Physics 302: Electromagnetic Theory II

Spring 2009

Lecturer: George Sterman
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Course Description

From the Department’s Website: A study of time-dependent electric and magnetic fields as derived from Maxwell’s equations. Topics include the interrelations of electric and magnetic fields and their potentials; energy and momentum associated with electromagnetic fields and the Maxwell vacuum and matter; waveguides and transmission lines; special relativity for electromagnetism; retarded potentials for time-varying sources; and radiation of electromagnetic waves. Prerequisite: PHY 301, 3 credits.

Course Information

• Lectures. MWF Monday/Wednesday/Friday 11:45 - 12:40 pm, Room P-125.
  First class, Monday, January 26; last class, Friday, May 8.
• Homework. Homework will be assigned each week. It will be collected for grading in the following week in class.
• Examinations. There will be a mid-term examination during the semester, and a final 2.5-hour exam during finals week (May 13).
• Short paper. Students will prepare a short paper (2-5 pages), reporting on an advanced topic or modern application of electromagnetic theory.
• Grading. Grades will be determined according to: hour midterm exam, 10%; short paper, 10%; homework, 40%; final exam, 40%.
• Textbook. The discussion of many, but not all, topics will follow the text from Phys. 301, available at the campus bookstore: Introduction to Electrodynamics, 3d Edition, by Griffiths.
## Tentative Course Outline

<table>
<thead>
<tr>
<th>No. of Lectures</th>
<th>Chapter</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>7, 8</td>
<td>Review; conservation laws in E &amp; M.</td>
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<tr>
<td>12</td>
<td>9</td>
<td>From Maxwell’s equations to waves; wave guides.</td>
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<tr>
<td>8</td>
<td>10</td>
<td>Potentials and fields; gauge invariance.</td>
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<td>Midterm: tentatively, Mar. 18 or 25.</td>
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<tr>
<td>10</td>
<td>11</td>
<td>Radiation.</td>
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<tr>
<td>8</td>
<td>12</td>
<td>Lorentz transformations and tensors in electromagnetism and other advanced topics, possibly including an intro. to quantum electromagnetic fields, and/or an intro. to groups and non-abelian gauge fields.</td>
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**Final Exam**: Wednesday May 13, 11:00 – 1:30

- **For Your Consideration**
  
  If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact Disability Support Services at (631) 632-6748 or http://studentaffairs.stonybrook.edu/dss/.

  They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

  Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website:

  http://www.sunysb.edu/ehs/fire/disabilities.shtml