SH2600 Reaktorfysik, större kurs 9,0 hp

Nuclear Reactor Physics, Major Course

Fastställande

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Fysik, Teknisk fysik

Särskild behörighet

The course requires Bachelor level knowledge of mathematics and physics from an engineering Bachelor programme. Fundamentals of basic nuclear physics and quantum mechanics are desirable but not formally requitred.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

The aim of this course is to give basic and advanced knowledge in modern reactor physics. The main part of the course is devoted to neutron diffusion theory, theory of nuclear fission and their industrial applications (power generation). The lectures give also an insight into new ideas to transmute nuclear wastes with help of particle accelerators. A historical survey of the milestones of nuclear physics since 1900 is also given in an introduction to the lectures. The course gives also some practical understanding of reactor operation through the laboratory exercises conducted at the deparmental reactor simulator and probably at a research reactor.

Kursinnehåll

Being a core discipline in nuclear engineering, the course focuses on fundamental concepts in reactor physics as well as basic physical processes that determine operation of nuclear reactors and some other related subjects. The course gives a gentle introduction to the following topics:

- Nuclear fission and chain reaction;
- Neutron thermalisation;
- Neutron diffusion equation;
- Reactor kinetics and reactor dynamics;
- Monte Carlo methods;
- Nuclear fuel cycle and nuclear waste management;
- Reactor types and future Generation IV reactors;
- Accelerator Driven Systems and transmutation;
- Basic principles and modern issues of nuclear power safety.

Kurslitteratur

- A multimedia textbook on CD.
- Web-based manuals for laboratory exercises.
- Web-based lecture presentations.
- Reference text book: D.J. Bennet & J.R. Thomson "The Elements of Nuclear Power" Longman Scientific & Technical, 1989.
- Alternative text book: J.R. Lamarsh and A.J. Baratta, “Introduction to Nuclear Engineering,” Prentice Hall, 2001
- Alternative text book: W.N. Stacey “Nuclear Reactor Physics” Wiley, 2001

Examination

- TENA - Tentamen, 5,0 hp, betygsskala: A, B, C, D, E, FX, F
- LABA - Laborationer, 4,0 hp, betygsskala: P, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Övriga krav för slutbetyg

To pass the course students are supposed to submit four written laboratory reports and pass the final written examination. The final grading may be improved by passing through a mid-term written examination (5 university credits) and/or orally presenting one out of four laboratory exercises (4 university credits).

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.