Instructor: Dr. Cameron Homeyer  
Office: NWC 5632  
Email: chomeyer@ou.edu  
Phone: (405) 325-5303  
Office Hours: Every Wednesday from 1 to 3 PM (or by appointment)  
Learning Management System (Canvas): http://canvas.ou.edu

Course Meeting Time and Location:  
Lecture: MWF 12:00-12:50 PM in NWC 5930  
Exam 1: Friday, September 29, 12:00-12:50 PM (NWC 5930)  
Exam 2: Friday, November 3, 12:00-12:50 PM (NWC 5930)  
Final Exam: Wednesday, December 13, 1:30 – 3:30 PM (NWC 5930)

Course Prerequisites:  
Undergraduate level Atmospheric Physics & Ordinary Differential Equations.

Course Description:  
The goal of this course is to develop an understanding of clouds and precipitation from the macroscale to the microscale. The course will start with a short introduction to clouds and precipitation and a review of basic thermodynamics. Following the introduction, the material will gradually transition into microphysical properties of clouds including the formation, growth, and thermodynamic interactions of cloud and precipitation particles. The remainder of the course will be dedicated toward common applications of the cloud physics framework for historical and modern research. Important themes will be polarimetric radar observation of clouds, cloud microphysics parameterization in numerical models, cloud electrification, and interactions between clouds and atmospheric chemistry. A tentative weekly outline of the course is provided below.

Course Goals:  
My goals for this course are to develop your understanding of cloud & precipitation physics and to provide valuable experience in graduate-level atmospheric research. The traditional lecture format will provide you with the material necessary to attain a communicable understanding of the science, and the assignments will allow you to gain useful experience and skills needed to be a successful researcher.

Learning Outcomes:  
Upon completion of the course, I expect you to be able to:  
- communicate theoretical and applied topics of cloud and precipitation physics with others  
- compare and contrast microphysical processes operating in a given cloud/environment  
- analyze datasets and identify distinct/implicative characteristics that confirm theoretical understanding of cloud microphysics or identify areas for improvement
Texts and Materials:
There is no required textbook for this course. There are many textbooks and journal articles that I use to develop lecture materials, but they all have strengths and weaknesses. Here is a list of some of the references I may use in the class:

- Lamb and Verlinde: Physics and Chemistry of Clouds, 1st ed., Cambridge Univ. Press
- Pruppacher & Klett: Microphysics of Clouds and Precipitation, 2nd ed., Springer
  *digital copy available for free through OU library: http://libraries.ou.edu
- Rogers and Yau: A Short Course in Cloud Physics, 3rd ed., Elsevier
- Wallace and Hobbs: Atmospheric Science; an introductory survey, 2nd ed., Elsevier
- Wang: Physics and Dynamics of Clouds and Precipitation, 1st ed., Cambridge Univ. Press

Teaching Philosophy:
Studies have shown that traditional lecture involving hand-written notes is the most effective form for developing memory recall of a learned subject, so the majority of our lecture time will be dedicated to this teaching style. However, my personal style is to encourage active discussion of the material in class. I will ask questions and I also expect you to ask questions, no matter how simple you think they are. The discussion aspect is critical to developing a communicable knowledge of the material, which is an expected learning outcome of the course.

Expectations:
During lecture, I expect you to be respectful to everyone. Please silence your cell phones, limit personal conversation, and take an active role in lecture. Notes may only be taken by hand (no laptops), unless you have a documented need for accommodation. **If your cell phone rings during lecture, you are required to provide cookies for the entire class during the next lecture period!**

In addition to office hours, I am generally available for discussion of lecture material and assignments in the hour following each day’s lecture. I am also available by email at any time (excluding vacation) and will make every attempt to respond to emails within 24 hours on weekdays and 48 hours on weekends. For course assignments and exams, grades can be expected within 1 week of completion.

Final Grade:
Your final cumulative grade in this course will be a weighted average of the following assessments:

- Homework & Quizzes 25%
- Exam 1 25%
- Exam 2 25%
- Final Project 25%

Percentage grades will correspond to letter grades as: **A (>90%), B (>80%), C (>70%), D (>60%).** Final grades may be curved if the distribution does not conform to the percentage lines above.

