Lecture 1

Introduction and Logistics

Objectives:

1. What this course is about: many roles of radiative transfer processes in the atmosphere

2. How this course is organized:

   - Lectures
   - Computer Modeling Labs
   - Homeworks
   - Research Project
   - Midterm Exams

3. Required/additional/advanced reading.

4. Grading

1. What this course is about

- This course provides a foundation for understanding the theoretical and computer modeling principles of radiative transfer in planetary atmospheres. **The main focus is on the interaction of gases, clouds, and aerosols with ultraviolet, visible, and infrared radiation. These processes are critical for understanding the atmospheric energy budget and for various remote sensing applications.**

- This course also includes an introduction to radiometric instrumentation and observing methods used on surface, aircraft, and satellite-based platforms as well as data interpretation. The overall goal of this course is to prepare a student in formulating and solving radiative transfer problems for a wide range of applications.

2. How this course is organized:

- **Lectures:**

Lectures are developed to provide the most critical material and to complement a textbook.

Lecture notes will be posted (in PDF format) at the course website:

http://irina.colorado.edu/ATOC5560.htm

Please review a lecture before coming to the class.

- **Computer Modeling Laboratories**

Meeting place: Stadium, room # 136, ATOC Weather Lab

Time: each Friday, two hours (> 1 PM)

Goals are to learn about radiative numerical codes and obtain hands on experience in running these codes and explaining the model results.

Tentative schedule of computer modeling labs

Date	*Lab*	*Written report due*
September 1	Laboratory 1	September 6
September 8	Laboratory 2	September 11
September 15	Laboratory 3	September 18
September 22	Laboratory 4	September 25
September 29	Laboratory 5	October 2
October 13	Laboratory 6	October 16
October 20	Laboratory 7	October 23
October 27	Laboratory 8	October 30
November 3	Laboratory 9	November 6
November 10	Laboratory 10	November 13
November 17	Laboratory 11	November 23
December 1	Laboratory 12	December 4
December 8	Laboratory 13	December 11

- **<u>Homeworks</u>**

will be posted (in PDF format) at the course website.

Please turn in your homework in time.

Tentative schedule

Homeworks	**Due date**
Homework 1	***September 13***
Homework 2	***October 4***
Homework 3	**October 25**
Homework 4	**November 15**
Homework 5	**December 6**

- **<u>Research Project</u>**

<u>Goal</u> is to perform the radiative transfer modeling and interpretation of radiometric measurements in a well-defined problem.

Plan of a research project must be prepared by a student but discussed with and approved by a professor in September. A research project is required in lieu of a final exam.

Presentation of student's projects is scheduled for Lectures 26-29 (December).

- **<u>Exams:</u>**

Two midterm exams, but no final exam.

3. Required/additional/advanced reading.

Required Text:

An Introduction to Atmospheric Radiation, Liou, 1980 (referenced to as L80).

(Photocopy of this book is available at CU Book Store)

Selected chapters from

Atmospheric Radiative Transfer. J. Lenoble, 1993.

Advanced Text:

Atmospheric Radiation: *Theoretical basis*. R.M. Goody and Y. L. Yung, 1989

Additional Text:

Radiation and cloud processes in the atmosphere. Liou, 1992

Others:

Radiative Transfer in the Atmosphere and Ocean. G. E. Thomas and K. Stamnes, 1999.

Absorption and Scattering of Light by Small Particles. C. Bohren and D. Huffman, 1983.

Atmospheric transmission, Emission, and Scattering. Kyle, 1991.

4. Grading.

Mid-term exams (2)	30%
Homeworks	20%
Computer modeling labs	25%
Research Project	25%