

# **ECE 784: Selected Topics in Microwave Systems: Microwave Remote Sensing**

Department of Electrical & Computer Engineering  
University of Massachusetts  
Spring 2023

This course provides an overview of theory and applications in microwave radiometry and radar including the concepts of blackbody radiation, emissivity, radiative transfer, emission, propagation, and scattering from natural media, and the theory and applications of microwave radiometer and radar systems for Earth remote sensing.

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office hours: by appointment.

## **Prerequisites:**

Basic EM analysis, plane waves, transmission lines, waveguides. Basic signal processing, probability theory, random signals and noise.

## **Required Text:**

None required.

## **Recommended Texts:** (pick one you like)

*Microwave Radar and Radiometric Remote Sensing*, F. T. Ulaby and D. G. Long, Artech House, 2015.

*Microwave Remote Sensing: Active and Passive, Volumes I,II*, F.T. Ulaby, R.K. Moore, and A.K. Fung, Artech House, 1981.

*Doppler Radar and Weather Observations*, R.J. Doviak and D.S. Zrnic, 2nd ed., Academic Press, 1993.

## **Grading:**

Midterm: 35%

Final: 35%

Homework/Project: 30%

Homework will be assigned periodically during lectures. Project will entail reviewing the literature on a particular topic in microwave remote sensing, writing a brief review paper, and giving an oral presentation.

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**Preliminary Schedule**

Week	Date	Topic
1	Feb 6	Organization, E-M Review
2	Feb 13	Thermal Radiation Laws, Emissivity
3	Feb 20	Microwave Emission from Surfaces
4	Feb 27	Total Power Radiometer
5	Mar 6	Radiative Transfer
	Mar 13	–Spring Break–
6	Mar 20	Microwave Scattering from Surfaces
7	Mar 27	Scatterometry
8	Apr 3	Altimetry
9	Apr 10	Synthetic Aperture Radar
10	Apr 17	Ocean Applications
11	Apr 24	Atmospheric Remote Sensing
12	May 3	Terrestrial Applications
13	May 10	Interferometry
14	May 17	Presentations
Final	TBD	Cumulative