ME 285C Electrodynamics of Continuous Media

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Outline:

1. Electric charges and currents
2. Electromagnetic field, Maxwell's equations; invariance properties.
3. The aether relations and Lorentz transformations. Wave propagation.
4. Polarization and magnetization in materials.
5. Coupling of electromagnetism with continuum mechanics
6. Electromagnetic fluids: Magnetohydrodynamics, Ferrous fluids.
7. Electromagnetic solids: Dielectrics, piezoelectricity, ferroelectricity, magnetoelasticity.
8. Variational principles.

Recommended text: A. Kovetz, Electromagnetic Theory. Oxford 2000.

Reading:

D.J. Griffiths, Introduction to Electrodynamics, 2nd ed. Prentice-Hall 1989.

L.D. Landau, E.M. Lifschitz and L.P. Pitaevski, Electrodynamics of Continuous Media. Pergamon Press 1984.

C. Truesdell and R. Toupin, The Classical Field Theories, in: Vol. III/1 of Handbuch der Physik (edited by S. Flugge). Springer 1960.

Grading: Exercises and a term project (to be presented in class at the end of term)