SH1600 Physics of Nuclear Engineering 7.5 credits

Kärnkraftsfysik

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

Establishment

Course syllabus for SH1600 valid from Autumn 2011

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

This course is obligatory for the nuclear energy engineering specialisation for the degree progr. in Mechanical Engineering (TIMAS).

Language of instruction

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

Intended learning outcomes

Nuclear power plants deliver about half of Sweden's electrical power. The production of power is self-regulating, reliable and relatively cost effective - mostly due to a combination of enriched uranium and water cooling used in the reactors. Nuclear plants are also associated with low greenhouse emissions. Circumstances can arise where the nuclear fuel and surrounding materials are damaged resulting in closure of the reactor and, in the worse case, a release of radioactive gases.

After completing this course you should be able to :

1) Calculate and adjust the power of a nuclear power station during normal operations by understanding how fission process and chain reactions work.

2) Choose operating parameters which limit the risk of damage to fuels and associated materials.

3) Suggest correction procedures when abnormal conditions arise.

4) Implement good practice regarding radiation protection

Course contents

1) The structure of the atomic nucleus

2) Nuclear fission and chain reactions

3) Types of radiation and the effect on humans

4) Nuclear fuel

5) Nuclear materials

6) The dual role of cooling media as a neutron moderator and heat transfer agent

7) Reactor kinematics

8) Temperature feedback

9) Shut down procedures and xenon poisioning

10) Latent heat

Course literature

Compendium, course notes.

Examination

- INL1 - Home Assignment, 1.0 credits, grading scale: P, F
- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB3 - Laboratory Work, 1.5 credits, grading scale: P, F
- LAB2 - Laboratory Work, 0.5 credits, grading scale: P, F
- LAB1 - Laboratory Work, 0.5 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.

Laboratory exercises, home assignments, written examination.

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.