



Magnetic Materials

MATSCEN 6778

Credit Hours:

2.00 - 2.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

This course teaches the basic properties of magnetic materials in a wide class of materials including metals, insulators, semiconductors. The relationships between structure, composition, processing, and magnetic properties will be reviewed with a special focus on the atomic origins of magnetism and the ability to engineer these mechanisms through alloying or doping, or layered structures.

Prerequisites and Co-requisites:

Prereq: Grad standing in Engineering or Mathematical and Physical Science; or permission of instructor.

Course Goals / Objectives:

- Develop a technical knowledge of fundamental magnetic properties
 - Develop a working knowledge of the atomic origins of magnetism
 - Develop theoretical understanding of types of magnetism
 - Develop an understanding of the role of domain structure in magnetization
 - Develop understanding of Anisotropy
 - Introduce the concept of engineering magnetic properties by composition, structure, and processing control.
 - Introduce how magnetic properties affect other functional properties such as structural, electronic, and optical properties.
 - Develop the ability to critically examine and understand recent scientific literature
 - Develop the ability to give oral presentations on scientific literature as well as write review papers on scientific sub-fields
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Course Topics:

- Fundamental magnetic properties
 - Atomic origins of magnetism
 - Theories of magnetism
 - Domain structure
 - Anisotropy
 - Magnons – spin waves
 - Magnetotransport
 - Spin Caloritronics
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Designation:

Elective