SH2603 Radiation, Protection, Dosimetry and Detectors 6.0 credits

Strålskydd, dosimetri och detektorer

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SH2603 valid from Autumn 2007

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

Recommended prerequisites: A solid background in mathematics as well as a basic knowledge in modern physics, corresponding to a Bachelor of Science is required.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The course is designed as a preparatory course for other courses in the neighbouring fields, preparing the student both for laboratory exercises where radioactive sources are used, and for solving problems involving basic radiation physics and radiation protection elements.

A main learning objective for this course is that the student should be able to use the gained knowledge in nuclear- and radiation physics as a tool for calculating and estimating the dose absorbed in the body after being exposed by radioactive material in a specific situation. Together with knowledge about the interaction between matter and radiation, the biological effects of radiation, and knowledge about the current regulations on radiation protection, the student will in addition be able to use these tools to make adequate choices for radiation protection in situations that will occur in their future courses, and in their future professional career.

To pass the course, the student must be able to:

- describe the basic parts and general attributes of the atomic nucleus
- explain the origin of alpha- beta- and gamma radiation and give a few examples of the origin of neutron radiation
- explain how ionising radiation of the above types interact with matter, and be able to apply this knowledge when designing radiation protection in various circumstances
- give several examples of radioactivity in nature and explain the origin of the radiation
- explain the principles for detecting radiation of the various types, and be able to apply this knowledge for measuring radiation from radioactive materials
- give an account for the basic regulations of dose limits, and be able to apply these rules for work in the laboratory as well as in the field.
- estimate, using calculations, the full body dose, from exposure of various radioactive sources, and from the results make adequate choices for the design of radiation protection

Course contents

The contents of the course are focused on ionising radiation, its origin and effects.

Theoretical models of the atomic nucleus, giving basic understanding of the various radiation types will be discussed. In connection to that, the basic building blocks and attributes of the nucleus are described. The basic models for the interaction between radiation and matter will be discussed in some detail. The effect of radiation on the human body is treated briefly.

The knowledge from the parts above is then applied when discussing dosimetry and radiation protection. The basic units of dosimetry are listed, as well as the current regulations for radiation protection, e.g. dose limits, when working with closed or open radioactive sources.

Course literature

Course Compendium

Extra Material

Examination

- PRO1 - Project, 2.0 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Written exam (3 hp), Project task presented orally and in writing (2 hp), laboratory exercises performed and presented with written report (1 hp).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.