Atmospheric Radiation - Fall 2009

ATM F613/F413 F01 Atmospheric Radiation (3)

Atmospheric radiation including the fundamentals of blackbody radiation theory and radiative properties of atmospheric constituents. Discussion of gaseous absorption including line absorption, broadening effects and radiative transfer. Includes scattering, radiative properties of clouds, and radiation climatology.

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Class: Tuesday and Thursday, 2 pm – 3:30pm, NSCI 207

Office Hours: Monday 3pm – 5pm 319 Akasofu, or by appointment.

Recommended Texts on Reserve at Mather Library and Chapters in eRes:

Radiative processes in meteorology and climatology
Paltridge, G. W., and C. M. R. Platt, Elsevier Scientific Pub. Co., 1976. ISBN: 0444414444

Fundamentals of atmospheric radiation: an introduction with 400 problems
Bohren, C. F., and E. E. Clothiaux, Wiley-VCH,2006. ISBN: 3527405038

An introduction to atmospheric radiation
Liou, K.-N., Academic Press, 2002. ISBN: 0124514510

A first course in atmospheric radiation
Petty, G. W., Sundog Pub., 2004. ISBN: 0972903305

Description

This course meets core requirements for Atmospheric Science M.S. and Ph.D. degrees. However, interested students from other areas of science and engineering are welcome. Course will follow elements from recommended text and review articles. Grades will be based on homework, exams and a term paper-project. This class focuses on the fundamental study and quantitative measurement of the interactions of solar and terrestrial radiation with molecules, aerosols and cloud particles in planetary atmospheres. The goal of the course is to give students a foundation in the principles of atmospheric radiation. Lectures will include material not found in the texts. Where possible we will try to explore concepts from a data driven perspective. The topics to be covered include;

1. Introduction and overview of Earth's radiation budget and balance
2. Principles and practices of describing radiation
3. The Sun and solar radiation.
4. Long-wave radiation
5. Radiative Transfer
6. Aerosols and clouds
7. Radiation and observed atmospheric thermal structure

Students completing the course should have an understanding of the key concepts in the interaction of radiation with the atmosphere. They should have developed a foundation for research in atmospheric sciences, geography, environmental sciences and remote sensing.

The instructor will work with the UAF Center for Health and Counseling's Disability Services Program (http://www.uaf.edu/chc/disability.html) to accommodate students with disabilities.

Grading

The class grade will be based on (near) weekly quizzes and homework, two term exams, a term paper-project, and participation as follows;

Homework	35%
Exams I and II	30%
Term Paper-Project	30%
Participation	5%

Grades will be assigned in accordance with university policy http://www.uaf.edu/catalog/catalog_09-10/academics/regs1.html. A student who scores greater than 90% on their submitted body of work is guaranteed an A. A student who scores greater than 75% on their submitted body of work is guaranteed a B. A student who scores greater than 60% on their submitted body of work is guaranteed a C. A student who scores greater than 50% on their submitted body of work is guaranteed a D.

Homework

Homework problems will be assigned bi-weekly and must be turned in on or before the stated deadline. No late homework will be accepted without a suitable excuse. You are encouraged to work independently in study groups. The work you hand in should be your own effort (not merely a copy of another student's work). You are welcome to use the scheduled office hours for tutorial assistance with the homework. If you have questions about a homework problem outside of office hours, contact the instructor by e-mail. Homework assignments are expected to be neat and legible. Students are expected to complete the reading assignments.

Exams

There will be two term exams. The term exams will last 90 minutes. Students may refer to a single double-sided cheat-sheet in each of the term exams.

Term Paper-Project

There will be a term paper-project required of each student based on a topic selected by the student. The paper should be present a review of several (minimum of four) while the project can present a smaller number of research articles and conduct an analysis The preparation of the term paper will be staged over the semester. An outline (~1 page) outlining the topic to be addressed, with list of possible papers, is due in October. A detailed outline citing the references to be used and giving a brief description of each paper and/or method is due in November. The instructor requires each student to meet with the instructor to discuss the paper project. The final paper-project report is due on the last class. Each student is required to make a PowerPoint® presentation with handout (15 min presentation, with 5 min for discussion) to the class. The grade for the paper-project will be based on both the paper and the presentation. Class members and the instructor will complete evaluation sheets for each presentation, and the grade for the presentation will be based on both the peer and instructor evaluations. Attendance and participation is mandatory in order to pass the class.

Participation

Participation is based on regular attendance, submitting a full body of work (i.e., attempting all homework assignments, reading assignments, exams, and term paper), participating in class discussion, and participating in the paper-project presentations and evaluations. Students are expected to come to class prepared, with assigned reading done.

Attendance

Class attendance is mandatory (see catalog). Material not in the text may be introduced at random intervals. If you miss a class, extras of handouts are available outside the instructor's office.

e-Access

Class will use Blackboard http://classes.uaf.edu/and materials will be placed on e-reserve http://eres.uaf.edu/.

ATM413 and ATM613

Students taking ATM413 will be required to review one research article (rather than a term paper based on multiple papers) for the term paper.

KEY DATES FOR ATM 613/413 FALL 2009		
Week 1		Sep 3 **First Class**
Week 2 **HW#1**	Sep 8	Sep 10
Week 3 **HW#2**	Sep 15	Sep 17
Week 4 **Term Paper Proposal Due**	Sep 22	Sep 24
Week 5 **HW #3**	Sep 29	Oct 1
Week 6	Oct 6	Oct 8 **Exam #1**
Week 7 **HW #4**	Oct 13	Oct 15
Week 8 **Paper-Project Outline Due**	Oct 20	Oct 22
Week 9 **HW#5**	Oct 27	Oct 29
Week 10	Nov 3	Nov 5
Week 11 **HW #6**	Nov 10	Nov 12
Week 12	Nov 17	Nov 19 **Exam #2**
Week 13 **Paper-Project Meetings**	Nov 24	Nov 26 **Thanksgiving - No Class**
Week 14	Dec 1	Dec 3
Week 15 **Presentations**	Dec 8	Dec 10 **Last Class**
Week 16 **Presentations** **AGU Fall Meeting**		Dec 19 **** Saturday **** **Final Exam Period** **1 pm – 3 pm**

Notes: **Schedule is provisional and dates may change.**
Changes will be announced in class.
September 18 last day to drop class without appearing on transcript.
October 30 last day to withdraw from class W on transcript.
http://www.uaf.edu/catalog/catalog_09-10/acad_calendar.html