



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Electronic Properties

## MATSCEN 3271

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

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**Course Description:**

Introduction to structure, property, and applications of electronic materials. Includes electronically and ionically conducting materials, dielectrics, and optical and magnetic materials.

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**Prerequisites and Co-requisites:**

Prereq: 2010; and Math 1151 or 1161; and Physics 1251 or 1261; and enrollment as MatScEn-BS student; or permission of instructor.

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**Course Goals / Objectives:**

- Learn the physical principles of electronically and ionically conducting materials, dielectrics, optical and magnetic materials
  - Learn the influences of composition, structure and microstructure on conducting, dielectric, optical and magnetic materials
  - Learn about applications of conducting, dielectric, optical and magnetic materials
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**Course Topics:**

- Electrical conduction in metals: microstructure and temperature dependence.
  - Elementary quantum physics, wave properties and band structures.
  - Electrical conduction in semiconductors. N- and p- type doping. Temperature dependence. Photoexcitation of carriers.
  - Semiconductor devices.
  - Ionic conductivity in materials and applications.
  - Low, medium and high permittivity dielectric and applications.
  - Optical materials and applications.
  - Magnetic materials and applications.
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**Designation:**

Required