Syllabus for ECE 331: Engineering Electromagnetics I

- Prerequisites: Mth254, Mth 256, Ph223 or Ph213, basic programming skills (we will use Matlab)
- Credits: 4
- Textbook: "Fundamentals of Applied Electromagnetics", (6th edition) by Fawwaz T. Ulaby, Eric Michielssen and Umberto Ravaioli, Pearson Prentice Hall, ISBN-13-978-0-13-213931-1
- Lectures will be held in Cramer Hall 321, on T,Th from 16:40-18:30. The instructor for the course is Professor R. Tymerski and his office is FAB 160-18 (tymerski@ee.pdx.edu). Office hours from 16:00-17:00 M,W.
- The Lab Teaching Assistant is Madeleine Roche madroche@pdx.edu
- The Homework Grader is Venkata Saimohan Kammila venkata2@pdx.edu
- Final Exams - Winter 2016

  Evening Classes: Meeting between 1640 and 1759

  All classes with regular meeting times between 1640 and 1759 meet from **1730–1920** for the final exam. The exam day corresponds to the first class meeting of each week.
- There are four labs and you will attend in weeks 2, 4, 6 and 8 OR 3, 5, 7 and 9. Week 10 is left open for making up labs.
- Exams are closed book and closed notes. Equation sheets will be provided.
- You must pass final exam (60% or better) to pass course (C-) regardless of your overall average.
- Homework should be submitted to D2L or handed in to the instructor before the beginning of class on the date specified on the homework. Late work is subject to a 10% per day penalty. No work will be accepted one week past the deadline

	Grading:
Mid-term	**25%**
Final	**35%**
Labs	**20%**
Homework	**20%**

- The contents of this syllabus are subject to change. The instructor will inform the class via email of any changes. So be sure to monitor the email address under which you registered.

Important Dates (subject to change)

- January 5 - First day of class
- **February 4 - Mid-Term Exam**
- March 10- Last lecture
- **March 15 - 17:30-19:20 Final Exam (Chapters 1-5)**

Course Objectives

Waves and Phasors: Chapter 1

Objectives

Upon learning the material presented in this chapter, you should be able to:

1. Describe the basic properties of electric and magnetic forces.
2. Ascribe mathematical formulations to sinusoidal waves traveling in both lossless and lossy media.
3. Apply complex algebra in rectangular and polar forms.
4. Apply the phasor-domain technique to analyze circuits driven by sinusoidal sources.

Transmission Lines: Chapter 2

Objectives

Upon learning the material presented in this chapter, you should be able to:

1. Calculate the line parameters, characteristic impedance, and propagation constant of coaxial, two-wire, parallel-plate, and microstrip transmission lines.
2. Determine the reflection coefficient at the load-end of the transmission line, the standing-wave pattern, and the locations of voltage and current maxima and minima.
3. Calculate the amount of power transferred from the generator to the load through the transmission line.
4. Use the Smith chart to perform transmission-line calculations.
5. Analyze the response of a transmission line to a voltage pulse.

Vector Analysis: Chapter 3

Objectives

Upon learning the material presented in this chapter, you should be able to:

1. Use vector algebra in Cartesian, cylindrical, and spherical coordinate systems.
2. Transform vectors between the three primary coordinate systems.
3. Calculate the gradient of a scalar function and the divergence and curl of a vector function in any of the three primary coordinate systems.
4. Apply the divergence theorem and Stokes's theorem.

Electrostatics: Chapter 4

Objectives

Upon learning the material presented in this chapter, you should be able to:

1. Evaluate the electric field and electric potential due to any distribution of electric charges.
2. Apply Gauss's law.
3. Calculate the resistance R of any shaped object, given the electric field at every point in its volume.
4. Describe the operational principles of resistive and capacitive sensors.
5. Calculate the capacitance of two-conductor configurations.

Magnetostatics: Chapter 5

Objectives

Upon learning the material presented in this chapter, you should be able to:

1. Calculate the magnetic force on a current-carrying wire placed in a magnetic field and the torque exerted on a current loop.
2. Apply the Biot–Savart law to calculate the magnetic field due to current distributions.
3. Apply Ampère's law to configurations with appropriate symmetry.
4. Explain magnetic hysteresis in ferromagnetic materials.
5. Calculate the inductance of a solenoid, a coaxial transmission line, or other configurations.
6. Relate the magnetic energy stored in a region to the magnetic field distribution in that region.