

# ELECTRONIC AND PHOTONIC MATERIALS, MINOR

Requirements for a minor may be completed at any campus location offering the specified courses for the minor. Students may not change from a campus that offers their major to a campus that does not offer their major for the purpose of completing a minor.

## Program Description

Electronic and photonic materials have greatly changed modern life. Without them, computers, telecommunication systems, compact disc players, video cameras, and all the electronics with which we have become accustomed would not be possible. The study of electronic and photonic materials is a natural bridge between the fields of electrical engineering and material science. Students in electrical engineering will benefit from this minor because they will better understand the materials with which they will design electronic and photonic devices, such as transistors on a computer chip or semiconductor lasers in a compact disc player. Training in the field of electronic and photonic materials requires study of the processing and characterization of these materials to help engineers develop ways to lower cost and improve performance. This knowledge will help prepare students to enter the semiconductor industry or pursue graduate studies.

## What are Electronic and Photonic Materials?

Electronic and photonic materials are vital components of future scientific and technological advances. Studying the electronic, photonic, magnetic, and optical properties of materials is vital for building integrated electronic systems for wide ranging applications from computers to cell phones to electronic instruments for medical applications and environmental monitoring. The development of new electronic and photonic materials depends on understanding and controlling the electronic structure of materials and is a natural bridge between the fields of electrical engineering and materials science.

## You Might Like This Program If...

- You are interested in working in the electronics manufacturing industry.
- You want to know more about what materials are required to power a range of current electronic devices.

## Program Requirements

Requirement	Credits
Requirements for the Minor	35

For the minor in Electronic and Photonic Materials, a minimum of 35 credits are required.

## Requirements for the Minor

A grade of C or better is required for all courses in the minor, as specified by Senate Policy 59-10 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/59-00-minors-and-certificates/#59-10>).

Code	Title	Credits
<b>Prescribed Courses</b>		
<i>Prescribed Courses: Require a grade of C or better</i>		

EE 310	Electronic Circuit Design I	4
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MATH 231	Calculus of Several Variables	2
MATSE 201	Introduction to Materials Science	3
CHEM 112	Chemical Principles II	3
EE 441	Semiconductor Integrated Circuit Technology	3

### Additional Courses

*Additional Courses: Require a grade of C or better*

MATSE 450	Synthesis and Processing of Electronic and Photonic Materials	3
or MATSE 455	Properties and Characterization of Electronic and Photonic Materials	
Select 3 credits from the following:		3
ESC 314	Engineering Applications of Materials	
An approved EE course		
Select 6 credits from the following:		6
EE 442	Solid State Devices	
ESC 445	Semiconductor Optoelectronic Devices	
MATSE 400	Crystal Chemistry	
MATSE 401	Thermodynamics of Materials	
MATSE 402	Materials Process Kinetics	
MATSE 413	Solid-State Materials	
MATSE 417	Electrical and Magnetic Properties	
MATSE 430	Materials Characterization	
MATSE 435	Optical Properties of Materials	
MATSE 450	Synthesis and Processing of Electronic and Photonic Materials	
MATSE 455	Properties and Characterization of Electronic and Photonic Materials	

## Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information need to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy>)

## University Park

**R. Allen Kimel**  
Associate Head for Undergraduate Studies  
225B Steidle Building  
University Park, PA 16802  
814-865-5397  
rak189@psu.edu

## **Contact**

### **University Park**

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

225B Steidle Building

University Park, PA 16802

814-865-9857

rak189@psu.edu

<http://www.matse.psu.edu/>