

Course web page: Blackboard

Class meets TTh 9:30-11:00 in RLM 7.112

Unique No. 16515

Professor: Hao Ling Office Hrs: TTh 11am – 12:30 pm
 Office : ENS 622
 Phone : 471-1710 all other times by appointment
 e-mail : ling@ece.utexas.edu

Text: There will be no required text in this course. The lecture materials will be delivered in class and made available on the web. It is therefore very important that you always attend class.

Supplements: Ulaby, Michielssen and Ravaioli, *Fundamentals of Applied Electromagnetics*, Prentice Hall, 6th ed, 2010.
 Balanis, *Antenna Theory: Analysis and Design*, Wiley, 3rd ed, 2005.
 Hayt and Buck, *Engineering Electromagnetics*, 8th ed, McGraw-Hill, 2012.

Prerequisites: EE 325 with a grade of at least C.

Grading:	12 10-min. quizzes	45%
	4 lab reports + design contest	20%
	3-hour final	35%

Course Objectives: We will examine solutions of time-varying Maxwell's equations and apply them to design antennas and understand radio wave propagation phenomena in modern communication and radar systems. Two major topics will be covered: 1) fundamentals of electromagnetic radiation with application to antenna theory and design, 2) electromagnetic wave propagation, scattering and diffraction, with application to understanding wireless propagation channels.

Course Outline:

1. Introduction and Review (4 lectures)
 - Electromagnetic spectrum, Maxwell's equations, constitutive relations, Poynting's theorem, time-harmonic fields, plane wave solution, dispersion relation, polarization
2. Antenna Theory and Design (11 lectures)
 - Radiation from sources, antenna parameters, directivity, gain, input impedance, wire antennas, monopoles, dipoles, helices, NEC, aperture theory, horns and reflector antennas, phased arrays, Friis transmission formula, receiving properties of antennas
3. Wave Propagation and Scattering (9 lectures)

Waves in materials, boundary conditions, reflection and transmission at media interfaces, Fresnel coefficients, Brewster's angle, total internal reflection, geometrical optics, scattering from different shapes, diffraction from knife edges, radar principles

Homework Policy:

Homework problems will be assigned weekly. Problems as well as their solutions will be posted simultaneously on the course webpage. *Homework assignments will not be collected or graded.* Collaboration on homework problems is permitted and encouraged.

Quizzes:

There will be a 10-minute in-class quiz at the beginning of class every Thursday. The weekly quiz will include questions very similar to the week's assigned homework problems. Therefore, you are strongly encouraged to do the homework problems and study the solutions.

There will be no make-up exam for the weekly quizzes. There will be a total of 12 quizzes. *The lowest two quiz grades will be dropped in computing the final quiz grade.*

Labs:

There will be 4 labs, where you are expected to design an antenna using an electromagnetic simulation tool, build the antenna and measure its performance. The measurement session will be held during class time in ENS 625. The TA for the course (Mr. Jimmy Chenchen Li, e-mail: cjli@utexas.edu) will assist you in the lab with the measurement instrument. After the lab, you will be expected to turn in a lab report that documents your findings. The lab reports must be done by your individual effort. They will be graded and returned to you.

Antenna Design Contest:

There will be a class antenna design contest at the end of the semester. The design goal will be posted at the beginning of November, and you will get to use the knowledge you've gained in the course to design, build and test an antenna to achieve a specified goal. Your score on the design contest will be counted the same as a lab report. Prizes will be awarded to the top winners.

Final Exam:

There will be a comprehensive final exam. It is scheduled for Tuesday 12/18 from 9am-12noon.

To be successful in the course, you should:

- Attend my lectures. Do the labs.

- Try hard on the homework on your own, and ask questions during my office hours.

- Quiz preparation: Make sure you know how to work the homework problems. Being able to solve homework problems is the key to doing well in this course.

POLICY ON SCHOLASTIC DISHONESTY

The University defines academic dishonesty as cheating, plagiarism, unauthorized collaboration, falsifying academic records, and any act designed to avoid participating honestly in the learning process. Scholastic dishonesty also includes, but is not limited to, providing false or misleading information to receive a postponement or an extension on a test, quiz, or other assignment, and submission of essentially the same written assignment for two courses without the prior permission of the instructor. By accepting this syllabus, you have agreed to these guidelines and must adhere to them. Scholastic dishonesty damages both the student's learning experience and readiness for the future demands of a work-career. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University.

http://deanofstudents.utexas.edu/sjs/acint_student.php.

RELIGIOUS HOLY DAYS OBSERVANC POLICY

The Texas Education Code specifies that an institution of higher education shall excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

<http://www.utexas.edu/student/registrar/catalogs/gi03-04/ch4/ch4g.html#attendance>

STUDENTS WITH DISABILITIES

Please notify your instructor of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the Dean of Student's Office in order that the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities.

<http://www.utexas.edu/diversity/ddce/ssd>