Theory of Wave Scattering from Rough Surfaces and Random Media
EECS 730

Prerequisite: EECS 530
3 credits

Tuesday and Thursday 9:00-10:30
Room: EECS 3433

Instructor: Professor Kamal Sarabandi
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Office Hours: Tuesday 3:00pm- 4:00pm
Wednesday 11:00 am- 12:00 pm

Prerequisite: EECS 530 or graduate standing and permission of instructor.

GSI: Amelia Buerkle
abuerkle@umich.edu

Course Website: http://www.eecs.umich.edu/courses/eecs730

Course E-mail Instructions: You will receive course instructions and important messages through our course E-mail group. After the second lecture, the GSI's and the instructor will assume that you can be reached through this group address. To subscribe, E-mail to: eecs730-request@eecs.umich.edu with the word 'subscribe' in the subject line.

Text : L. Tsang, J.A. Kong, and R.T. Shin, Theory of Microwave Remote Sensing, John Wiley & Sons, 1985. (**optional**)
The instructor will provide typed lecture notes throughout the semester.

References:

A. Ishimaru, Wave Propagation and Scattering in Random Media, Vol. 1 and Vol. 2, Academic Press, 1978.
F.T. Ulaby, R.K. Moore, A.K. Fung, Microwave Remote Sensing Vol. 2 and Vol. 3, Artech House, 1986.
A.J. Kong, Electromagnetic Wave Theory, EMW Publishing, 2000.

K. Sarabandi, ``Electromagnetic Scattering from Vegetation Canopies," Ph.D. Thesis, The University of Michigan, 1989.

Course Description: Advanced topics in theory of microwave and millimeter-wave remote sensing; Dyadic Green's function of layered media, Ewald-Oseen extinction theorem, scattering by periodic surfaces, scattering by random rough surfaces (small perturbation method and Kirchhoff Approach), analytical scattering models for discrete scatterers (low and high frequency scattering techniques), T-matrix approach, Periodic structures, Radiative transfer theory, low frequency effective permittivity of random media (dielectric mixing formulas), effective permittivity tensor of periodic media, propagation in a sparse random media (effective field approximation), optical theorem, numerical and experimental evaluation of effective permittivity, Analytical wave theory (Born approximation and Strong permittivity fluctuation), Green's function for tenuous media (Dyson's equation, Bethe-Salpeter equation).

Homeworks: Homework problems will be assigned every week (3-5 problems). The problems may be long and involve algebraic manipulations. You are strongly encouraged to do the homework problems to get familiar with the details of not so familiar techniques. You will be asked to implement some of the solutions using computer to get quantitative results necessary for developing intuition. **Homeworks are due on Tuesdays**.
Honor code applies to all homework assignments.
Solutions will be posted on class website a week after.

Exams: There are no formal quizzes or final. The Homework problems should be regarded as take-home quizzes. Each student is expected to complete a term paper by the end of the semester. The subject of term papers should be proposed by students and approved by the instructor. Each student will give a ten minutes presentation on his/her paper. A typed report is also expected.

Grading: Your grade will be based upon: 80% Homeworks +20% Term paper.

Important Dates: Class begins Thursday January 8
Sping Break, February 21- March 2
Last day of class April 21