

EE 546- Electrical Engineering Materials

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr Rania El Sharkawy

TEXT BOOK:

Lecturer Notes

COURSE DESCRIPTION:

Electric materials classification. Dielectrics macroscopic and microscopic approaches. Types of polarization. Frequency response. Complex permittivity. Dielectric losses and their measurements. Dielectric breakdown (1). Dielectric breakdown (2). Dielectric breakdown (3). Applications of dielectrics. Magnetic materials: Macroscopic and microscopic approaches. Hysteresis. Magnetostriction. Applications. Superconductivity and superconductors. Polymers and their characteristics. Ceramics and their characteristics. Optical fibers and their properties. Corrosion and cathodic protection of metals

PREREQUISITE:

EE333

RELATION OF COURSE TO PROGRAM:

Elective

COURSE INSTRUCTION OUTCOMES:

The student gains knowledge on the nature of electrical engineering materials (ceramics, polymers, permanent magnets).

TOPICS COVERED:

- Electric materials classification.
- Study of dielectrics.
- Study of magnetic materials.
- Superconductors, polymers, ceramics, and optical fibers.
- Cathodic protection.

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional Component Content			
Math and Basic Sciences	Engineering Topics	General Education	Engineering Design
	✓	✓	✓

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course Outcomes
a.	An ability to apply knowledge of mathematics, science, and engineering.	
b.	An ability to design and conduct experiments, analyze and interpret data.	
c.	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	✓
d.	An ability to function on multi-disciplinary teams.	
e.	An ability to identify, formulate, and solve engineering problems.	✓
f.	An understanding of professional and ethical responsibility.	
g.	An ability to communicate effectively.	
h.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	
i.	A recognition of the need for, and an ability to engage in life-long learning.	
j.	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k.	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	✓