ECE 031: Electromagnetic Fields

Term: 2020 Winter Session Instructor: Staff Language of Instruction: English Classroom: TBA Office Hours: TBA
Class Sessions Per Week: 5 Total Weeks: 3 Total Class Sessions: 15 Class Session Length (minutes): 240 Credit Hours: 4

Course Description:

The main purpose of this course is for students to obtain electromagnetic knowledge and technologies for further electric engineering studies. Students will learn topics including electrostatics and magnetostatics; Later in this course dynamics and wave equations will be vocered, including Maxwell's equation for time varying electromagnetic phenomena; transmission lines and plane waves will also be studied.

Course Materials:

Fundamentals of Applied Electromagnetics, by Fawwaz T. Ulaby (Author), Umberto Ravaioli (Author)

Publisher: Pearson; 8th edition (May 27, 2019)

ISBN-10: 013519900X

ISBN-13: 978-0135199008

Course Format and Requirements:

This course has 15 class sessions in total. Each class session is 240 minutes in length. Pre-reading the relevant chapter prior to each class is strongly recommended. Familiarizing with the course material before class, you will gain a better understanding of the information presented

during the class. Students are strongly encouraged to ask questions on things they do not understand. Main learning points will be highlighted from the relevant textbook chapters.

Attendance

Attendance will not be taken but all quizzes will be the taken at the beginning in class. Arriving late may cause you to miss a quiz, impacting your performance assessment. There is no made-up quiz.

Grading Scale:

A+: 98%-100%
A: 93%-97%
A-: 90%-92%
B+: 88%-89%
B: 83%-87%
B-: 80%-82%
C+: 78%-79%
C: 73%-77%
C-: 70%-72%
D+: 68%-69%
D: 63%-67%
D-: 60%-62%
F: Below 60%

Course Assignments:

Quizzes:

There will be six 10-20 minute quizzes in total. The quizzes will cover material from in-class handouts and homework. The lowest grade will be dropped.

Project:

There will be one particular project assigned during the semester. Details on this assignment and the open lab hours will be announced during the semester. Each student is expected to submit an individual report.

Exams:

The exams will be closed book and closed notes. Formula sheets will be provided by the instructor. No makeup exams will be given. Upon prior notification of the instructor, allowances will be made under extreme circumstances. There will be two midterms and one cumulative final exam.

Course Assessment:

Quizzes (5 out of 6)	15%
Project	15%
Midterm Exams 1	20%
Midterm Exams 2	20%
Final Exam	30%
Total	**100%**

Course Schedule:

Week	Topics	Activities
1	Go through syllabus Introduction to course. Review of Vector-based Calculus Coulomb's Law Electric Filed Guass' Law and calculation of flux Gradient of Electric Potential More Classical Electrostatics Problems and applications Biot-Savart Law Topics on Electromagnetism Ampère's law Magnetic circuits Magnetic Force and Magnetic Energy Faraday's law of induction. Lenz's law. Faraday's law examples.	Quiz 1 and Quiz 2 **Midterm 1**
2	Displacement current and Ideal transformer.	Quiz 3 & Quiz 4

	Maxwell's equations, boundary conditions. Time Harmonic Fields Sinusoidal steady state, phasors. Time domain reflectometry. Sinusoidal steady state. Transmission lines. Time domain solutions to TL wave equations. TL termination, reflections. Current waves. Bounce diagrams.	***Midterm 2***
3	Pulse propagation on TLs. Single-stub tuner – Analytical solution. Uniform plane waves. Infinite current sheets. Uniform plane waves in lossy materials. Poynting's theorem, equations and derivations. Power flow and plane waves. Normally incident plane wave. Uniform plane wave on a lossless half space. Electromagnetic radiation and antennas. Hertzian dipole antenna. Radiation resistance. Course summary Review for final exam	Quiz 5 & Quiz 6 **Final Exam**

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.