

PHYS 505 Electromagnetic Theory I

2013-2

Instructor:

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Course Web Page:

<http://www.metu.edu.tr/~kseckin/PHYS505.html>

Schedule:

Tuesday: 09:40-12:30 P7

Recitations:

Teaching Assistant for this course is Gönül Ünal.

Textbook:

John David Jackson, *Classical Electrodynamics*, (3rd ed., John Wiley & Sons, Inc., 1999)

Suggested Books:

Jack Vanderlinde, *Classical Electromagnetic Theory*, (2nd ed., Kluwer Academic Pub., 2005)

Asım O. Barut, *Electrodynamics and Classical Theory of Fields and Particles*, (2nd ed., Dover, 1980),

Undergraduate Level Preparation:

David J. Griffiths, *Introduction to Electrodynamics*, 4th ed., Pearson Academic, 2012

Grading:

There will be two midterm examinations and a final. Your midterm average will comprise 50% each. If your midterm average is greater than your final, the midterm average and the final will contribute 60% and 40%, respectively, to your final grade; otherwise the midterm average and the final will contribute 50% each to your final grade.*

Exam Dates and Places:

1st Midterm Exam: 12 April, Saturday

2nd Midterm Exam: 24 May, Saturday

Final Exam: TBA

Course Content:

Electrostatics, Magnetostatics & ElectroDynamics:

- ❖ Review of elementary concepts in electrostatics, Gauss's Law, Boundary Conditions and Conductors, Laplace and Poisson Equations and Uniqueness of solutions with Dirichlet and Neumann boundary conditions.
- ❖ Methods of Solving Electrostatic boundary value problems, Method of Images, Separation of Variables, Green's Functions.

* I have not decided yet on the weight of the assigned HW-sets. They may well have an effect in the %15-%20 range, and accordingly a reduction in the weights of the midterms and the final.

- ❖ Multipole Expansions, Electric Fields in Matter, Polarization, Electric Displacement, Dielectrics.
- ❖ Lorentz Force Law, Biot-Savart Law, Ampere's Law, Vector Potential, Magnetic Fields In Matter, Magnetization
- ❖ Electromotive Force, Electromagnetic Induction, Faraday's Law & Maxwell's Equations
- ❖ Conservation Law's: Continuity Equation, Poynting's theorem, Conservation of Momentum and Angular Momentum

- ❖ Electromagnetic Waves in Vacuum & Matter, Wave Equations for E&B fields, Plane Waves, Absorption and Dispersion, Guided Waves & Wave Guides.