

Course 180
Engineering Electromagnetic

Prof. Franco De Flaviis
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Class hours Mo We 5-6.20 PM Room SSH 100
Instructor Office hours Mo We 6.30-7.20 PM Room EG-2230
Web page: <http://www.ece.uci.edu/rfmems>

Course objectives

- Students are able to solve electrostatic problems applying Coulomb and Gauss law
- Students are able to solve magnetostatic problems applying Gauss magnetic law, Amphere law and Biot-Savart law.
- Students are able to solve problems dealing with plane waves interacting with dielectrics and conductors at normal incidence.

Week 1 (Text book chapter 2)

Coulomb's law. Electric field due to a charge distribution.

Week 1 (TA)

Review of complex numbers. Review of vector analysis (*text book chapter 1*), Homework discussion.

Week 2 (Text book chapter 3)

Electric flux density, Gauss law, Divergence of electric flux.

Week 2 (TA)

Review of vector analysis. Homework discussion.

Week 3 (Text book chapter 4)

The scalar potential.,

Week 3 (TA)

Review of vector analysis. Homework discussion.

Week 4 (Text book chapter 6)

Dielectrics and conductors in electrostatic. The concept of capacitance. Example of capacitance calculation.

Week 4 (TA)

Example problems. Homework discussion.

Week 5 (Text book chapter 7)

Poisson's equation. Laplace equation,

Week 5 (TA)

Example problems. Homework discussion.

Week 6 (Text book chapter 8)

The steady magnetic field, Biot-Savart law. Ampere's law.

Week 6 (TA)

Midterm review section.

Week 7 (Text book chapter 9)

The concept of inductance. Application examples.

Maxwell's equations for time varying fields. Faraday's law, Stationary loop in time varying field, The ideal transformer. Moving conductors in time varying fields. Displacement current.

Week 7 (TA)

Example problems. Homework discussion.

Week 8 (Text book chapt 8&9)

Boundary conditions. Time varying fields.

Week 8 (TA)

Review of plane wave propagation, Homework discussion.

Week 9 (Text book chapter 12)

Plane waves reflection and transmission in free space. Wave equation.

Week 9 (TA)

Review of wave reflection and transmission concepts, Homework discussion.

Week 10 (Text book chapter 8)

Plane waves reflection and transmission at normal incident angle.

Week 10 (TA)

Final review section.

Week 11

Final exam in class, comprehensive.

Text Book: William H. Hayt, Jr. and John A. Buck *Engineering Electromagnetics*, Seventh edition Addison Wesley (ISBN 0-07-252495-2).

Homework: Homework is assigned every week (usually on Wednesday), and they are due one week from the assigned day. Homework will be collected between 4.50-5.05 PM. Once the reader completes the collection of homework, he/she will not accept any late turn in (no exceptions!). Homework will be returned by the TA during discussion and office hours.

Complain procedure: You have one week from the day the homework or exam is returned to you to complain either with the reader, TA or faculty on the grade you received. After one week regardless the content of your homework or exam you are not entitled to ask for grade revisions.

Honesty: If you copy your homework from another student, your homework and the one from the student you copy are not counted toward your final grade (0 points assigned to the homework). If during the midterm or final exam you are caught copying or using material that you are not supposed to use, you will be asked to leave the exam and your exam will not be graded (0 points assigned)

Grade: Homework 10%

Midterm exam 40% (close book one page note)

Final exam 50% (close book 1 page note)