

PHY 345

THE PHYSICS OF CLOUDS AND CLIMATE

TUESDAYS AND FRIDAYS, XX AM IN SCP-121

DR. NATHAN MAGEE

OFFICE: SCP-112

EMAIL ADDRESS: MAGEE@TCNJ.EDU

OFFICE HOURS: XX PM & TU/FR XXPM, AND BY APPOINTMENT

REQUIRED TEXTS

- 1) *The Physics and Chemistry of Clouds*. D. Lamb and J. Verlinde. Cambridge Univ. Press, 2011. ISBN: 9780521899109
- 2) *The Climate Crisis*. Archer and Rahmstorf. Cambridge Univ. Press, 2010. ISBN: 9780521732550
- 3) *The Cloudspotter's Guide*. G. Pretor-Pinney. Penguin USA, 2007. ISBN: 9780399533457

COURSE DESCRIPTION

This is a course in the physics of water and ice, physical meteorology, and its application to current knowledge in the science of climate change. The course takes an interactive approach to understanding clouds and radiation in the atmosphere, including collaborative problem solving, topical literature review and writing, tutorials on state-of-the art weather forecasting software, 3D visualizations, and several laboratory and field exercises. The course will satisfy the mid-level writing requirement.

COURSE REQUIREMENTS AND STRUCTURE

Assignments: Readings, Problem Sets, and Review papers

- Reading will be assigned to be completed prior to each class. Comprehension of this reading will be necessary to actively participate in class.
- 5 problem sets will be assigned over the semester and will consist of questions and problems drawn from the texts as well as other sources. We will reserve some time during class to work on problem-solving, but much of the work will need to be completed outside of class. The problem sets are an essential tool for learning and should be done carefully. Late submissions will not be accepted without prior approval. Problem sets will be graded for completeness and select problems will be assessed for correct solutions.
- You will be asked to conduct two review writing projects during the course of the semester on relevant topics of your choosing. Each review project requires a paper of approximately 10 pages length, based on a current literature review of the given topic.

Exams: 2 major exams and a comprehensive final exam.

Two exams will be held during the semester and a comprehensive final exam will conclude the course. Each exam will require understanding of lecture material, assigned problems, and lab exercises.

Classroom lectures and discussions:

The classroom time will be devoted to lectures, discussions, and problem solving which follow text material. Please do not hesitate to ask questions during class. Your presence and active participation in the classroom is important for developing a positive learning experience for all students in the course. Your classroom participation does contribute to your course grade (see below) and will be evaluated based on your involvement in class discussions and your contribution to group exercises in the lab.

SCHEDULE

An updated schedule of exams, and assignments, dues dates is available on SOCS. Please let me know by email if you have questions about the schedule. The schedule below is preliminary and likely to change.

