

EE 320: Engineering Electromagnetics

Fall 2019
Classroom: KC137
Days: MWF
Time: 1:00-1:50 P.M.

Instructor: Dr. Tony Richardson
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Catalog Description: EE 320 Engineering Electromagnetics (3) Introduction to electromagnetic field theory. Topics include Maxwell's equations, divergence, Poisson's and Laplace's equations, conductance and capacitance, Stokes's theorem, retarded potentials, Poynting theorem, and skin effect. Prerequisites: EE 215, MATH 323. Recommended: MATH 324. Fall.

Credit Hour Policy: This course meets the federal requirements of 15 in-class hours plus an expected 30 hours of out-of-class work per credit hour over a semester. (At least 135 hours total; 9 per week)

Text: *Fundamentals of Engineering Electromagnetics*, D.K. Cheng, Prentice-Hall, © 1993, 0-201-56611-7

Course Structure: The class will meet three hours a week in lecture. The will be primarily a lecture-discussion course with reading and problem assignments.

Grading: There will be three midterm exams and a comprehensive final exam. Homework assignments will be given on an approximately weekly basis. Short quizzes will be given at the beginning of almost every lecture period. Quizzes are used to encourage regular and on-time attendance.

Item	Weight
Three Midterm Exams	54%
Final Exam	26%
Homework	10%
Quizzes	10%

Class Policies: Students are expected to abide by the Academic Honor Code. No aid should be given or requested on any examination. Students may collaborate on homework (in fact, this is encouraged), but each student must submit their own work. Each student is expected to be able to recreate any homework solutions submitted.

Credit Hour Policy: This course meets the federal requirements of 15 in-class hours plus and expected 30 hours of out-of-class work per credit hour.

Disability Policy: It is the policy and practice of the University of Evansville to make reasonable accommodations for students with properly documented disabilities. Students should contact the Office of Counseling and Health Education at 488-2663 to seek services or accommodations for disabilities. Written notification to faculty from the Office of Counseling and Health Education is required for academic accommodations.

Class Communication: To receive notifications (class reminders, assignment hints and corrections, answers to exam questions, etc) from the instructor related to this course do one (or both) of the following: (1) text @ue-ee320 to 81010 (or 812-301-1469) to receive notifications by text, (2) send email (empty subject and body are ok) to ue-ee320@mail.remind.com to receive notifications by email. Alternatively, browse to remind.com/join/ue-ee320 to join OR install the Remind app or your smart phone/pad (Apple, Android) to join and receive notifications. To receive more general notifications from Dr. Richardson (class cancellations, departmental event reminders, winning lottery numbers, etc) please also text @ue-rich to 81010 (or 812-301-1469) or send email to ue-rich@mail.remind.com. Note that I remove all participants from all of my Remind classes at the end of the every semester, so you will need to rejoin the ue-rich class even if you have previously been a member.

Topics:

- Vector Analysis
- Static Electric Fields
- Steady Electric Currents
- Static Magnetic Fields
- Maxwell's Equations
- Plane Electromagnetic Waves

Course Objectives

Upon completion of the course, students will be able to:

- perform vector calculus operations (gradient, divergence, curl, divergence theorem, Stoke's theorem).
- use Maxwell's equations to determine both static and time-varying electric and magnetic fields.
- apply boundary conditions in problems involving electromagnetic wave propagation.

University Objectives

- Students will acquire a depth of knowledge in one or more disciplines of their choice.
- Students will master communication, organizational and critical thinking skills.
- Students will develop skills and competencies to be productive team members and leaders.
- Students will seek and use available resources, including technology, to answer questions and solve problems.

Lecture Schedule

This schedule is tentative. The instructor reserves the right to change it.

<i>Monday</i>	<i>Wednesday</i>	<i>Friday</i>
	Period 1 (Aug 21) S 1.1-1.3: Introduction	Period 2 (Aug 23) S 2.1-2.3: Vector Addition, Vector Mult (dot product and curl)
Period 3 (Aug 26) S 2.4: Coordinate Systems (Cartesian and Cylindrical)	Period 4 (Aug 28) S 2.4: Coordinate Systems cont. (Cylindrical and Spherical)	Period 5 (Aug 30) S 2.5-2.6: Gradient, Divergence
Sep 2 Labor Day NO CLASS	Period 6 (Sep 4) S 2.7: The Divergence Theorem	Period 7 (Sep 6) S 2.8: The Curl Operation
Period 8 (Sep 9) S 2.9: Stoke's Theorem	Period 9 (Sep 11) S 2.10-2.11: Vector Identities	Period 10 (Sep 13) S 3.1-3.3: Coulomb's Law
Period 11 (Sep 16) S 3.4: Gauss' Law	Period 12 (Sep 18) S 3.5: Electric Potential	Period 13 (Sep 20) S 3.6: Materials in Electric Fields
Period 14 (Sep 23) S 3.7-3.8: The Dielectric Constant, Boundary Conditions	Period 15 (Sep 25) S 3.9-3.10: Capacitance, Energy	Period 16 (Sep 27) S 3.11: Boundary Value Problems
Period 17 (Sep 30) Exam Review	Period 18 (Oct 2) EXAM I Chapters 1 - 3	Period 19 (Oct 4) S 4.1-4.2: Current Density and Ohm's Law
Oct 7 Fall Break NO CLASS	Period 20 (Oct 9) S 4.3-4.5: Kirchhoff's Current Law, Joule's Law	Period 21 (Oct 11) S 4.6: Resistance
Period 22 (Oct 14) S 5.1-5.2: Magnetostatics	Period 23 (Oct 16) S 5.3-5.4: Magnetic Potential, Biot-Savart Law	Period 24 (Oct 18) S 5.5-5.6: The Magnetic Dipole, Magnetization
Period 25 (Oct 21) S 5.7-5.9: Magnetic Intensity, Boundary Conditions	Period 26 (Oct 23) S 5.10: Inductance	Period 27 (Oct 25) S 5.11-5.12: Energy, Torque
Period 28 (Oct 28) Exam Review	Period 29 (Oct 30) EXAM II Chapters 4 - 5	Period 30 (Nov 1) S 6.1-6.2: Electromagnetic Induction
Period 31 (Nov 4) S 6.3: Maxwell's Equations	Period 32 (Nov 6) S 6.4: Potential Functions	Period 33 (Nov 8) S 6.5: Time-Harmonic Fields
Period 34 (Nov 11) S 7.1-7.2: Lossless Plane Waves	Period 35 (Nov 13) S 7.3: Plane Waves in Lossy Media	Period 36 (Nov 15) S 7.4-7.5: Group Velocity, The Poynting Vector
Period 37 (Nov 18) S 7.5: Normal Incidence	Period 38 (Nov 20) S 7.6: Oblique Incidence	Period 39 (Nov 22) Exam Review
Period 40 (Nov 25) EXAM III Chapters 6 - 7	Nov 27 Thanksgiving Break NO CLASS	Nov 29 Thanksgiving Break NO CLASS
Period 41 (Dec 2) Exam Review	Period 42 (Dec 4) Exam Review	

The Final Exam is on Friday, December 6th at 11:00 AM