Course web page:  Blackboard

Class meets TTh 11:00-12:30 in RAS 211A                                          Unique No. 17310

Professor: Hao Ling  
Office: ENS 622  
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Office Hrs:  T 12:30-2:00  
Th 12:30-2:00  
all other times by appointment


Prerequisites: Graduate standing and consent of instructor.

Grading:  
2 75-min. tests 50%  
Homework (~11) 20%  
3-hour final 30%

**Course Outline:** This is an introductory graduate course in electromagnetic field theory. We shall examine the fundamental solutions of time-varying Maxwell's equations in problems involving wave propagation, radiation and guidance. The following topics are planned:

1. **Introduction and Review (Balanis Chaps 1, 2)**  
   Maxwell's equations, charge conservation, Poynting's theorem, time-harmonic fields, constitutive relations, boundary conditions

2. **Plane Wave Propagation (Balanis Chaps 3, 4, 5)**  
   Solution to the source-free wave equation, plane waves, dispersion relation, waves in materials, polarization, reflection and transmission at media interfaces, Fresnel coefficients, total internal reflection, Brewster's angle

3. **Radiation from Sources (Balanis Chaps 6, 7, 14)**  
   Vector potentials, Green’s function in 1D and 3D, solution to the inhomogeneous wave equation, near field and far field, electromagnetic theorems and principles, uniqueness, images, Huygens’s principle, Lorentz reciprocity

4. **Guided Waves (Balanis Chaps 8, 9)**  
   Guided wave solution in cylindrical structures, TE/TM/TEM modes, parallel-plate/rectangular/circular waveguides, waveguides with arbitrary cross sections, mode orthogonality, attenuation of modes, waveguide excitation

5. **Scattering (Balanis Chap 11)**
Homework Policies:

- Homework will usually be assigned on Tuesday and due the following Tuesday by 2:00 pm in ENS 622.

- Solution will be posted on the course web page.

- The lowest homework score will be dropped in computing the final grade.

- **No late homework will be accepted. No excuses.**

- Show relevant steps and circle your final answer.

- You must do your own work. Copying other people's work or letting others copy your work is considered as scholastics dishonesty and will not be tolerated under any circumstances.

Exams:

- There will be 2 in-class exams and 1 comprehensive final.

  Tentative Test Dates:  
  Test 1  10/7  
  Test 2  11/18

  Final Exam:  
  Friday, Dec. 12, 9 am -12 noon.

- You are expected to be present for every test. No make-up exams will be given.

- Additional office hours will be scheduled before each exam.

- Cheating will be dealt with in as severe a manner as possible. The minimum penalty for cheating is an 'F' in EE383L.