FSH3773 Nuclear Power Safety 6.0 credits

Kärnkraftsäkerhet

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

Establishment

Course syllabus for FSH3773 valid from Spring 2012

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Completed courses in Nuclear Reactor Engineering

Language of instruction

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

Intended learning outcomes

Nuclear Power Safety (NPS) is paramount to both economic performance and public acceptance of nuclear power. The ultimate mission of NPS is to ensure that release of radioactive materials from nuclear power plants and its effect on plant personnel, public health and

environment is as low as reasonably achievable. Technical content of NPS addresses both the Probability and Consequences of such radioactive releases from the plant under normal, abnormal and accident conditions, including hypothetical accidents. The NPS course aims to provide students with basics they need to be able to address questions: What are possible accidents? How do they occur? How often they occur? What are consequences?

After the course the student shall possess a basic understanding of principles, issues and tools in nuclear power safety. This objective is achieved if you show that you are able to:

1. Define safety design requirements and explain how they are achieved in design, construction and operation of a nuclear power plant;
2. Identify key milestones in accident progression scenarios (from design-basis accidents to severe core-melt accidents) and relate them to respective prevention and mitigation measures;
3. Perform a scoping assessment of a perceived threat against a plant safety barrier using contemporary knowledge and methods in safety analysis.

Course contents

The course addresses both fundamentals of safety design and methods for safety analysis of nuclear power plants, with emphasis on Light Water Reactors. Topics covered include

- Safety characterization and safety features of nuclear power plants
- Reactor safety principles and criteria
- Design-basis and beyond-design-basis events
- Accident phenomena, including severe accidents
- Safety systems, containment performance
- Deterministic safety analysis (basic elements)
- Accident modeling and simulation codes
- Probabilistic safety analysis (basic elements)
- Analysis of operation transients, accidents and severe accidents.
- Emergency operation procedure, accident management
- Safety issues and safety issue resolution
- Operating experience, regulation and safety culture

Disposition

The course instruction includes 32 hours of classroom (24 hours of lecture and 8 hours of seminar) and 130 hours of work in your office (~70 hours of reading the course literature, ~60 hours of work with the course assignments).

Course literature

1. Lecture Materials and Complementary Course Notes

2. B. Pershagen, Light Water Reactor Safety, Pergamon Press, 1989
3. Scientific papers and technical reports on selected topics of plant safety.

Examination

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.

PRO1 - Assignment (project) 3 hp grade scale: P/F

TEN1 - First exam 2 hp, grade scale: P/F

TEN2 - Final exam 1 hp, grade scale: P/F

Other requirements for final grade

Assignment (project) 3 hp

First exam 2 hp

Final exam 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.