EE-536 Physical models for micro and nanosystems

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Cursus		Sem.	Туре	Language of
Electrical and Electronic	al Engineering	MA1, MA3	Opt.	teaching
MNIS		MA3	Obl.	Credits Session
				Semester Exam
				Workload
				Weeks
				Hours
				Courses
				Number of positions

Summary

Students will learn simple theoretical models, the theoretical background of finite element modeling as well as its application to modeling charge, mass and heat transport in electronic, fluidic and electromechanical micro and nanosystem.

Content

- 1. Finite element method background and implementation
- 2. Modeling electrostatic problems, voltage and charge distribution
- 3. Micro and nanoelectromechanical devices: mechanical properties, modeling electromechanical coupling
- 4. Detection systems for x-ray and gamma ray imaging devices
- 5. Modeling of fluid mechanics in micro and nanosystems
- 6. Modeling heat transfer

Learning Prerequisites

Required courses Basic electronics and physics

Learning Outcomes

By the end of the course, the student must be able to:

- · Choose the appropriate approach to modelling a simple device
- Design a Comsol model appropriate for a given device type
- Interpret the predictions from a model
- Solve a simple theoretical device model
- Perform a sanity check on a model
- Choose the appropriate boundary conditions

Teaching methods

Ex cathedra Exercises on a computer using Comsol Project work in a small group

Assessment methods

Project report and presentation

