

ATS 724
Cloud Microphysics
Spring 2017

Course Objectives:

- To expose students to cloud microphysical processes at a more advanced level than is presented in ATS620;
- To address how these cloud processes are represented in a variety of parameterization schemes and numerical models; and
- To provide students with practical experience in the design and development of microphysical parameterization schemes by requiring them to build and work with simple models utilizing several different parameterization approaches.

Instructor:

Professor Susan C. van den Heever
Room 425
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Graduate Teaching Assistant

Leah Grant
Room 427
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Office Hours: Tuesday 9:30 – 10:30 am

Meeting Times:

Mondays and Wednesdays: 10-10:50 AM, 212B ACRC

Prerequisites:

- ATS620
- PhD level, or MS level with written consent of the instructor
- A working knowledge of Fortran and Linux, as the course will involve building and working with simple cloud microphysical models.

Texts / Outside Reading:

There is no required text for this class.

Course notes will be distributed for the class via the website:

<http://vandenheever.atmos.colostate.edu/vdhpage/ats724/ats724.php>

Username is 724notes. The password will be distributed in class.

Course Description:

This class will combine an advanced theoretical analysis of cloud processes with a practical approach to representing these processes through student-designed and -built cloud models. The cloud processes that will be examined include nucleation, condensation, collision and coalescence, and precipitation processes, for liquid cloud systems. Feedbacks between these microphysical processes and cloud dynamics will also be examined, as will the role of entrainment. Bin and bulk approaches to the parameterization of microphysical processes in cloud models will be presented. Students will explore parameterization schemes in more detail through appropriately constructed homework assignments.

Course Structure, Expectations, and Grading Criteria:

- Course material will be delivered in a lecture format, meeting for two 50-minute periods each week as indicated above. Lectures (.pptx or .pdf format) are posted on the class website. At least 4 hours of effort (2 hours per each hour of class time) outside of class each week are expected to complete readings and homework assignments.
- Regular homework is assigned and is due at the start of the class indicated. No late homework assignments will be accepted without prior approval by the instructor.
- There are no exams in this course.
- Each student is to prepare an oral presentation on the final homework assignment. The last homework assignment will be more extensive than the previous homework assignments, and will provide the student some freedom to explore the sensitivity to various parameters and / or microphysical schemes within the numerical models being used this semester. The results of these sensitivity tests should form the basis of the oral presentation.

Final grades are weighted as follows:

Homework: 80% Presentation: 20%

Academic Integrity:

This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (<http://www.catalog.colostate.edu/Content/files/2012/FrontPDF/1.6POLICIES.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.

Special Needs:

Please see the instructor during the first two weeks of the semester, if you have special learning needs that should be accommodated in this class, and refer to <http://rds.colostate.edu/csuinto/accommodations.asp> for more information.