*We will meet during the final exam time period to play Cloud & Precipitation Physics Jeopardy!. The class will be split up into 3 teams and members of the winning team will receive a special prize.*
Course Policies

**Absences & Make-up Policy**

Students with excused absences (University/academic commitment, health/family issue, jury duty, etc.) may attain electronic copies of the lecture notes from me for the day of their absence. If an excused absence falls on an exam day or due date for an assignment, please contact me as soon as possible to arrange acceptable accommodations for making up missed work.

**Late Assignments**

Late submission of course assignments will not be accepted unless related to an excused absence. Unless otherwise noted, all assignments are due by 5 pm on the provided date.

University Policies

**Academic Integrity**

Academic integrity is expected of all students enrolled at the University of Oklahoma and in this class. Please visit [http://integrity.ou.edu](http://integrity.ou.edu) for a student’s guide to academic integrity and the OU code. Violations of the code (defined as “any act that improperly affects the evaluation of a student's academic performance or achievement”) will not be tolerated.

**Religious Observance**

It is the policy of the University to excise the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

**Reasonable Accommodation Policy**

The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or fax only 405/325-4173.

**Adjustments for Pregnancy/Childbirth Related Issues**

Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see [www.ou.edu/content/eoo/faqs/pregnancy-faqs.html](http://www.ou.edu/content/eoo/faqs/pregnancy-faqs.html) for commonly asked questions.

**Title IX Resources**

For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24.7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5, M-F) or OU Advocates 405-615-0013 (24.7) to learn more or to report an incident.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic(s)</th>
<th>Notes/Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (8/21-8/25)</td>
<td>Intro. &amp; Basic Thermodynamics Cloud Macrophysics</td>
<td>HW1</td>
</tr>
<tr>
<td>2 (8/28-9/1)</td>
<td>Cloud Macrophysics Cloud Microphysics</td>
<td>HW2; Fill-in Instructor</td>
</tr>
<tr>
<td>3 (9/4-9/8)</td>
<td>Droplet Nucleation</td>
<td>Labor Day (no class 9/5)</td>
</tr>
<tr>
<td>4 (9/11-9/15)</td>
<td>Ice Particle Nucleation Vapor Growth of Cloud Particles</td>
<td>HW3</td>
</tr>
<tr>
<td>5 (9/18-9/22)</td>
<td>Vapor Growth of Cloud Particles Collection Growth of Cloud Particles</td>
<td></td>
</tr>
<tr>
<td>6 (9/25-9/29)</td>
<td>Collection Growth of Cloud Particles</td>
<td>Exam 1 (9/29)</td>
</tr>
<tr>
<td>7 (10/2-10/6)</td>
<td>Collection Growth Cloud Systems (Collective Work of Thermodynamical and Microphysical Processes)</td>
<td>HW4</td>
</tr>
<tr>
<td>8 (10/9-10/13)</td>
<td>Cloud Systems</td>
<td>HW5</td>
</tr>
<tr>
<td>9 (10/16-10/20)</td>
<td>Cloud Systems</td>
<td>Fill-in Instructor (10/18)</td>
</tr>
<tr>
<td>10 (10/23-10/27)</td>
<td>Microphysics Summary C&amp;P Physics with Radar</td>
<td>Quiz 1; Fill-in Instructor (10/23 &amp; 10/25)</td>
</tr>
<tr>
<td>11 (10/30-11/3)</td>
<td>Radar</td>
<td>Exam 2 (11/3) Final Project Handout</td>
</tr>
<tr>
<td>12 (11/6-11/10)</td>
<td>Radar</td>
<td>Quiz 2</td>
</tr>
<tr>
<td>15 (11/27-12/1)</td>
<td>Numerical Modeling Cloud Electrification</td>
<td>Quiz 3</td>
</tr>
<tr>
<td>16 (12/4-12/8)</td>
<td>Clouds &amp; Chemistry</td>
<td></td>
</tr>
<tr>
<td>Final (12/13)</td>
<td>C&amp;P Physics Jeopardy!</td>
<td>1:30-3:30 PM; Subject to change.</td>
</tr>
</tbody>
</table>