Syllabus
ATMS 410
Radar Meteorology
Fall 2008

Instructor: Asst. Prof. Steve Nesbitt (ASB 203, 244-3740, snesbitt@illinois.edu)
Schedule: MWF 10:00-10:50 am, ASB 109
Office Hours: Mondays, Wednesdays: 1:30-3 pm
Course Website: http://www.atmos.uiuc.edu/~snesbitt/ATMS410

Description
This class will cover many facets of the topic of radar meteorology, including basic principles, radar systems, Doppler radar, weather radar interpretation, polarimetric radar, and spaceborne radar. The class time will be a combination of formal lectures and lab/discussion sections, and there will be several homework exercises and a case study project. *You are requested to read the lecture notes and relevant reading material prior to class.*

Course materials
There is no required text for this class. The lecture notes and provided electronic materials will encompass the "textbook." The lecture notes will be provided on the class web page listed above in Powerpoint and pdf format. Supplementary written material will be available in pdf format on the class web page. I ask that you read the lecture notes and supplementary material prior to the lecture it is presented. I have included a list of suggested textbooks if you are interested in additional material.

Important note: The course materials are a collection of notes and written materials that are a combination of materials assembled by Prof. Rauber and myself. We give you permission to use and keep these materials for your reference, but please do not distribute them.

Course requirements
You will need access to a computer with MATLAB installed on it. Most ATMOS computers (including the 1st floor lab) have MATLAB installed, but if you want to use MATLAB on your personal computer you will need to install it yourself if you have not done so already. Free copies can be downloaded for Windows, Mac, or linux from the CITES Software WebStore. You can this version of MATLAB on your machine it as long as you are connected to the campus network or off campus via the CITES VPN. If you need help either contact me or the CITES help desk.

Grading
Grading will be based on six homework assignments, a case study analysis and written report, a midterm exam, and a final exam. The homework projects will be a mixture of software based analyses and basic "pencil and paper" problems. Homework will be due

approximately two weeks after assignment. Late homework will be deducted 5% per day.

Homework assignments will be worth 40% of the final grade. The midterm and final exams will be worth 20% each. The remaining 20% will be based on the case study grade. The case study will involve analysis of a flash flood in Colorado observed by polarimetric radar, and it will be a mixture of computer analyses and a written report (~10 p. double spaced plus figures). More details on the case study will be provided in November when it is assigned.

Letter grading for the course will be assigned based on the following numerical grading system:

A+	96.67	%	-	100.00 %
A	93.33	%	-	96.67 %
A-	90.00	%	-	93.33 %
B+	86.67	%	-	90.00 %
B	83.33	%	-	86.67 %
B-	80.00	%	-	83.33 %
C+	76.67	%	-	80.00 %
C	73.33	%	-	76.67 %
C-	70.00	%	-	73.33 %
D+	66.67	%	-	70.00 %
D	63.33	%	-	66.67 %
D-	60.00	%	-	63.33 %
F	0.00 %	-		60.00 %

Suggested References (in no particular order)

http://ams.allenpress.com - Link to AMS journals

Battan (1973), *Radar Observation of the Atmosphere* – out of print but used copies can be found on the web

Bringi and Chandrasekar (2001), *Polarimetric Doppler Weather Radar*, Cambridge Press – very detailed text on polarimetric techniques (I have this if you want to borrow it)

Doviak and Zrnic (1984, 1993), *Doppler Radar and Weather Observations*, Academic Press – good overview text, but out of date

Atlas (1990), *Radar in Meteorology*, AMS (Battan Memorial volume)

Reinhart (2004), *Radar for Meteorologists*, Reinhart Publications – An introductory text in radar meteorology – lots of good examples and description but not very mathematically rigorous

Radar and Atmospheric Science: A Collection of Essays in Honor of David Atlas (2003), AMS – a collection of essays and summary papers (I have this if you want to borrow it)

Course Outline

8/25, 27 Introduction and syllabus, Chapter 1: Course Introduction ppt pdf

8/29, 9/3 Chapter 2: EM theory and radar beam propagation ppt pdf

9/5 Using MATLAB, HW#1

9/8, 10 Chapter 3: Radar characteristics ppt pdf

9/12, 15 Chapter 4: Radar displays ppt pdf

9/17 Radar resources on the web and in the department, HW #2

9/19, 22 Chapter 5: Radar equation ppt pdf

9/24 Chapter 6: Radar equation for weather radars pdf ppt

9/26 Using MATLAB II, HW#3

9/29, 10/1 no class (Washington, DC)

10/3, 6 Chapter 7: The relationship of Z to other quantities pdf ppt

10/8 Using MATLAB III, HW#4

10/13 Mid-term exam

10/15, 17, 20, 22, 24 no lecture (China)

10/27, 29 Chapter 8: Doppler radar pdf ppt

10/31 CSU-CHILL Radar virtual tour (with your host Pat Kennedy)

11/3, 5 Chapter 9: Doppler velocity patterns pdf ppt

11/7 Chapter 10: Severe weather from a Doppler radar perspective pdf ppt, HW#5

11/10 Chapter 11: Velocity Azimuth Display pdf ppt

11/12, 14 Chapters 12 and 13: Single and Dual Doppler recovery of winds pdf ppt

11/17 Chapter 13: Single Doppler recovery of winds pdf ppt

11/19, 21 Chapter 15: Polarization radars pdf ppt, Assignment of Case study using Polarization radar

11/24, 26, 28 Thanksgiving break

12/3, 5 Spaceborne precipitation and cloud radars pdf ppt, HW#6

12/8 Application of radar to lake effect snow pdf ppt

12/10 Thermodynamic retrievals pdf ppt

Final Exam (8:00-11:00 AM, Friday, December 19)