

PHY103A: PHYSICS II (2013-2014, Semester-I)

Department of Physics, IIT Kanpur

This course is one of the three foundational courses for the first year of Engineering and Sciences curriculum and seeks to provide the student with the basics of the electromagnetic paradigm. In addition, a thorough grounding in this course helps tackle many more courses in the undergraduate programme involving applications of vector calculus, and fields, flux, flow and potential in general.

Instructors:

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Schedule and location:

Lectures: Mon, Wed, Fri, 11:00-12:00, L7 (all sections)

Tutorial: Tue, 11:-12:00 (L8; L9; ; L10 , L11)

Office hours: To be Announced in the Tutorials

Course contents:

1. Introduction to vector analysis and calculus
2. Electric field, charge distributions, Gauss's law, potentials, energy of charge distributions, conductors and capacitors
3. Laplace equation, uniqueness theorems, method of images
4. Multipole expansions
5. Fields and interaction of dipoles
6. Electrostatics of material media: bound charges, polarization, displacement field, electrostatic energy
7. Linear dielectrics, force on a dielectric
8. Magnetic fields, current distributions, Bio-Savart law, forces between current carrying conductors
9. Ampere's law, magnetic vector potential
10. Magnetostatics of material media
11. Electromagnetic induction, emf, inductance
12. Maxwell's equations, displacement current
13. Energy and momentum of plane electromagnetic waves, Poynting's theorem
14. The wave equation, polarization
15. Reflection and transmission coefficients for dielectric, Brewster's angle, total internal reflection

Text books:

1. **D. J. Griffiths**, *Introduction to Electrodynamics*, 4th ed. PHI
2. **E. M. Purcell**, *Electricity and Magnetism: Berkley Physics Course -Vol. 2*, 2nd ed. McGraw-Hill

Evaluation:

Mid-sem Examination: 80 marks 120 minutes

End-sem examination: 120 marks 180 minutes

Quizzes: 40 marks 2 x 30 minutes (Last week of August and October)

More Practice Problems, Practice Quizzes, Recommended Reading and References will be uploaded at the course website.: <http://home.iitk.ac.in/~ynm/phy103>



Note: The tutorials will be held on Tuesdays, the problem set (pdf file) will be sent to you by email, you may also collect it from COPY POINT in the Shopping Centre. There may be additional quizzes which will not be included for grading but for your self assessment. Hope you will make full use of all the opportunities to understand and enrich your knowledge on the subject.