

Class meets TTh 9:30-11:00 in ENS306

Unique No. 17138

Course web page: Blackboard

Professor: Hao Ling

Office Hrs: TTh 11:00-12:30

Office : ENS 622

all other times by appointment

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Text: D. R. Wehner, *High-Resolution Radar*, 2nd edition, Artech House, 1994.

References: M. I. Skolnik, *Introduction to Radar Systems*, 3rd edition, McGraw-Hill, 2001.

V. C. Chen and H. Ling, *Time-Frequency Transforms for Radar Imaging and Signal Analysis*, Artech House, 2002.

Prerequisites:

Graduate standing or consent of instructor. One prior course in electromagnetics (or acoustics) and one in signal processing are desirable, although not absolutely required.

Course Objectives:

- (i) To build up a thorough understanding of radar principles from the fundamental aspects of electromagnetics and signal processing.
- (ii) To gain in-depth knowledge of a radar-related topic through a student-defined term project.

Grading: Homework (40%) + 2 Midterms (30%) + Term Project (30%)

Course Coverage:

1. Introduction (Wehner Chap. 1)
Overview, radar frequencies, range resolution and bandwidth, Nyquist sampling, Doppler effect and resolution, point scatterer model, FFT
2. Electromagnetics of Radar (Chap. 2)
Radar range equation, electromagnetic scattering, numerical and asymptotic solutions, radar cross section, point scatterer model, antennas, propagation
3. Signal Processing of Radar (Chap. 3, 4, 5)
Matched filter, ambiguity function, linear FM waveform, pulse compression, binary phase coding, stepped frequency waveform, quadrature receiver, detection threshold
4. Radar Imaging (Chap. 6, 7)
Microwave imaging basics, synthetic aperture radar, chirp pulse waveform, SAR processing, inverse synthetic aperture radar, motion compensation
5. Other Types of Radars (dictated by time and class interests)
FMCW, pulse-Doppler, MTI, tracking, monopulse, microDoppler, IFSAR

POLICY ON SCHOLASTIC DISHONESTY

The University defines academic dishonesty as cheating, plagiarism, unauthorized collaboration, falsifying academic records, and any act designed to avoid participating honestly in the learning process. Scholastic dishonesty also includes, but is not limited to, providing false or misleading information to receive a postponement or an extension on a test, quiz, or other assignment, and submission of essentially the same written assignment for two courses without the prior permission of the instructor. By accepting this syllabus, you have agreed to these guidelines and must adhere to them. Scholastic dishonesty damages both the student's learning experience and readiness for the future demands of a work-career. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University.

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The Texas Education Code specifies that an institution of higher education shall excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

<http://www.utexas.edu/student/registrar/catalogs/gi03-04/ch4/ch4g.html#attendance>

STUDENTS WITH DISABILITIES

Please notify your instructor of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the Dean of Student's Office in order that the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities.

<http://www.utexas.edu/diversity/ddce/ssd>