Objectives: The purpose of this course is to provide students with an introduction to the fundamentals of electrostatics, magnetostatics, and electromagnetics.

Catalog Description: Introduction to electrostatics and magnetostatics; properties of conductive, dielectric, and magnetic materials; solutions of Maxwell's equations; uniform plane wave applications; frequency- and time-domain analyses of transmission lines. Three lecture hours a week for one semester.

Topics to be discussed by the class:

1. Vectors analysis (~1 week)
   a. Vector algebra, vector calculus (divergence, gradient, curl, Laplacian), coordinate systems (Cartesian, cylindrical, and spherical)

2. Electrostatics (~6 weeks):
   a. Coulomb’s law, Gauss’s law (integral and differential (divergence) forms), electric scalar potential (line integral, gradient), Laplace and Poisson’s equations (Laplacian), conduction and polarization, boundary conditions on conductors and between dielectrics, method of images, resistance and capacitance

3. Magnetostatics (~3 weeks):
   a. Biot-Savart law, Ampere’s law (integral and differential (curl) forms), magnetic vector potential, Lorentz force, magnetization, boundary conditions between magnetic materials, magnetic energy and inductance

4. Electrodynamics (~4 weeks):
   a. Maxwell’s equations, Faraday’s induction, displacement current
   b. Plane wave propagation in free space and in materials, Poynting vector, reflection and transmission of plane waves at media boundary
   c. Transmission lines, standing wave ratio, solution to transmission line equations, source/load problems.

Textbook: I will attempt to give almost self-contained lectures but the text will also be essential. The required text is “Engineering Electromagnetics” by Hayt and Buck, 7th edition or 8th edition. I will make every attempt to use nomenclature which is consistent with this text, and will coordinate lectures with readings from Hayt. I also highly recommend “Schaum's outline of theory and problems of electromagnetic,” Joseph A. Edmister, 3rd ed., ISBN 9780070212343; the second edition of this book is also fine. This 'outline' contains very short and highly useful summaries of all the materials that we will cover and a large number of practice problems (excellent source for exam preparation!).

For better understanding of the lecture material try to complete reading the material that will be covered in a lecture BEFORE coming to class.

GRADES
Your grades will be based upon homework and exams. Homework will be assigned approximately weekly. Late homework will NOT be accepted.

The weighting for different areas is:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>In-class participation</td>
<td>5%</td>
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<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Midterm I</td>
<td>20%</td>
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<tr>
<td>Midterm II</td>
<td>20%</td>
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<tr>
<td>Midterm III</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>25%</td>
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The worst-case grades will be based on: A 100-90% of total points, B 80-89%, C 70-79%, D 50-69%, F 0-49%.

SEE NEXT PAGE FOR IMPORTANT INFORMATION ON HOMEWORK AND EXAMS.
HOMEWORK:

You will be graded for grading your own homework. This is how it will work:

1. Do the assigned homework before it is due
2. Make a photocopy of your homework solution before it is due
3. On the due date, IN CLASS, turn in your original homework solution; there is no credit for late submissions.
   **YOU SHOULD KEEP THE PHOTOCOPY**
4. Immediately after class I will post a solution for the homework set.
   Take your photocopied solutions and correct them IN RED INK.
5. Turn in your corrected copy on Monday of the next class week; no credit for late submissions.

I will grade your submissions using the following procedure:

1. I will cross check your correction copy against your original (please use RED INK for corrections).
2. Points will be assigned for each problem as follows:
   - 3 points: you did it correctly on the original submission, and showed that you did it correctly on the marked up correction copy.
   - 2 points: you got close on the original and showed how to fix any errors on the correction copy.
   - 1 point: you really didn’t get the problem at all on your original submission, but you did copy my posted solutions onto your correction copy.
   - 0 points: you didn’t bother to do anything at all.

You will NOT get back your “corrected copy” since you already graded it and know what your score is going to be. I will return the original so you have a version of your own work.

EXAMS:

There will be three in-class exams during the semester, each covering roughly 1/4 of the lecture material. About 1/3 of the final exam will cover lecture material presented after midterm 3. The remaining 2/3 of the final will cover all other lecture material. Tentative dates for the exams are: 2/15 (midterm 1), 3/9 (midterm 2), 4/13 (midterm 3), and TBD (final).

Exams make up policy:

There will be no makeup for the midterm exams. If you miss a midterm exam for an illness or other emergency reason, you should notify me at least 12 hours prior to the exam and be able to present a written documentation (e.g., a note from attending physician). I have final authority to determine if your absence is excused. If you have an excused absence from a mid-term exam, your final exam will receive extra weight to compensate for the missed mid-term exam. Remember that a final exam is 3 hours long and will cover all course material at once. I expect that midterms will be easier than a final.

There will be no make-up for the final.

Policy on cheating:

You are expected to do your own work at all times. I expect you will often discuss assignments, but you must do your own original written work. Any evidence of cheating or plagiarism will be treated as grounds for failure in the class. If you are even slightly un-clear what constitutes plagiarism, I recommend you review the document "On Being A Scientist: Responsible Conduct In Research" by the Committee on Science, Engineering, and Public Policy of the National Academies of Science and Engineering and the Institute of Medicine (published by National Academy Press, Washington, D.C. 1995). You can find it here: [http://www.nap.edu/openbook.php?record_id=4917](http://www.nap.edu/openbook.php?record_id=4917)

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the college of engineering director of students with disabilities at 471-4382. Please see [http://deanofstudents.utexas.edu/ssd/index.php](http://deanofstudents.utexas.edu/ssd/index.php).


LAST DAY TO DROP: 4TH DAY OF CLASSES (JAN 21); BETWEEN THEN AND Feb. 2 MUST GO TO DEAN'S OFFICE; AFTER Feb. 2 THERE MAY BE AN ACADEMIC PENALTY; after March 28 drops allowed by UT only for extreme non-academic reasons. Notice of planned absences for the observance of religious holy days must be submitted to me as far in advance of the date of the absences as possible.

Course Evaluation: University survey during last week of class.