<i>Week #</i>	<i>Tuesday</i>	<i>Friday</i>
<i>Week 1: Chapter 1 & 2, Lamb The Atmospheric Setting</i>	<i>1/17</i>	<i>1/20</i>
<i>Week 2: Chapter 2 &3, Lamb The liquid and solid phases of water</i>	<i>1/24</i>	<i>1/27</i>
<i>Week 3: Chapter 3 &4, Lamb Atmospheric Thermodynamics & Equilibria</i>	<i>1/31 PS 1 due</i>	<i>2/3 Review Paper 1 prop. due</i>
<i>Week 4: Chapter 5&6, Lamb Cloud Thermodynamics and formation</i>	<i>2/7</i>	<i>2/10</i>
<i>Week 5: Chapter 5&6, Lamb Cloud Thermodynamics and formation</i>	<i>2/14</i>	<i>2/17 Paper 1 draft due/peer reviews begun Trip: ?NWS Tour?</i>
<i>Week 6: Chapter 7-9, Lamb Condensed Phase Cloud Microphysics</i>	<i>2/21</i>	<i>2/24 PS 2 due, my paper review returned, peer review meetings</i>
<i>Week 7: Chapter 7-9, Lamb Condensed Phase Cloud Microphysics</i>	<i>2/28 Exam I</i>	<i>3/2 Paper 1 final due</i>
<i>Week 8: Spring Break-- Read & Write!</i>	<i>3/6 No Class, Spring Break</i>	<i>3/9 Spring Break</i>
<i>Week 9: Chapter 7-9, Lamb Cloud Microphysics</i>	<i>3/13 CloudSpotter's Guide: quiz & discussion</i>	<i>3/16 Paper 2 prop. due, ?RadioSonde launch?</i>
<i>Week10: Ch 1 & 2, Archer Paleoclimate and Energy Budgets</i>	<i>3/20 PS 3 due</i>	<i>3/23</i>
<i>Week11: Ch 2 & 3, Archer Energy Budget & Present Change</i>	<i>3/27</i>	<i>3/30 Paper2 draft due, peer reviews begun</i>
<i>Week 12: Ch.4 & 5, Archer Clouds, Snow, Ice, and Oceans</i>	<i>4/3</i>	<i>4/6 PS 4 due</i>
<i>Week 13: Ch. 6 & 7, Archer Future climate change</i>	<i>4/10 Exam II</i>	<i>4/13 my paper 2 review returned peer review meetings</i>
<i>Week 14: Ch. 7 & 8, Archer Future climate change & Impacts</i>	<i>4/17</i>	<i>4/20 PS 5 due</i>
<i>Week 15: Ch. 9-10 Climate change mitigation and policy</i>	<i>4/24</i>	<i>4/27 no Fri. Class last week Paper 2 final due</i>
<i>Exam Week, Final Exam</i>	<i>Date TBA (4/30 -5/4)</i>	

GRADING

50% midterm exams and final (exam 1: 15%; exam 2: 15%; final exam: 20%)

20% Problem Sets

20% Review Papers

5% Cloudspotter's Guide discussion & quiz

5% Classroom participation

Final course grades are based on the following scale, composite scores rounded to the nearest whole %

No curve or extra credit will be used for grading.

93-100	A	78-79	C+
90-92	A-	73-77	C
88-89	B+	70-72	C-
83-87	B	60-69	D
80-82	B-	00-59	F

SELECTED TCNJ POLICIES

TCNJ's final examination policy is available on the web:

<http://www.tcnj.edu/~academic/policy/finalevaluations.htm>

Attendance

Every student is expected to participate in each of his/her courses through regular attendance at lecture and laboratory sessions. It is further expected that every student will be present, on time, and prepared to participate when scheduled class sessions begin. At the first class meeting of a semester, instructors are expected to distribute in writing the attendance policies which apply to their courses. While attendance itself is not used as a criterion for academic evaluations, grading is frequently based on participation in class discussion, laboratory work, performance, studio practice, field experience, or other activities which may take place during class sessions. If these areas for evaluation make class attendance essential, the student may be penalized for failure to perform satisfactorily in the required activities. Students who must miss classes due to participation in a field trip, athletic event, or other official college function should arrange with their instructors for such class absences well in advance. The Office of Academic Affairs will verify, upon request, the dates of and participation in such college functions. In every instance, however, the student has the responsibility to initiate arrangements for make-up work.

TCNJ's full attendance policy is available on the web:

<http://www.tcnj.edu/~recreg/policies/attendance.html>

Academic Integrity Policy

Academic dishonesty is any attempt by the student to gain academic advantage through dishonest means, to submit, as his or her own, work which has not been done by him/her or to give improper aid to another student in the completion of an assignment. Such dishonesty would include, but is not limited to: submitting as his/her own a project, paper, report, test, or speech copied from, partially copied, or paraphrased from the work of another (whether the source is printed, under copyright, or in manuscript form). Credit must be given for words quoted or paraphrased. The rules apply to any academic dishonesty, whether the work is graded or ungraded, group or individual, written or oral.

TCNJ's academic integrity policy is available on the web:

<http://www.tcnj.edu/~academic/policy/integrity.html>.

Americans with Disabilities Act (ADA) Policy

Any student who has a documented disability and is in need of academic accommodations should notify the professor of this course and contact the Office of Differing Abilities Services (609-771-2571). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992.

TCNJ's Americans with Disabilities Act (ADA) policy is available on the web:

<http://www.tcnj.edu/~affirm/ada.html> .