MAGNETIC MATERIALS AND DEVICES
SYLLABUS

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COURSE DESCRIPTION
Introducing fundamentals of magnetic materials for the next-generation magnetic, nanomagnetic, and spintronics-related technologies. Includes basics of magnetism, models of the equivalent magnetic charge and current, paramagnetic and diamagnetic materials, soft and hard magnetic materials, equivalent magnetic circuits, and magnetic system design foundations.

TOPICS
• Review of basic magnetostatics
• Magnetization and magnetic materials
• Atomic origins of magnetism
• Diamagnetism
• Paramagnetism
• Interactions in ferromagnetic materials
• Ferromagnetic domains
• Antiferromagnetism
• Ferrimagnetism
• Anisotropy
• Nanoparticles and thin films
• Magnetoresistance
• Superconductors
• Spin-FETs
• Magnetic data storage
• Magnetic storage media
• Magnetic read and write heads
• GMR, spin valve
• Magneto-optics recording
• Magnetic semiconductors and insulators

EXAMS
No exams, No HWs
GRADING POLICY
Group project presentation

Recommended Books and References (Notes will be provided)


4. K. Krishnan, Fundamentals and Applications of Magnetic Materials