Department of Atmospheric Sciences

COURSE ANNOUNCEMENT – SEMESTER I – 2006– 2007

ATMS 410: Radar Meteorology

Call number:	39848
Instructor:	Prof. Bob Rauber, 210 Atmospheric Science Bldg., 333-2835
E-mail:	r-rauber@uiuc.edu
Room and Time:	109 Atmospheric Science Bldg.; 10:00 – 1050 a.m. M W F
Credit:	4 hours
Prerequisites:	ATMS 300 or consent of instructor

This course introduces the student to basic principles of radar and its use in meteorology. The student is first introduced to fundamental principles of weather radar, radar design and operation. Principles of Doppler radar are introduced, followed by discussions of Doppler signals from distributed (weather) targets and signal processing techniques. A section of the course is devoted to topics concerned with data interpretation, such as aliasing, signal attenuation, the effects of sidelobes and clear air echoes. Polarization techniques and applications are discussed. Data post-processing techniques are covered including single, dual and triple Doppler wind field analysis. A section of the course is dedicated to observations of meteorological phenomenon, such as severe thunderstorms, and wind shear. The use of radar in precipitation measurements, and in cloud physics research is included. The students will have the opportunity to perform analyses of archived datasets, will observe current National Weather Service (NWS) radar data available in the Department of Atmospheric Sciences weather laboratory, and will visit an NWS Weather Service Forecast Office to see new WSR-88D (NEXRAD) Doppler radar in operation.

Course Content:

1. Weather radar principles: Pulse radar system design, characteristics of the transmitted and received signals, radar displays, precipitation echoes, radar equations for solitary and distributed targets, relationship of the radar signal to meteorological quantities, attenuation.
2. Doppler radar: the Doppler shift, principles of Doppler radar operation, system con-figurations, measurement of echo phase, aliasing and ambiguity problems, Doppler spectra and relationship to echo fluctuations, relationship of Doppler spectra to reflectivity and radial velocity fields, spectral width, shear and turbulence.
3. Signal post-processing: Measurement of wind and derivatives of the wind field, analysis of vertically pointing measurements, dual and triple Doppler processing techniques, airborne Doppler, field program design, thermodynamic retrieval techniques.
4. Weather observations: radar measurements within thunderstorms, tornados, cyclones, hurricanes. Wind shear detection.
5. Multiparameter measurements: Differential reflectivity, circular depolarization ratio, applications in meteorological research.

Text: Course notes will be provided by instructor.