Course Syllabus
EE 307 – Electricity and Magnetism – Fall 2012
T/Th 2:20– 3:40 PM EB 239

Course Instructor:
Dr. J. D. Williams (256) 824-2898 williams@eng.uah.edu; jdw0010@uah.edu
MWF: 406 Optics Building (256) 824 – 2898 MWF
T/Th: Eng. Building Rm. 213
Office Hours: 1:20 -2:20 PM T/Th EB 213 or any other time that I am in.

Required Textbook:

Optional Reading:
5. Z. Popovic, B.D. Popovic, Introductory Electromagnetics, Printice Hall, 1999.

Course Prerequisites:
- Electrical Circuit Analysis I, Calculus I, II, and III, Ordinary Differential Equations, and Linear Algebra
- It helps to have had Physics III

Course Material:
Chapter 1-3. (Review Material)
   Vectors Algebra, Coordinate Transformations, Vector Calculus
Chapter 4.
   Coulomb’s Law, Electric Field Intensity, Charge Distribution, Electric Flux Density, Gauss’ Law, Electric Potential, E and V, Energy
Chapter 5-6.
   Properties of Materials, Currents, Continuity Equation, Poisson’s Equation, Laplace’s Equation, Resistance, Capacitance, Image Theory
Chapter 7-8.
   Biot-Savart Law, Ampere’s Law, Magnetic Flux Density, Maxwell’s Equations (Static), Magnetic Vector Potentials, Magnetic Forces, Magnetic Materials, Boundary Conditions
Chapter 9
   Faraday’s Law, Maxwell’s Equations (Time Varying), Time-Harmonic Fields,
General Course Information: This course is taught using active learning techniques. Approximately 1/5th of the class time will be spent solving problems in groups of 1-4 students. The student will also find websites, java applets, pretest, and other self evaluation material on the www.angel.uah.edu website for this course. This is done to significantly improve the student’s ability to solve problems from first principles using Maxwell’s equations. Almost every problem solved in this course will be done without the use of a calculator. Thus the student will be able to understand the fundamental science behind many different engineering applications of electromagnetic field theory upon completion of this course.

Homework (20 % of the total course grade): Each student is required to solve no less than 10 problems from the assigned list per chapter. Each problem is worth 1 point. Furthermore, at least two problems from each set must be solved using Matlab. The student is to provide the Matlab code and solutions (including a plot of the functions solved for). The student is required to provide integral and differential eqns. coded into Matlab so that the program solves the problem. Thus, simply typing in various parameters to be multiplied together will not be counted for credit.

These assignments are due three calendar days after the completion of that chapter in class. Thus if the student completes the assignment and turns it on time then he or she will receive full credit for the assignment. Late assignments will be counted for 40% of the allowed score.

Exams (60% of the total course grade): There will be a total of two regular class exams during the semester. Exams will evaluate the student’s ability to derive theoretical solutions to word problems within a short time period. Each student will be allowed to bring one sheet of paper with a pre drawn concept map of the material for that test. Tests will consist of 4-7 problems that should be solved in less than 90 minutes. No calculators are allowed. All work must be shown to receive partial credit for incorrect answers.

Comprehensive Final Exam (30% of the total course grade): The final exam will be a comprehensive test covering each of the topic areas presented between chapters 4 and 9. A few of the questions will address topics not previously tested during the first two exams. Questions will generally cover major concepts presented in the class such as Gauss’s and Ampere’s Laws.

Final Exam: Thursday, December 6th, 3-5:30 PM in EB 239