Course Syllabus   Spring 2008

ECE/METR 5683: Weather Radar Applications

Instructor:	Prof. Phillip Chilson (chilson@ou.edu)
	Office: NWC 4618, 325-5095, Office Hours: 14:00-15:00 MW
	Feel free to come outside of office hours if my door is open
Time:	MWF, 15:00-15:50
Location:	NWC 5930

Required Text:	*Doppler Radar and Weather Observations, 2nd Ed,*
	R. J. Doviak and D. S. Zrnic, 1993

Recommended Text:	*Severe and Hazardous Weather, 2nd Ed,*
(for ECE students)	R. M. Rauber, J. E. Walsh, and D. J. Charlevoix, 2005

References:	*Radar Meteorology,* Henri Sauvageot, 1992
	Radar Observations of the Atmosphere, Louis J. Battan, 1973
	Radar Meteorology, S. Raghavan, 2003
	Weather Radar, Peter Meischner (Ed), 2004
	Radar in Meteorology, D. Atlas (Ed), 1990
	Radar and Atmospheric Science R. W. and R. C. Srivastava (Ed), 2003

Course Information

Overview: This course continues to build on the concepts that were presented in *Weather Radar Theory and Practice (ECE/METR 5673)*. A variety of methods will be presented to assist the student in identifying meteorological structures using weather radars, wind profilers, and the radar equation. An introduction to the interactions of electromagnetic waves in a geophysical medium will be given. In particular, scatter from hydrometeors and refractive index variations will be explored. The course presents quantitative precipation estimation methods based on the radar reflectivity factor, attenuation, and dual-polarization observations. Wind retrieval algorithms derived from weather radars and how they can be used in the interpreation of severe weather will be discussed. Additionally, students will be introduced to the treatment of clear-air echoes and the retrieval of winds under non-precipating conditions. Throughout the course, emphasis will be placed on the implementation of processing algorithms using actual Doppler radar data.

Class Homepage
The class home page will be administered through Desire2Learn
    https://learn.ou.edu/
Materials and announcements will be posted on the **combined page**
    ECE/METR 5683 SP08 – WEATHER RADAR APPS

It is important that you check the web page regularly for new class material, postings, and other course related information.

Course Content (subject to change)

Background and Review
Including: *complex index of refraction, radio wave attenuation,*
backscattering cross-sections, Mie and Rayleigh scatter

Precipitation Measurements
Including: *impact of microphysics, particle size distributions,*
reflectivity factor, Z-R relationships, non-Rayleigh signatures

Radar Polarimetry
Including: *fundamental principles, quantification of cloud/precipitation,*
retrieval of rain drop size distributions, hydrometeor classification

Wind Measurements with Doppler Radar
Including: *Patterns in the Doppler velocity field,*
Velocity azimuth display, dual Doppler measurements

Higher-Level Radar Products
Including: *azimuthal shear and rotational divergence computation, velocity dealising,*
beam-blockage computation, super-cell identification

Observations of Severe Weather
Including: *identification of cloud systems, convective and mesoscale processes,*
impact of deep convection and thunderstorms, lightning

Clear-Air Radar Techniques
Including: *Bragg scattering mechanisms, planetary boundary layer applications,*
interferometry and imaging, radio acoustic sounding systems

Assignments

Homework: During the course of the semester, there will be three to four calculation-based homework assignments. For each assigned problem, students will be asked to include numerical solutions along with a short write up, in which the results are discussed.

Modules: Three to four programming-based assignments or modules will be assigned. These modules will focus on real-world applications and require data analysis completed using MATLAB. For each module students will be asked to process the data, present and explain results, and provide any code used during the exercise.

Project: In addition to the homework and modules, students will complete a research project of their choosing and make an oral presentation during the end of the semester. A self-contained written report with references will be part of the project. More description of the project to be provided during the semester.

Grading

Homework and Modules:	25%
Project:	25%
Midterm-Examination:	25%
Comprehensive Final Examination:	25%

Policies / Administrative

Assignments: No late assignments will be accepted.

Pre-Finals Week: Note that a final homework or laboratory assignment may be due during Pre-Finals Week.

Examinations: If you cannot be present for an examination, it is YOUR responsibility to make other arrangements before the examination. Otherwise, the missed test cannot be retaken.

Academic Honesty: Homework assignments are important for your understanding of the material. Occasional help from a classmate is fine but be sure that you actually understand the material. It will help tremendously for you to come visit me in my office hours. Realize that simply copying a homework assignment from any source is considered cheating and will definitely not help your understanding. If caught, such activity could result in a failing grade in the course and possible disciplinary action. You are responsible for knowing the University of Oklahoma Student Code which can be obtained at `http://www.ou.edu/studentcode/`. Each assignment for this class must be accompanied by the following signed statement:

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STATEMENT OF ACADEMIC INTEGRITY
On my honor I affirm that I have neither given nor received inappropriate aid in the completion of this exercise (homework, quiz, examination, laboratory report, etc.).

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Signature: _____ Date: _____

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Reasonable Accommodation Policy: The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Those having such a need are requested to speak with Prof. Chilson as early in the semester as possible. Students with disabilities also must be registered with the Office of Disability Services (ODS) prior to receiving accommodations in this course. You may contact the ODS at Goddard Health Center, Suite 166, phone 405-325-3852 or TTD only at 405-325-4173.

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