Summary
The course provides the basis to understand the physics, the key performance, and the research and industrial applications of magnetic sensors and actuators. Together with a detailed introduction to magnetism, several magnetic sensors and actuators are studied.

Content
1. Basics of magnetostatics

2. Sensors & Actuators (principles and selected topics)
Basic principles, design and characteristics of following selected sensors and actuators:

• Micromachined sensors.
• Hall effect devices.
• Anisotropic (AMR) and giant (GMR) magneto resistors.
• Flux-gates Microsystems.
• Magnetic resonance methods (NMR and ESR) and their applications in magnetometry, spectroscopy and imaging.
• Magnetic force microscopy (MFM).

Discussion of following topics: sensitivity, noise, accuracy, magnetic field resolution, electronic interfaces, applications.

3. Case studies
Study and discussion of examples of micro-magnetic sensors from the current scientific literature that illustrate the usefulness of the previously introduced concepts. Opportunities for scaling down, integration, and new applications.

Keywords
Magnetostatics, Hall effect devices, magnetic resonance, magnetometry, magnetic sensors
Learning Prerequisites
Recommended courses
Basic knowledge in physics and mathematics