

1997-99 Class Catalog Data

This course provides a scientific foundation in electromagnetic field concepts, models and theories. Students should have a basic understanding on Maxwell equations and how the electromagnetic waves propagate through different mediums. This course is also designed to teach the basic engineering skills to analyze the interaction between electromagnetic fields and physical structures (F).

Prerequisites: MATH 3113

Textbook: Fawwaz T. Ulaby, Electromagnetics for Engineers, Prentice Hall, 2005. ISBN: 0-13-149724-3

References: David K. Cheng, Field and Wave Electromagnetics, Addison-Wesley, second edition, 1989

Course Objectives: To provide a foundation in electric and magnetic field concepts and theories. Provide training of basic problem solving and engineering applications in electrostatics, magnetostatics, the Maxwell equations, and plane wave propagations.

Coordinator: Yan Zhang

Prerequisites by Topic: Analytical geometry, coordinate systems

Topics:

1. Vector algebra and coordinate systems
2. Electrostatics
3. Magnetostatics
4. Dynamic fields and Maxwell's equations
5. Plane wave and propagations

Schedule: Lecture – 3 hours per week

Computer Usage: CD-ROM with the textbook, MATLAB and/or other engineering software tools.

Design Projects: None

Laboratory Projects: 1-2 lab projects focusing on (a) computing and visualizing electric field potential, (b) Studying wave propagation in different medias. All lab projects use MATLAB as the major tool.

Assessment Methods Used: Standard course evaluation.

Contributions to Professional Component:

Science: 2.4 credits or 80%

Engineering: 0.6 credits or 20%

Program Objectives, Related Strategy, and Actions:

1: i

2: ii

ABET 2000 Criterion 3 Contents:

a, e, k

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Date: Dec 12, 2008

ECE3613 ABET MTO a-k Element Coverage

1. ABET element a (ability to apply knowledge of mathematics, science, and engineering)

The ECE3613 course is based on a strong and strict mathematical and physical theory framework. The students are required to have the prerequisite knowledge and theoretical skills, and go through the review study at the beginning of the course. After that, students are required to apply the fundamental knowledge to different problems. Those problems are designed to require student setup appropriate physical models and coordinate systems, apply correct EM laws/equations, and use the vector, calculus and phasor related math skills.

2. ABET element e (ability to identify, formulate and solve engineering problems)

There are 8 homework, 5 pop quizzes and 2 exams in this course designed to train the basic problem solving skills in the engineering EM area. A portion of the homework questions are 'engineering oriented', meaning that they are more or less related to the real-world engineering challenges (e.g., studying of coaxial cable's EM properties). In the course lectures, on the other hand, significant amount of engineering applications of the theories are discussed.

3. ABET element k (ability to use techniques, skills and modern engineering tools)

The class project requires students use MATLAB as the basic engineering tool to solve and visualize the EM fields. Other advanced engineering design software such as HFSS was also introduced to students.