance of vacuum technology

Presentation of the main areas of synchrotron radiation research

Overview information about the applications of free electron lasers

Overview information about VUV radiation sources

Presentation of properties of synchrotron radiation induced by bending magnets and insertion devices

Presentation of common optical components used for focusing and monochromatisation of synchrotron radiation

The history of synchrotron radiation research

Overview information about applied and industrial research

Course design

The teaching consists of lectures, group exercises, study visits and laboratory experiments at MAX Laboratory in Lund. Participation in laboratory experiments and group exercises, and associated teaching, is compulsory.

Assessment

The assessment is based on written and/or oral assignments throughout the course, and on written laboratory and exercise reports. One aim of the assignments is that they shall serve as material for updating the information on a course website. Students who fail an assessment will be offered another opportunity for assessment soon thereafter.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.

For a grade of Pass on the whole course, the student must have passed the laboratory reports and assignments, and participated actively in all compulsory components.

The final grade is determined by an aggregate of the results on all assessed components.

Entry requirements

To be admitted to the course, students must meet the general requirements for admission to Swedish higher education, have English B from Swedish upper secondary school and 90 credits in science or engineering.

Further information

The course may not be included in a degree together with course MAXM01 Introduction to Synchrotron Radiation Based Research, 5 credits.

Subcourses in MAXM06, Introduction to Synchrotron Radiation Based Science

Applies from H09

0801 Introduction to Synchrotron Radiation Based Science, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction