

Electromagnetic Waves and Propagation (ECED 4301) Course Outline

Instructor: Dr. Sergey Ponomarenko (office: C313; phone: × 3270; email: serpo@dal.ca).

Course website: www.top.ece.dal.ca.

Office hours: W 2:35 to 4:35 pm, or by appointment.

Objectives

- To learn fundamental laws governing behavior of time-dependent electric and magnetic fields.
- To learn to apply these laws to solve basic problems of electromagnetics.

Syllabus

- Brief review of vector algebra.
- Charges, currents, electric and magnetic fields.
- Electromagnetic fields in materials.
- Maxwell's equations in global and local form. Constitutive relations. Boundary conditions.
- Electric charge and electromagnetic energy conservation laws.
- Waves in general. Doppler effect.
- Plane electromagnetic waves in free space and lossy media.
- Reflection and refraction of plane waves from the interface separating two homogeneous media.
- Total internal reflection.
- Quasi-static electromagnetic fields.
- Scalar and vector potentials.
- Capacitance, resistance and inductance at low frequencies.
- Application I: Transmission lines.
- Application II: Optical fibers.

Textbooks

- Lecture Notes to be available at <http://www.top.ece.dal.ca> shortly.
- "Elements of Electromagnetics" by Matthew N. O. Sadiku, 5th Ed., Oxford U. Press, 2010. (I don't follow it too closely, though).

Format

- Lectures (3 hours/week) + Tutorials (2 hours/week) + six homework assignments.

Examinations

- **Midterm Exam (Thursday, July 12, 12:35 am – 2:35 pm, B311)** and a three-hour Final Exam (TBD): closed-book, written exams with formula sheets provided and no calculators allowed.

Grading

1. Homework 20%
2. Midterm 35%
3. Final 45%

Notes

- Two grades will be calculated: one including the midterm and the other without it, and the **higher** will determine the final grade, i.e.,

$$\text{Final Grade} = \text{Max}(20\%HW + 35\%M + 45\%F; 20\%HW + 80\%F).$$

- Should you miss the midterm for a legitimate reason, its final grade weight will be shifted to the final exam.
- There will be no supplementary examination to this course.
- There will be no Classes or Tutorials the week of June 17 through 23 (I am away at a conference).
- **Accommodation Policy for Students**

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic under the Nova Scotia Human Rights Act. Students who require academic accommodation for either classroom participation or the writing of tests, quizzes and exams should make their request to the Office of Student Accessibility & Accommodation (OSAA) prior to or at the outset of each academic term (with the exception of X/Y courses). Please see www.studentaccessibility.dal.ca for more information and to obtain Form A - Request for Accommodation. A note taker may be required to assist a classmate. There is an honourarium of \$75/course/term. If you are interested, please contact OSAA at 494-2836 for more information. Please note that your classroom may contain specialized accessible furniture and equipment. It is important that these items remain in the classroom so that students who require their usage will be able to participate in the class.