

**VILLANOVA UNIVERSITY
DEPARTMENT OF PHYSICS**

Syllabus

Physics: 4001-01/2

Electricity and Magnetism Lab I

Fall 2012

INSTRUCTOR: Dr. John K. Vassiliou,
Room # M365D, Tel# (610) 519-4880 e-mail:John.Vassiliou@Villanova.Edu

CLASS STRUCTURE AND OBJECTIVES:

The purpose of this experimental course is to complement the Electricity and Magnetism course where the basic theoretical ideas of Electromagnetism are introduced and described using Maxwell's equations. [The course satisfies the writing enriched requirements.](#) The experiments studied here will introduce methods and ideas that become standard tools of experimental physics or gave rise to new technologies. Emphasis will be given to the logic and methodology of the experiments as it is applied in a realistic scientific thinking. The use of computer as an experimental tool in collecting and analyzing data will be introduced.

We will have ten (10) mandatory experiments. In addition, one (1) experimental project and their theoretical ideas, related to the projects, will be studied extensively as a work study. The topic will be chosen jointly by the student and the instructor from a pool of topics. The student is expected to interact closely with the instructor for guidance and help during the project.

REPORTS:

You are expected to submit a four to five page report *for each experiment* a week after you took the data. The report will be corrected and judged for content, style and language and is expected to satisfy the writing enriched requirements. If the requirements are not satisfied the report will be returned for further corrections and resubmission. If the time is not enough to finish the lab during the assigned time, feel free to continue the experiment any time during the week. Each student will submit his/her own report. Cooperation is encouraged but plagiarism is not tolerated.

The students will cooperate with the instructor and report weekly, in writing, on the progress of their project. They will devote a three hour time in the lab setting up their experimental project, for the weeks we will not have experiments.

At the end of the semester each student will present a 30 minutes talk on the progress of his experimental project and a complete project report will be submitted to me. He/she is expected to be able to answer questions and address the audience's criticism that his talk could generate.

GRADING:

Your grade will be based on your lab reports (70%) and your experimental project and class presentation (30%). Lab reports submitted later than the one week allotment time, will incur a 10% reduction in grade for each additional week of delay. The student is expected to be aware of the theoretical and experimental ideas involved. The instructor will orally quiz the students about their lab preparation and a grade will be assigned, which will contribute to the lab report grade.

ACADEMIC INTEGRITY:

The University's code of ethics has to be respected. Cheating or plagiarism will result in failing the class.

OFFICE HOURS:

Monday, Wednesday & Friday 2:30-3:00. You can talk to me any time you want. If I am not in office, leave a message in my mail box or with the physics department office or send me an e-mail message.

Experiments in operation:

- 1) Frictional Force on a Rolling Cylinder
- 2) Electrostatic Voltmeter (Electrostatic torque)
- 3) Thermal and Shot Noise
- 4) Magnetic Fields
- 5) Torque on a Magnetic Dipole and Measurement of its Magnetic Moment
- 6) Larmor Precession of a Magnetic Dipole in a Magnetic Field
- 7) Hysteresis Loop of a ferromagnetic soft iron core
- 8) Digital Signal Analysis
- 9) Electric Polarization of Materials
- 10) The Kerr Effect

If for any reason some of the above experiment can not be done, we will substitute it with one of the following experiments.

Pulsed Nuclear Magnetic Resonance (NMR) experiment
Signal Averaging, Resistivity and Hall Effect
High T_C superconducting transition and the Meissner effect