

SYLLABUS

ATMO 708 —General Circulation of the Atmosphere

- Office hours: After class or by appointment
- Office: HIG337
- Instructor: Professor Jin, 956-4645, jff@hawaii.edu
- Prerequisites: ATMO 402 or 600

REQUIRED TEXTBOOK:

- Ian N. James, 1994: Introduction to Circulating Atmosphere. Cambridge University Press. 422 pp.

REFERENCE MATERIAL:

1. D. Randall, 2001: Introduction to General Circulation.
<http://kiwi.atmos.colostate.edu/group/dave/at605>
2. K. E. Trenberth, 1992: Climate System Modeling. Cambridge University Press.

Student Learning Outcome:

This course covers selected materials in theory, observations, large-scale analyses, and global model simulations that describe characteristic large-scale circulation of the atmosphere. The theoretical part aims at providing students with an understanding of the physical and dynamical processes responsible for the observed, analyzed, and simulated large-scale circulation of the earth's atmosphere. The diagnostic part describes main features of the general circulation of the atmosphere, illustrates how the global atmospheric wind systems organize themselves to satisfy the conservation laws of physics, and highlights how primary processes can be distinguished from secondary processes in the complex atmospheric system. Main features of the general circulation of the atmosphere to be described and understood include the zonally averaged climatology (e.g., the global energy balance, the easterly trade winds, the storm tracks, the westerly jets in the midlatitudes, the Hadley cell in the tropics, the Ferrell cell in the midlatitudes) and the asymmetric features of the general circulation (such as stationary waves in the midlatitudes, Atlantic and Pacific storm zones, tropical monsoon systems, blocking of the midlatitude flow, teleconnection patterns, and interactions between transient and steady eddies). The course allows students to have a hands-on experience to create their own climate statistics using readily available software and data sets, and enhances students' ability to use theoretical tools to gain insight into various aspects of the general circulation of the atmosphere.

CONTENTS

Ch. 1 An introduction and an overview of the Governing Physical Laws

- Ch. 2 An overview of observed Circulation
- Ch. 3 The Atmospheric Heating
- Ch. 4 The Zonal Mean Meridional Circulation
- Ch. 5 Transient disturbances in the midlatitudes
- Ch. 6 Stationary waves
- Ch. 7 Three-Dimensional Aspects of the Global Circulation
- Ch. 8 Low frequency variability

GRADING

- Homework & quizzes 30%
- Midterm test 30%
- Term paper / project 40%

Each term paper shall include a comprehensive survey of the published literature in a selected area, a critical analysis of the published results, and student's own interpretation based on published materials or climate statistics calculated by the student. Each student is required to present this material in a form that would be suitable for publication as a book chapter. A 10-15 minutes oral presentation of the material in the term paper might also be required.

A Sample Schedules for ATMO708 (Spring 2017)

	Tu	Th	
Week 1	Jan 10 Syllabus & Intro	Jan 12	
Week 2	Jan 17	Jan 19	
Week 3	Jan 24 Trip	Jan 26 trip	
Week 4	Jan 31	Feb 2	
Week 5	Feb 7	Feb 9	
Week 6	Feb 14	Feb 16	
Week 7	Feb 21 Quiz #1	Feb 22	
Week 8	Feb 28	March 2	
Week 9	March 7	March 9	
Week 10	March 14	March 19	
Week	March 21	March 23	

11			
Week 12	March 28 Spring Break	April 30 Spring Break	
Week 13	April 4	April 6 mid term	
Week 14	April 11	April 13	
Week 15	April 18	April 20	
Week 16	April 25	April 27	
Week 17	May 2 Class Presentations		
Week 18	No final exam!		