



FEK3360 Advanced Hands-on MEMS Course 10.0 credits

Avancerad hands-on MEMS kurs

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

Establishment

Course syllabus for FEK3360 valid from Autumn 2015

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

registered as PhD student at Swedish university or equivalent

Language of instruction

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

Intended learning outcomes

Upon completion of the course, the students will be able to:

- conceptualize microsystem/microactuator devices for research tasks and for given real-world specifications,
- model, simulate and design microsystems in state-of-the-art design software,
- fabricate microsystem devices in a state-of-the-art semiconductor clean-room laboratory,
- characterize the performance of microsystem devices,
- analyse failure mechanisms and to propose design improvements for a subsequent engineering cycle
- independently carry out research projects involving micro-electromechanical systems

Course contents

The students will learn about the design of micro-electromechanical systems, and will be guided through a complete microsystem engineering cycle in which they will do design, fabrication, and characterization of their own microdevice concepts. The students will learn to use state-of-the-art microsystem engineering tools, including finite-element modeling (FEM), CAD layouting, clean-room microfabrication machines, and electrical/mechanical/optical characterization tools.

Disposition

After the introductory lectures (course phase 1: lectures) the students, working in teams of 2 (max. 3) people, get a MEMS design problem, for which they have to conceptualize a solution, decide on which actuators to use, and to model and simulate their solutions, as well as to draw the CAD layouts for manufacturing (course phase 2: design). During that phase 2, there will be weekly review meetings guiding the students' progress. After phase 2, there are two deadlines: handing in of the layouts, and handing in of an intermediate report. Then, the students are fabricating their microsystems in the KTH cleanroom (phase 3: fabrication), are then characterizing their devices and have to identify failure mechanisms and to suggest design improvements (phase 4: characterization). The course completes with a final report and a final presentation (phase 5: examination). In order to pass the course, the students need to complete all phases, but not necessarily in the same course year.

Course literature

Föreläsningsmaterial, forskningspublikationer som distribueras under kursen, labbmanualer

Equipment

All equipment provided by the course organizer.

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.

Other requirements for final grade

- attendance of the introductory lectures
- project work in team
- active participation in weekly review meetings
- keeping of hand-in deadlines (for design, intermediate and final report)
- approved 20 min oral presentation of project results
- approved intermediate and final reports

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.