ECE 305: Electromagnetic Fields and Waves I

FALL 2015

TIME & ROOM: M, W, F: 11:30 a.m. - 12:20 p.m. (2400 Engineering Building)
Tu: 11:30 a.m. - 12:20 p.m. (1415 Biomedical & Physical Sciences)

INSTRUCTOR: Dr. Prem Chahal
2214B Engineering Building
Email: chahal@egr.msu.edu
Phone: 517-355-0248

OFFICE HRS: Tu.: 1:00 – 3:00 p.m and Mon. 10:00 – 11:00AM (grader), Room: EB 2220. I am also available by appointment as needed.

OTHER COURSE PERSONNEL: A grader for homework is assigned. All questions related to homework grading should be directed to the grader (contact information: Jennifer Byford, byfordje@msu.edu).

COURSE WEB SITE: The primary web site is via the D2L Course Management System. Please point your browser to the following Course website: Desire2Learn (https://d2l.msu.edu/) and log-in with your MSUNet ID and password.

COURSE OBJECTIVES: This is an introductory course in engineering electromagnetics. Emphasis is placed on time-varying topics, such as transmission lines, Maxwell's equations, and plane and guided waves. The basic concepts of electromagnetic fields, including field vectors, potentials, energy, boundary conditions and material effects will be covered. At the completion of this course the student should be able to:

a. Understand the fundamental nature of static fields, including steady current, static electric and magnetic fields, potentials, resistance, capacitance, inductance, stored energy, materials, and boundary conditions.
b. Apply Maxwell's equations and fundamental concepts from dynamic electromagnetic fields, including Faraday's law of induction, time-harmonic fields, boundary conditions, wave equations, and Poynting's power-balance theorem.
c. Describe the properties of plane waves in unbounded space. Understand such concepts as wavelength, phase velocity, attenuation, and skin depth for waves in various media. Solve problems involving reflection of plane waves from different material interfaces.
d. Understand the properties of simple guiding wave systems such as a parallel plate waveguide.
e. Solve problems involving lossless transmission lines with transient excitation. Understand the concepts of traveling waves, reflection, and characteristic resistance.
f. Solve problems involving transmission lines with time-harmonic excitation. Understand the concepts of standing waves, reflection coefficient, impedance, attenuation and power transfer.
g. Use Smith charts to solve transmission line problems.

REQUIRED TEXT: David K. Cheng, Field and Wave Electromagnetics, Addison-Wesley, 2nd Edition, (1989).

SUPPLEMENTAL:
U.S. Inan and A.S. Inan, Engineering Electromagnetics, Addison-Wesley, 1999.
Griffiths, D.J., Introduction to Electrodynamics, Prentice Hall, 1999, ISBN 9780138598518
Hayt, W.H., Engineering Electromagnetics, McGraw-Hill, 1981, ISBN 9780070273955
Neff, H.P., Basic Electromagnetic Fields, Harper & Row, 1981, ISBN 9780060447854
Rao, N.N., Elements of Engineering Electromagnetics, Prentice Hall, 1994, ISBN 9780139487460

CLASS PARTICIPATION: Classroom attendance is expected.

GRADING weights are as follows:

- Two 50-minute exams: 30 %
- Final exam: 20 %
- Homework: 25 % (Lowest Grade Dropped)
- Quizzes: 25 % (Lowest Grade Dropped)
- Attendance/Participation: Extra Credit (~2%)

GPA assigned to total score (%)

92.5 -100	85 – 92.5	77.5 – 85	70 – 77.5	62.5 – 70	55 – 62.5	50 – 55	0 - 50
4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.0

THERE IS NO CURVE IN THIS COURSE! The instructor reserves the right to adjust the grading scale.

