Faculty of Science

MAXC11, Photon and Neutron Production for Science, 7.5 credits

Produktion av fotoner och neutroner för vetenskap, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2010-03-31 to be valid from 2010-03-31, autumn semester 2010.

General Information

The course is an optional course at first cycle level for a Degree of Bachelor of Science in physics.

Language of instruction: English and Swedish
If needed the course is given in English.

Main field of studies	*Depth of study relative to the degree requirements*
Synchotron Radiation Based Science	G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is that the students should have acquired the following knowledge and skills upon completion of the course:

Knowledge and understanding:

- Be able to describe and explain different accelerator types and their function
- Be able to describe how photons and neutrons are produced by means of accelerators and how they are led to experiments
- Know and be able to describe other photon and neutron sources and associated nuclear reactions
- Be able to discuss and illustrate the use of photons and neutrons in research, medicine and industry.

Course content

The course corresponds to 7.5 credits.

The course gives a general overview about how one produces and uses neutrons and photons for science.

The course starts with an overview of different accelerators (above all synchrotrons and linear proton accelerators). The different components in an accelerator are introduced and the general theory of how different components e.g. magnets are used in accelerators been described and used. Accelerators for synchrotron light (especially synchrotrons) and neutrons (especially spallation neutron source) are described in more detail.

An overview about traditional light sources and reactor based neutron sources are given. Special focus is directed against beamlines (for photons) and neutron guides (for neutrons) with their function and structure. Different components in typical beamline and neutron guide are introduced in addition to the optical theory that describes them and underliing design and optimisation of beamline and neutron guide.

Finally, different current research methods are presented based on synchrotron lights and neutrons with application in natural sciences, medicine and technology.

Course design

The teaching consists of lectures, study visits, demonstrations, seminars, written assignments, laboratory sessions and group work. Participation in group work, laboratory sessions, study visits, demonstrations and thereby integrated other teaching as well as written assignments is compulsory.

Assessment

Examination takes place in writing in the form of written assignments, laboratory reports and examination.

Students who do not pass the regular exam are offered a re-examination shortly after the regular exam.

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.
To pass the whole course, approved examination is required/approved laboratory reports/passed written assignment as well as participation in all compulsory components.

Entry requirements

For admission to the course, general entry requirements are required as well as 60 credits in natural sciences or technology.

Further information

Subcourses in MAXC11, Photon and Neutron Production for Science

Applies from H11

1001 Photon and Neutron Production for Science, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction