Syllabus

ECSE-2100: Fields and Waves I, RPI Spring 2016
Credits: 4, Contact Hours: 4

Instructor and Coordinator: James J.-Q. Lu, Professor, Office Rm: CII-6229, Phone: x2909
Office Hours: Wednesday 12:00 PM – 4:00 PM, JEC-4107


Supplemental Materials: http://www.ecse.rpi.edu/courses/F15/ECSE-2100/ & LMS Course Homepage

Prerequisites: ECSE-2010 Electric Circuits; MATH-2010 Multivariable Calculus and Matrix Algebra

Course Classification: Required

Attendance Policy: Attendance at all lectures and lab sessions is required. A student who has to miss part or all of a session should submit a confirmation of the absence from the Student Experience office either prior to class or upon returning to class. Students are responsible for all missed content and work.

Academic Integrity: We follow Rensselaer general Academic Policies and Procedures and Student Handbook. Student-instructor relationships are built on trust. For example, students must trust that instructors have made appropriate decisions about the structure and content of the courses they teach, and instructors must trust that the assignments that students turn in are their own. Acts, which violate this trust, undermine the educational process. All instances of academic dishonesty will at a minimum result in a zero score for that assignment, exam, etc. and will be referred to the Dean of Students for consideration of further action.

Catalog Data: Development and application of Maxwell's equations in free space and within materials. Introduction to vector calculus and computer-aided analysis and design methods in electromagnetics. Applications include calculation of lumped circuit elements from field theory, plane wave propagation in various materials, and reflection from boundaries. Transmission line concepts, Smith Charts, and other design tools for distributed circuits.

Topics Covered: Transmission Lines, Electrostatics, Magnetostatics and ElectroMagnetodynamics, Plane Electromagnetic Waves

Course Learning Outcomes: The students who finish this course in a satisfactory manner will be able to demonstrate: i) an ability to obtain solutions to Laplace’s and Poisson’s equations for simple configurations of materials and sources; ii) an ability to determine the capacitance of simple practical systems of conductors; iii) an ability to determine the self and mutual inductance of simple practical current carrying systems; iv) an ability to apply the basic principles of
electromagnetic motors and generators; v) an ability to determine the transmission of power by low loss TEM transmission lines from a simple source to a passive load; vi) an ability to determine the reflection and transmission of power for uniform plane waves incident on planar material boundaries for low loss or conducting media

**Grading:** (More details and schedules to be announced on course homepage)

The course grade weightings are as follows:

- 3 Tests                                      34.5%
- 8 Homework Assignments       18.4%
- 22 Online Quizzes                    12.6%
- 2 Design Projects                      11.5%
- Final Exam                                23%

**Grading Policy:**

- Homework and project reports submitted after the due date will receive no credit.
- Attendance to the 3 Tests and Final Exam is mandatory; there will be NO MAKE-UP tests or final exam.
- The tests and final exam will be closed book and no crib sheets are allowed; instead, we will provide formula sheets. Students are allowed to bring a calculator and pens, but any other items, such as books, notes, phones and any other communication devices are not allowed to use.
- Collaboration: (i) Absolutely no collaboration is allowed during quizzes, tests and final exam; (ii) Students are encouraged to work with others on homework and design problems, but the paper submitted must be the student’s own work. Simple copying of other’s work without an honest effort to learn does not qualify as collaboration.
- If there are any problems with the grading of assignments or exams, students should submit the paper along with a written statement describing the points in question. Papers submitted more than 2 weeks after grading is finished will not be considered.

**ABET Criterion 3a-k Outcomes Addressed**

( x ) 3.a An ability to apply knowledge of mathematics, science, and engineering
( x ) 3.b An ability to design and conduct experiments, as well as to analyze and interpret data
( x ) 3.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
( x ) 3.d An ability to function on multi-disciplinary teams
( x ) 3.e An ability to identify, formulate, and solve engineering problems
( x ) 3.f An understanding of professional and ethical responsibility
( x ) 3.g An ability to communicate effectively
( x ) 3.h The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
( ) 3.i A recognition of the need for, and an ability to engage in life-long learning
( ) 3.j A knowledge of contemporary issues
( x ) 3.k An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.