



LUND
UNIVERSITY

Faculty of Science

FYSC12, Physics: Nuclear Physics and Reactors, 7.5 credits

Fysik: Kärnfysik och reaktorer, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2010-12-14 and was last revised on 2010-12-14. The revised syllabus applies from 2010-12-14, spring semester 2011.

General Information

The course is a compulsory first cycle course for students intending to execute a Bachelor of Science degree project in physics.

Language of instruction: English

Main field of studies

Physics

Depth of study relative to the degree requirements

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

On completion of the course, the students shall be able to:

- describe and use basic modern physics, especially in the field of nuclear physics
- plan, conduct and report experiments
- assess experimental results
- demonstrate the ability to judge the applicability and limitations of physical models
- independently obtain new knowledge and report it in speech and writing
- exemplify and describe in outline current research in nuclear physics
- demonstrate understanding of the role of nuclear physics in society
- understand the function and use of reactors

Course content

Part 1: Nuclear physics, 6 credits:

- The properties of atomic nuclei
- Two-nucleon systems
- Excitation and decay of nuclei: beta decay due to weak interaction, electromagnetic transitions, alpha decay
- Nuclear structure models: the shell model for spherical and deformed systems, collective models
- Nuclear reactions: cross section and reaction mechanisms, reactions due to strong and electromagnetic interaction, fission and fusion, accelerators and detectors
- Applied nuclear physics

Part 2: Reactor physics, 1.5 credits

- Different types of fission reactors, their structure and use
- Reactors as sources of energy from environmental and societal perspectives

Course design

The teaching consists of classes, group tuition and supervision in the context of laboratory sessions, computer exercises and seminars.

The classes primarily go through material from the theory course and problem-solving. Furthermore, the classes provide research information, which is an important component of the course, often in conjunction with a demonstration of the research conducted.

The laboratory sessions mainly involve laboratory and computer exercises, seminars and feedback sessions. Compulsory participation is required in all components associated with laboratory sessions. The laboratory components are awarded a total number of points and the student's performance is graded.

The students' reports of assignments to their fellow students are an essential element of the course.

Assessment

The assessment is normally based on written assignments and an oral exam.

The course will be assessed in its entirety. There are normally three opportunities for assessment per year. Further opportunities may be provided, subject to an agreement with the lecturer and the director of studies.

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 students must have passed the exam/laboratory reports/assignments and participated in all compulsory components.

The final grade is determined by the aggregated results of the oral exam and the laboratory sessions in accordance with the number of credits for the different components.

Entry requirements

To be admitted to the course, students must have knowledge equivalent to 60 credits in physics, including FYSA21 Tools in Science, 30 credits, or the equivalent. Students are recommended to take FYSC11 Atomic and Molecular Physics, 7.5 credits, prior to or in parallel with the present course.

Further information

The course may not be included in a degree together with FYSA31 Physics 3: Modern Physics, 30 credits, and FYSB03 Nuclear Physics, 7.5 credits.

Subcourses in FYSC12, Physics: Nuclear Physics and Reactors

Applies from V11

- 1001 Oral Exam, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 1002 Laboratory Exercises and Projects, 2,5 hp
Grading scale: Fail, Pass, Pass with distinction