



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING
The Edward S. Rogers Sr. Department of Electrical and Computer Engineering

ECE 1229H1S: ADVANCED ANTENNA THEORY

DESCRIPTION: This course deals with the analysis and design of a range of antennas. Topics addressed include: definitions of antenna parameters; vector potentials; solutions to the inhomogeneous wave equation; principles of duality and reciprocity; wire antennas; antenna arrays; phased arrays; synthesis techniques for discrete and continuous line sources; integral equations and solutions using the method of moments; field equivalence principle; aperture antennas; antenna measurement techniques; diffraction; horn antennas; reflector antennas; and microstrip antennas.

PREREQUISITES: Junior-level electrodynamics course (e.g. ECE320 or ECE357) plus one electromagnetics-related course at the senior level or higher.

COURSE WEBSITE: via Quercus (q.utoronto.ca)

LECTURES: Mon 10:00-11:30 (BA4164)
Wed 10:00-11:30 (BA4164)

INSTRUCTOR: Prof. Sean V. Hum

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MARK COMPOSITION

Assignments 30%

Project 25%

Final 45%

REFERENCE MATERIALS

- C. A. Balanis, *Antenna Theory*, 3rd Ed., John Wiley & Sons, 2005 [required].
- W. L. Stutzman and G. A. Thiele, *Antenna Theory and Design*, 2nd Ed., John Wiley & Sons, 1997 [recommended].
- S. N. Makarov, *Antenna and EM Modeling with MATLAB*, John Wiley & Sons, 2002 [recommended].
- Course notes will be provided as needed. Additional references will be posted on the course website.

ASSIGNMENTS

Assignments involving basic theory and numerical codes will be assigned and due one week from the date of assignment.

PROJECT

The project will involve selecting a recent paper from the IEEE Transactions on Antennas and Propagation related to antennas and presenting a rigorous analysis of the paper in an oral presentation. Presentations will be held towards the end of the semester.

COLLABORATION POLICY

Although collaboration with other students is permissible, you must complete projects and assignments **independently**. Evidence of copying or plagiarised work will result in a substantial penalty or a zero grade being assigned for the affected course work.