**Memorial University of Newfoundland**

**Faculty of Engineering and Applied Science**

# Engineering 7811 (Antennas)

## Course Particulars

**Term 8, Winter 2009**

**Class of 2009**

**INSTRUCTOR:** Eric Gill
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## THE COURSE

This course extends and applies the concepts encountered in Engineering 6813 (Electromagnetic Fields). In ENGI6813, it was seen that Maxwell's Equations, along with a pair of constitutive relations, Ohm's law, the definition of convection current and the Lorentz force equation, were the means of describing any classical electrodynamical phenomenon. Also intimated, but not discussed, was the fact that current-carrying structures could be responsible for radiated electromagnetic energy. The whole of this course addresses this phenomenon. The *antenna*, as we shall see, is the means of radiating or receiving "radio" waves. As time permits, a further discussion of electromagnetic wave propagation will be included.

**TEXT:** There is no specific text for this course. The following are suggested reference materials to which we shall refer from time to time.

(1) Constantine A. Balanis, Antenna Theory – Analysis and Design, Wiley,1997.

(2) Hayt and Buck, Engineering Electromagnetics, 7th ed., McGraw-Hill, 2006.

(3) J.D. Kraus, Antennas, McGraw-Hill, 1988.

(4) W.L. Stutzman and G.A. Thiele, Antenna Theory and Design, 2nd ed., Wiley, 1998.

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## COURSE OUTLINE

### Unit 1 Electromagnetics Review (Mostly)

1.1 Introduction

1.2 Maxwell's Equations and Related Formulae

4.3.1 Effective Aperture

4.3.2 The Friis Transmission Formula

**Unit 5 Aperture Antennas**

5.1 Field Equivalence and Related Concepts

5.1.1 Magnetic Current Density, Electric Vector Potential and Duality

5.1.2 More on Images

5.1.3 Field Equivalence

5.1.4 Application – Rectangular Aperture on an Infinite Ground Plane

**Topics on Propagation as Time Permits.**

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## Evaluation Scheme

| Evaluation Instrument | Value | Date |
|---|---|---|
| Assignments (5 or 6) | 10% | Biweekly |
| Term Tests (2) | 40% | Feb. 13<br>March 20 |
| Final Exam | 50% | Wk. of Apr. 13 |

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## Office Hours

Official: Monday 12:00–1:00 PM and Tuesday 3:30–4:30 PM.

Actual: Open door most of the time.

Calculator Policy: Calculators and other devices with text storage capabilities are NOT permitted in Tests and Exams.