Syllabus

ECSE-2100: Fields and Waves I, RPI Fall 2019
Credits: 4, Contact Hours: 6

Instructor and Coordinator: James J.-Q. Lu, Professor, Office Rm: CII-6229, Phone: x2909
Office Hours: Wednesday 2:00 PM – 4:00 PM, JEC-4107


Supplemental Materials: http://www.ecse.rpi.edu/courses/F19/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 electrostatic and magnetostatic fields for typical 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 TEM waves 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 3 Student Outcomes (applicable: “✓”, not applicable “○”):**

✓ (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
✓ (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors;
○ (3) an ability to communicate effectively with a range of audiences;
○ (4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
○ (5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
✓ (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
○ (7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.