ATMOSSC 5950, ATMOSPHERIC THERMODYNAMICS

Autumn Semester 2023, 3 units, Call number: 18207/18208
Classroom: Derby Hall 140
Lectures: MW 9:35-10:30 AM
Labs: F 9:35-10:30 AM

Instructor: Prof. Jialin Lin
Email: lin.789@osu.edu This is the best way to reach me.
Telephone: 614-292-6634
Office Hours: Friday 10:30am-12:30pm

Reference Books:
"Atmospheric Thermodynamics: Elementary Physics and Chemistry" by G. North and T. Erukhimova, Cambridge University Press.
"An Introduction to Atmospheric Radiation" (2nd ed.) by K. N. Liou, Academic Press.
"Atmospheric Convection" by K. Emanuel, Oxford University Press.

Course Objectives:

The basic objective of this course is to provide students with knowledge of the fundamentals of atmospheric thermodynamics. Thermodynamics deals with the processes that transfer energy and thermodynamic processes help to create and change atmospheric systems. Knowledge of the basic principles of thermodynamics and their interactions will facilitate students' comprehension of meteorological processes that determine the weather and climate of the Earth. Understanding thermodynamic processes is critical to accurate assessment of the current state of the atmosphere and to accurate evaluation of the output from numerical models of weather and climate. The four specific objectives of this course are: (1) to understand the basic principles of thermodynamics as they apply to dry air (i.e. air with no water vapor); (2) to understand the effects of the different phases of water on thermodynamic processes; (3) to determine how thermodynamic processes generate the observed structure of the atmosphere; (4) to examine how thermodynamic processes affect the stability of portions of the atmosphere.

Methods for accomplishing these objectives:

The objectives of the course will be accomplished through the lectures, in-class assignments, research project, and examinations. Determination of your final grade will be as follows:

Pop quizzes or attendance check	15%
In-class assignments and homeworks (11 total, will drop your worst score)	30%
Research project (Presentation 15%, Term Paper 10%)	25%
Three midterm exams (15% each, will drop your worst score)	30%

The grading scale is as follows: 100-93% A, 92-90% A-, 89-87% B+, 86-83% B, 82-80% B-, 79-77% C+, 76-73% C, 72-70% C-, 69-67% D+, 66-63% D, 62-60% D-, 59% and below E.

Academic Misconduct It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic

misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

Disability Services Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

Cell Phones Like on airplanes, interfere with navigation of the course, therefore, cell phones and pagers must be turned *OFF* during class as they interfere with the navigation of the course.

Some Tips for Doing Well:

1. Pay special efforts to the in-class assignments and homeworks, which will help you to get solid skills in Atmospheric Thermodynamics.
2. Enjoy the research project.
3. Check the course website frequently for updates.
4. Relax and have fun.

The schedule may change, probably only slightly, as the class evolves. Instructor will alert students if/when schedule changes.

COURSE LECTURE OUTLINE

Date	LECTURE
08/23	Syllabus and course introduction
08/25	Lab
08/28	Introduction
08/30	Introduction
09/01	Lab
09/04	Labor Day (NO CLASS)
09/06	Introduction
09/08	Lab
09/11	Atmospheric Radiation
09/13	Atmospheric Radiation
09/15	Lab
09/18	Atmospheric Radiation
09/20	Atmospheric Radiation
09/22	Lab
09/25	Atmospheric Radiation
09/27	Midterm 1 Review
09/29	MIDTERM 1
10/02	Vertical Structure
10/04	Dry Static Energy
10/06	Lab
10/09	Potential Temperature
10/11	Lab
10/13	Autumn Break (NO CLASS)
10/16	Skew-T Diagram
10/18	Atmospheric Moisture
10/20	Lab
10/23	Ideal Gas Law for Moist Air
10/25	Moist Static Energy
10/27	Lab
10/30	Midterm 2 Review
11/01	MIDTERM 2
11/03	Lab
11/06	Equivalent Potential Temperature
11/08	Lab
11/10	Veteran's Day (NO CLASS)

11/13 Entropy
11/15 Convective Instability
11/17 Lab

11/20 Convective Available Potential Energy
11/22 Thanksgiving Break (NO CLASS)
11/24 Thanksgiving Break (NO CLASS)

11/27 Convective Available Potential Energy
11/29 Moist Convection in Global Climate Models
12/01 Lab (**Term Paper Due**)

12/04 Midterm 3 Review
12/06 MIDTERM 3