Course Objectives
To understand radiation fundamentals, linear antennas, point source arrays, aperture antennas, antenna impedance, and antenna systems.

Prerequisites
ECE 3590 Electromagnetic Theory

Course Content
The following topics will be covered:
1. Review of Maxwell’s equations; scalar and vector potentials; boundary conditions; phasors
2. Time harmonic fields; power and Poynting vector
3. Antenna fundamentals
4. Radiation by linear wire antennas
5. Antenna arrays
6. Aperture antennas
7. Microstrip antennas
8. Reflector antennas
9. Antenna measurements

Accreditation Units
Mathematics: 0%
Natural Science: 0%
Complementary Studies: 0%
Engineering Science: 60%
Engineering Design: 40%

Web Page
https://universityofmanitoba.desire2learn.com/

Textbook

Evaluation Details
Students who are unable to write the mid-term exam for medical (or other acceptable) reasons will have their final examination weighted to include the mid-term weighting. Students must complete all the laboratories in order to be eligible to receive a passing grade.

Mid-Term
Friday, October 24, 2014 at 6:00 PM (location TBA).

Instructor
Prof. Puyan Mojabi
Room: E3-504B EITC
Telephone: (204) 474-6754
Email: Puyan.Mojabi@UManitoba.ca
Office Hours
After lectures or by appointment.

Teaching Assistants
TBA

Voluntary Withdrawal Date
Wednesday, November 12th, 2014.

Requirements/Regulations
- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

Academic Integrity
Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism or any other form of cheating in examinations, assignments, laboratory reports or term tests is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

Learning Outcomes
1. Understanding of antenna applications in communications and remote sensing.
2. Understanding the mathematical foundation of antenna theory, design, and associated analysis.
3. Analysis, design and applications different antenna types.
4. Analysis and design of antenna array types based on theory.
5. Antenna synthesis and measurement techniques.

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<thead>
<tr>
<th>Learning Outcome</th>
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Expected Competency Level **
*Attributes:
A1  A knowledge base for engineering
A2  Problem analysis
A3  Investigation
A4  Design
A5  Use of engineering tools
A6  Individual and team work
A7  Communication skills
A8  Professionalism
A9  Impact of engineering on society/environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

**Competency Levels:**
1 - Knowledge (Able to recall information)
2 - Comprehension (Able to rephrase information)
3 - Application (Able to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships)
5 - Synthesis (Able to combine separate elements into whole)
6 - Evaluation (Able to judge of the worth of something)

Student Contact Time (Hrs)

Lectures: 3 hrs lecture/week × 13 weeks/term = 39 hrs
Laboratories: 3 hrs laboratory × 5 weeks = 15 hrs
Tutorials: 0 hr tutorial × 0 weeks = 0 hrs

Evaluation

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Methods of Feedback</th>
<th>Learning Outcomes Evaluated</th>
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* Methods of Feedback: F - formative (written comments and/or oral discussion), S - summative (number grades)