



SH2602 Transmutation of Nuclear Waste 8.0 credits

Transmutation av kärnavfall

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

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

Establishment

Course syllabus for SH2602 valid from Autumn 2007

Grading scale

P, F

Education cycle

Second cycle

Main field of study

Engineering Physics, Physics

Specific prerequisites

Recommended prerequisites: You have to be able to apply basic knowledge about nuclear and reactor physics before the first meeting. A suitable background is e.g. the KTH course in reactor physics (SH2600).

Language of instruction

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

Intended learning outcomes

The generation of radio-toxic nuclear waste is considered by the public to be one of the major drawbacks related to the use of nuclear power. Recycling of the waste in nuclear reactors may reduce the dimension of this problem considerably. After the course you will be able to make design choices that makes waste transmutation safe and reasonably economic. This objective is achieved if you show that you are able to

- assess nuclear and thermal hydraulic aspects of reactor safety when introducing plutonium, americium and curium into the fuel,
- select chemical forms for the fuel that provide acceptable compromises between high temperature stability, reprocessability and transmutation performance,
- select structural materials that combine irradiation and corrosion resistance with good mechanical properties.

Passing the course typically means that you have attended 30 hours of meetings, and performed 170 hours of work in your office. Most effort is thus to be done out of class.

Course contents

Course literature

- Transmutation of nuclear waste, J. Wallenius, 2006 (PDF-files).
- Computer code manuals
- Collection of scientific articles

Examination

- PRO1 - Multirecycling of Plutonium in PWRs, 1.0 credits, grading scale: P, F
- PRO2 - Transmutation in a Fast Neutron Spectrum, 1.0 credits, grading scale: P, F
- PRO3 - Transmutation in Accelerator Driven Systems, 1.0 credits, grading scale: P, F
- PRO4 - Coolant and Clad Temperatures, 1.0 credits, grading scale: P, F
- PRO5 - Writing of Conference Paper, 2.0 credits, grading scale: P, F
- TEN1 - Interview about Conference Paper, 2.0 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.

Other requirements for final grade

To pass the course you should actively participate in all course meetings. With exception of the first meeting, the result of home assignments will be presented and discussed. If you cannot attend a meeting, report this in advance, and you will be given an extra written assignment to replace the meeting you missed.

You are further required to have participated in writing and presenting a conference paper with the title "Performance and safety of waste transmutation in a reactor of type A with coolant B and fuel C". The research for the paper will be done in groups. The paper is to be presented orally at one of the course meetings. The final examination constitutes of an individual discussion with the teacher about the contents of the paper, lasting 30-60 minutes.

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.