HOMEWORK POLICY: Homework is generally assigned on Wednesday's and due the following week on the same day. Homework is due at the start of class and no late homework is accepted unless prior arrangements have been made. There will be 9-to-11 homework assignments, and the lowest score will be dropped. Only a set number of problems in a given homework will be graded. Working in groups on the problem sets is permitted, but each student should prepare his/her own version to hand in. All students are encouraged to attempt homework's on their own, as there is a strong correlation between homework effort and exam performance. Solutions will be made available via the course web page.

QUIZZES: On days homework's are due, 15-minute quizzes may be given to check your understanding of the subject. These quizzes will always be assigned at the start of class, and they will be closed book and closed notes. Lowest quiz score will be dropped.

EXAM POLICY: There will be two 50-minute exams and one final exam. All exams are closed book and closed notes. You will have a common cheat-sheet (provided by the instructor). Students who do not take the final exam will receive a score of 0.0 in the class. Students who request a rescheduled ECE 305 Final Exam based on the MSU "3-exam in 1 day policy" and/or due to special needs must request rescheduling in advance. There will be NO make-up exams given in EE 305. If you must miss an exam, you must make appropriate arrangements before the exam period. If arrangements have not been made, you will receive a ZERO on the exam. Please see the instructor if you have any questions.

POLICY ON RELIGIOUS OBSERVANCES: If any exam, assignment or project conflicts with a religious observance, let me know ahead of time and we will make other arrangements.

POLICY ON RECORDING LECTURES: You may make audio recordings of the lectures for personal use only. Do not post or otherwise distribute the recordings. Video recordings are not allowed.

ACADEMIC HONESTY: Article 2.3.3 of the Academic Freedom Report states: "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, this instructor adheres to the University regulations, policies, and ordinances on academic honesty and integrity, as specified in General Student Regulation 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations, all of which are available on the MSU Web site (www.msu.edu).

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES: Students with disabilities should contact the Resource Center for Persons with Disabilities to establish reasonable accommodations. For an appointment with a disability specialist, call 353-9642 (voice), 355-1293 (TTY), or visit MyProfile.rcpd.msu.edu.

IMPORTANT DATES:

Exam 1: October 02, 11:30 -12:20 pm, 2400 EB
Exam 2: October 30, 1:30 -12:20 pm, 2400 EB
Final Exam: December 18, 10:00AM – 12:00 Noon, 2400 EB

Other Important Dates:

09/07 Labor Day (no class)
09/30-10/01 Career gallery (Breslin Center)
11/26 – 11/27 Thanksgiving break (no class)
12/11 Design day – Engineering Building (no class)
12/14-12/18 Final Exam Week
For additional important dates, please refer to Registrar's website at:
http://www.reg.msu.edu/ROInfo/Calendar/Academic.asp

TENTATIVE COURSE SCHEDULE:

Week	Mon	Tues	Wed	Thurs	Fri
Aug. 31			Introduction		Ch. 02
Sept. 07	*No Class*	Ch. 02	Ch. 03		Ch. 03
Sept. 14	Ch. 03	Ch. 03	Ch. 03		Ch. 03
Sept. 21	Ch. 04	Ch. 04	Ch. 04		Ch. 04
Sept. 28	Ch. 04	Ch. 04	Review		**Exam 1**
Oct. 05	Ch. 05	Ch. 05	Ch. 05		Ch. 05
Oct. 12	Ch. 05	Ch. 05	Ch. 05		Ch. 06
Oct. 19	Ch. 06	Ch. 06	Ch. 06		Ch. 06
Oct. 26	Ch. 06	Ch. 06	Review		**Exam 2**
Nov. 02	Ch. 07	Ch. 07	Ch. 07		Ch. 07
Nov. 09	Ch. 07	Ch. 07	Ch. 07		Ch. 07
Nov. 16	Ch. 08	Ch. 08	Ch. 08		Ch. 08
Nov. 23	Ch. 08	Ch. 08	Ch. 09	*No Class*	*No Class*
Nov. 30	Ch. 09	Ch. 09	Ch. 09		Ch. 09
Dec. 07	Ch. 09	Ch. 09	Review		Design Day
Dec. 14					**Final Exam**