



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Electronic, Optical, and Magnetic Properties Laboratory

MATSCEN 5532

Credit Hours:

1.00

Course Levels:

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

Course Components:

Lab

Course Description:

Correlates electronic, optical, and magnetic properties of materials with structure, composition, and microstructure. Examples include resistivity, the Hall effect, and ferromagnetic/ferroelectric hysteresis.

Prerequisites and Co-requisites:

Prereq: 3141, 3261, 3271, 3332, and enrollment as MatScEn-BS major student; or permission of instructor.

Course Goals / Objectives:

- Learn the principle of current/voltage measurement using 4 contact method, intrinsic versus extrinsic properties
 - Learn principles of the Hall effect including measurement of charge carrier type, electron or hole, and charge carrier mobility
 - Learn principles of optical absorption and photovoltage. Measure photovoltage versus wavelength for intrinsic-Si, p+ or n+ Si, and a pn photodiode
 - Measure the magnetization of ferromagnetic metals, paramagnetic metals, and diamagnetic insulators
 - Measure polarization of ferroelectrics as a function of electric field
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Course Topics:

- 4-pt resistivity: Objective: Learn the principle of current/voltage measurement using 4 contact method, intrinsic versus extrinsic properties
 - Hall effect: Objective: Learn principles of the Hall effect including measurement of charge carrier type, electron or hole, and charge carrier mobility
 - Photovoltage: Objective: Learn principles of optical absorption and photovoltage. Measure photovoltage versus wavelength for intrinsic-Si, p+ or n+ Si, and a pn photodiode
 - Magnetic memory materials: Objective: Measure the magnetization of ferromagnetic metals, paramagnetic metals, and diamagnetic insulators
 - Ferroelectric materials Polarization of ferroelectrics as a function of electric field
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Designation:

Elective