EEL 4473/5486

ELECTROMAGNETIC FIELDS AND APPLICATIONS II/
ELECTROMAGNETIC FIELD THEORY I

Spring 2017

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3 credits, M, W, F, 5th period (11:45 a.m. – 12:35 p.m.)

Room: 328 BEN

Website:
http://www.rakov.ece.ufl.edu/teaching/4473&5486/4473&5486.html
EEL 4473 ELECTROMAGNETIC FIELDS AND APPLICATIONS II

EEL 5486 ELECTROMAGNETIC FIELD THEORY I

Spring 2017


Introduction 1 lecture

1. Review of Maxwell's equations 3 lectures
   Ch. 9, Sections 4.5, 4.6, 4.8, 7.3-7.6

   - Electromagnetic (EM) field quantities, units, and constants
   - Maxwell's equations for static EM fields
   - Maxwell's equations for dynamic EM fields
   - Time-harmonic Maxwell's equations
2. Electromagnetic wave propagation 5 lectures, test
   Ch. 10
   - Waves in general
   - Lossy dielectrics (general case)
   - Lossless dielectrics
   - Good conductors
   - Reflection of a plane wave

3. Waveguides, Ch. 12, Sections 11.1-11.4 8 lectures, test
   - Transmission lines (TEM waves)
   - Transverse magnetic (TM) waves in rectangular waveguides
   - Transverse electric (TE) waves in rectangular waveguides
   - Wave propagation in the guide
   - Cavity resonators

4. Antennas, Ch. 13 8 lectures, test
   - Hertzian dipole
   - Half-wave dipole and quarter-wave monopole
   - Small loop antenna
- Antenna characteristics (antenna pattern, directive gain, power gain, radiation efficiency)
- Antenna arrays
- Effective area and Friis equation

5. Numerical techniques, Ch. 14  
   5 lectures, test

- The finite-difference method
- The moment method
- The finite-element method

6. Electromagnetic coupling  
   5 lectures
   Notes provided by instructor

- Lightning electromagnetic fields
- Lightning-induced overvoltages

7. Introduction to electromagnetic compatibility (EMC)  
   3 lectures
   Section 13.10

Review
EEL 4473/5486  Spring 2017


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<tr>
<th>Course Section</th>
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<th>Homework Due</th>
<th>Test</th>
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<tr>
<td>1. Review of Maxwell's equations</td>
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<td>3. Waveguides</td>
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<td>5. Numerical methods</td>
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<td>6. Electromagnetic coupling</td>
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<tr>
<td>7. Introduction to electromagnetic compatibility (EMC)</td>
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<td>Final Exam (27B)</td>
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<td>9, 10, 12, 13, 14, Course Packet</td>
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Each test accounts for **17%** of the overall grade for the course. Final exam is comprehensive and accounts for **32%** of the overall grade. Homework grades do not explicitly enter the overall grade equation, 

\[ G = 0.17 (T_1 + T_2 + T_3 + T_4) + 0.32F. \]

**Bonus System:** If your homework grade is **80% or higher**, **AND** if your homework grade is **higher than your corresponding test grade**, then your test grade will be increased by **5%** (not to exceed **100%**). For example, if your homework and corresponding test grades are **90% and 80%**, respectively, your test grade will become **85%**.
≥90% → A;  ≥86.67% → A-;  ≥83.33% → B+;  ≥80% → B;

≥76.67% → B-;  ≥73.33% → C+;  ≥70% → C;  ≥66.67% → C-;

≥63.33% → D+;  ≥60% → D;  ≥56.67% → D-;  <56.67% → E