

Course Syllabus

Course name: Radar Meteorology

Course number: AT741

Instructor: Prof. Steven Rutledge, 307 ATS, 970 491 8283. Instructor web page: radarmet.atmos.colostate.edu

Office hours: Tuesday's, 12:30 – 1:30 PM

Classroom and meeting time: 212 ACRC, 11:00 AM – 12:15 PM, Tue-Thur

Prerequisites: AT652, or permission of instructor

Course goals and Objectives: AT741 is designed to provide a foundational understanding of radar meteorology. Topics presented include microwave scattering theory, Doppler principles, polarimetric radar, dual-wavelength radar, mm-wave radars with applications. The course also provides information on the theory of radar including engineering principles. The objective of the course is to provide the student with a working knowledge of radar meteorology including applications to remote sensing of clouds and precipitation.

Textbook: None

Course readings: As recommended during the semester, also see course web page.

Course web site: radarmet.atmos.colostate.edu/AT741

Login: radar

Password: blizzard

Course calendar: Follows CSU course calendar

Expectations: Regular attendance is strongly recommended. Read the class notes in advance of class.

Statement on academic dishonesty: This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (<http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf>) and the Student Conduct Code (<http://www.conflictresolution.colostate.edu/conduct-code>) At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

Exam schedule: There are no examinations. Course grading is based on homework assignments.

Grading policy: Course grading is based on several homework assignments, in class student presentations of key papers, and a final project (oral and written).

Contact hours: At least two hours of effort are expected to complete readings and homework assignments outside of class for each hour of class time.

TA information: Brody Fuchs.

Suggested references:

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

Battan (1973), *Radar Observation of the Atmosphere*

Bringi and Chandrasekar (2001), *Polarimetric Doppler Weather Radar*, Cambridge Press

Doviak and Zrnich (1984, 1993), *Doppler Radar and Weather Observations*, Academic Press

Skolnik (1980), *Radar Systems*, McGraw Hill

Course content:

SECTION 1 – (*Basics and Scattering*)

Course introduction, history and basic principles of radar meteorology. Electromagnetic waves. Principles of dielectrics. Basic antenna and scanning principles

Ray paths. Scattering by spherical hydrometeors. Scattering by non-spherical and melting hydrometeors, and by lightning.

SECTION 2 – (*Radar Systems and Data*)

System hardware. Signal processing. Meteorological Fields (Doppler). Meteorological Fields (Polarimetric).

SECTION 3 – (*Doppler Radar*)

Doppler spectra. Doppler signatures. Single Doppler retrievals. Multiple Doppler retrievals.

SECTION 4 – (*Multiparameter Radar*)

Polarimetric retrievals in rain. Polarimetric retrievals in ice/mixed-phase. Data QC, hydrometeor ID, rainfall algorithms.

SECTION 5

Spaceborne radar topics, TRMM, CloudSat, GPM. Ship-based radars.