ECE 8873a: Special Topics
Radio Wave Propagation in the Earth and Space Environment

Spring 2019, M/W, 3:00-4:15

Instructor: Morris Cohen, mcohen@gatech.edu

Prerequisites: Electromagnetics background. ECE3025 or equivalent required. ECE4350 or 6350 recommended.

Description: Radio wave propagation in the Earth and space environment remains highly relevant to radar applications, geophysical science, communications, global navigation and positioning, and remote sensing. The Earth, both in the neutral atmosphere and in the solar-space environment, exerts a tremendous range of physical effects on these waves, which must be understood for the betterment of the above applications. In this course, we will detail the physics of radio wave propagation across frequencies ranging from a few Hz to many GHz, and connect these physics to the critical limitations of real-world engineering systems.

Grading:

17.5%	Midterm project
22.5%	Final project
30%	Homeworks (3 of them)
30%	Quizzes (2 of them)

Projects: Students will complete two projects during the semester, in groups or 2-3. The project consists of selecting a specific research area or practical application related to radio wave propagation in the Earth and space environment, performing a literature search of current state of the art and future R&D directions, and presenting this to the class orally. The project must not be nearly identical to any research work the student is doing but may be somewhat related. The final project also includes a short written paper (~5 pages double spaced).

Textbook: None required

Course Topics:

Review of electromagnetics
Atmospheric propagation
Plasma and Ionospheric propagation
Radio scattering
Waveguides
Longwave propagation
The near-Earth space environment
Special research areas: Radars, THz propagation, LIDAR, subsurface propagation