COURSE SYLLABUS: PHYS 2401, Principles of Physics II, Spring 2008

Section: 2401-002, TR, 11:00-12:20, Sci. 118, Dr. Mahdi Sanati, Office: Sci. 46, Phone: 742-3759, m.sanati@ttu.edu, Office hours: Open door policy

Course outline and purpose: This course aims to provide students with an introduction to the principles and behavior of electric and magnetic systems. The course begins by considering the electric effects of static electric charge distributions. Then, we consider magnetic effects (i.e. what happens when you allow the electric charges to move). Finally, we combine both the electric and magnetic behaviors into a unified topic Electromagnetism and introduce Maxwell's four equations which provide an elegant summary of this subject. We will also see that there are two, equivalent mathematical descriptions of Electromagnetism i.e. differential and integral. Topics include:

- An introduction to the mathematical methods of vector analysis (div, grad and curl) used to describe electromagnetic quantities such as field and potential.
- The effects of static electric charge distributions. Electric fields. Gauss' law.
- The response of real materials to applied electric fields; dielectrics. Electric polarization and displacement. The fundamental electric vectors E, D and P.
- The magnetic fields due to electric currents. Calculation of magnetic fields, Biot-Savart and Ampère laws.
- The response of real materials to magnetic fields; types of magnetism of real materials, diamagnets, paramagnets, ferromagnets. The fundamental magnetic vectors B, H and M.
- Induced EMF due to changing magnetic flux; Faraday and Lenz laws.
- Maxwell's equations
- Wave optics

This is the second semester of a one-year calculus-based introductory physics course. The topics include classical electrodynamics and optics. The course is intended for students in science and engineering and those with a general interest in physics.

Course materials:
1. Your lecture notes taken during classes.
2. Text: M. Alonso and E.J. Finn "Physics"

Grades: Three examinations 20% each, final exam 20%, laboratory and quizzes 20%

100-A-88-B-76-C-64-D-52-F-0

Attendance required, lectures, recitations, and Labs are fundamental. This is where students will understand the concepts, will interact with the instructor and fellow students; will bring up any of their questions, except for excused absences given to the instructor in writing, preferably by e-mail. For each recorded unexcused absence, -2% off course total.

Withdrawal policy: Automatic grade of "W" for withdrawals by the deadline, thereafter "W" if the examination average is at a "D" or better. **The student must withdraw himself or herself from the class. The instructor does not do that.** But please notify the instructor if you intend to withdraw.

If you repeat the course, you also have to repeat the laboratory. Old laboratory credit no longer carries forward to repeated courses.

Homework:
Homework problems are assigned weekly. Do homework problems every day and do it yourself. It is unethical and unproductive to obtain homework answers from others. However, informal discussions among students about the homework are encouraged. Questions from the homework will be asked on the examinations.

The examinations cover the material from class, your lecture notes (most important), lecture demonstrations, and homework. The examinations are closed book. Formula cards are not allowed. Bring with you a simple calculator, without any physics content, and a ruler. For the final examination, you may prepare a formula sheet with up to 50 formulas of your choice. (One formula means one equation and one = equal sign.)

No make-up examinations generally are given. In a serious emergency, please contact the instructor as soon as possible with proper documentation to find out how the missed grade will be determined.

An absolute necessity: Spend at least **10 hours** outside of class each week on the lectures and homework. The laboratory requires additional time. If you ignore, you will most likely receive a "D" or "F" in the course. Study your lecture notes, the textbook, and do the homework yourself. Review the new material in the textbook before each class. Your lecture notes and the textbook complement each other.

Tutors: Trying to pass this course on your own, without the help of tutors. You are earning the grade, not the tutor, especially as far as the homework is concerned. Experience shows that relying on too much on outside help results in poor grades on the examinations.

Disability: Any student who because of a disabling condition may require special arrangements in order to meet course requirements should contact the instructor as soon as possible so that the necessary accommodations can be made. The student must present appropriate verification from Access Tech. No requirement exists that accommodations be made prior to completion of the approved university procedure.

Academic honesty is assumed and violations will be dealt with appropriately.

Course objectives and expected learning outcomes:
Students who are taking this course will obtain a deep conceptual understanding of the topics while mastering mathematical techniques. This course should also prepare students for more advanced courses in electricity and magnetism, as well as for the many areas where the classical theories of electricity and magnetism are useful (including, but not limited to, electronics, engineering, statistical mechanics, and quantum mechanics).

Methods for assessing the expected learning outcomes:
1. Examinations and grades.
2. In-class responses by students.
3. Class discussions to assess assimilation of new knowledge.
4. Feedback from students after graduation about the usefulness of physics.