

## ECE 4390 - Fall 2022

Radar and Electromagnetic Sensing



**Location:** Van Leer Bldg. C341

**Schedule:** T/Th 2:00-3:15p

**Textbook:** "Introduction to Radar Systems", M.I.Skolnik, McGraw-Hill, any edition.

**Reference Textbooks:** "Microwave Remote Sensing (Active and Passive)", Vol.I, F.T.Ulaby, R.K.Moore and A.K.Fung, Artech House Inc., any edition.

**Instructor:** [Prof. Manos M. Tentzeris](mailto:etentze@ece.gatech.edu)

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**Office Hours:** TBA

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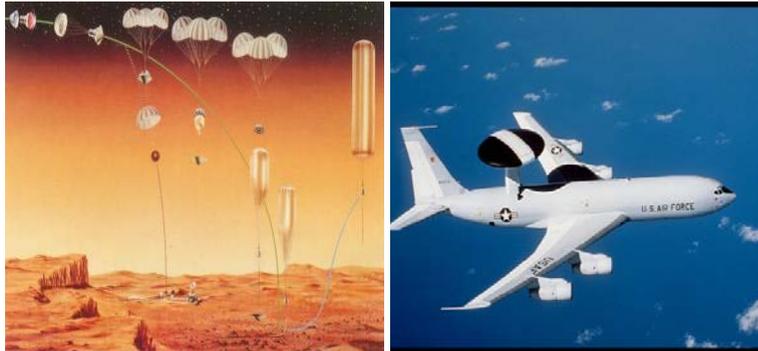
**Secretary:** Mrs. Monica Ross [[monica.ross@ece.gatech.edu](mailto:monica.ross@ece.gatech.edu)]

**Office:** TSRB 543

### Important Announcements

- All material will be posted on GT Canvas
- Holidays: Fall Break 10/18/22
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### Overview



- Radar Equation and Block Diagram
- Detection of Signals in Noise
- Probabilities of Detection and False Alarm
- Integration of Radar Pulses
- Radar Cross Section
- Moving Target Identification (MTI) Radar - AMTI
- Pulse Doppler Radar
- Tracking Radar
- Ambiguity Diagram - Pulse Compression
- Radar Clutter (Land, Sea, Weather)
- Propagation of Radar Waves (Scattering, refraction, absorption)
- Radar Antennas
- Radar Transceivers
- Radiometer - Remote Sensing Systems
- Wireless Sensing Systems and RFIDs

**Nanotechnology and Carbon-Based Sensors, Backscattering & IoT**

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**E-Mail List**

**ece4390a@lists.gatech.edu**

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**Lectures Material**

**All lectures will be posted online on GT Canvas.**

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**Homeworks**

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**Grading Policy**

\*\*\*\*\* **20% Homework** **20% QUIZ 1** **20% QUIZ 2** **40% Term Project**

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**Homework Policy**

Problems will be posted on Canvas and will be due by 11:59p on the assigned dates. Late Homework will not be accepted without justification.

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**Exams**

There will be in-class exams on September 27 and November 8.

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**Term Project**

In groups of 2 students, you will have to find information (block diagram, operation principles) and evaluate in terms of probabilities of false alarm and missed detection, power requirements, noise performance, clutter cancellation capability, antennas and RF components specs one practical radar system (e.g. Air-traffic control radar ASR-9, USAF E3 AWACS Aircraft Radar, AN/FPQ-6 Missile Precision Tracking Radar, AN/TPN-19 bad-weather aircraft landing radar) or group of practical radars (alternative systems for sea navigation radars, weather Doppler radars, sensor and RFID radars). The preliminary project 10' presentations (choice of application, evaluation criteria, preliminary bibliography) will take place the week of on 10/10-10/14/22 (10% of the total grade). The final project presentations (15') will take place the week of 11/28-12/2 (20% of the total grade). The 10-page project reports will be due by 12/17/22. (10% of the total work)

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