

**GEOG 5900, WEATHER, CLIMATE AND GLOBAL WARMING**  
**Spring Semester 2020, 3 units, Call number: 27579**  
**Lectures: TuTh 12:45-2:05 PM, Hitchcock Hall 306**

**Instructor:** Prof. Jialin Lin  
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**Textbook: "Understanding Weather and Climate" (7th ed.) by E. Aguado and J. Burt (published by Prentice Hall).** (Ordered at the OSU bookstores.)

**Course Objectives:**

This course is designed to provide a broad introduction to *climatology*, the study of the average state of weather on planet Earth. Emphasis is made of planetary energy budgets, regional climates, climate change, and past and future climates. Energy budgets include the solar energy receipt, infrared radiation loss, turbulent heat fluxes, and the redistribution in the earth-atmosphere system as well as the role of atmospheric moisture, its global spatial distribution, and its importance in energy exchange, and cloud and precipitation formation. Course lectures will describe the causes, and the spatial distribution, of climates of the world as well as the physical mechanisms of some observed weather phenomena. The physical causes of and spatial variations in small- and large-scale motions of the atmosphere will be described. The distribution and causes of 21<sup>st</sup> century climate will be explained and the distributions of past climates, methods for reconstructing them, and the potential explanations for them will be discussed. The course will also consider how humankind has both intentionally and unintentionally become a factor in the physical processes of weather and climate. Many students will find the basic concepts and ideas discussed in the course will have applications in their fields of interest as well as applications to their daily lives.

Upon successful completion of this course, students should (1) be able to describe the structure and composition of the atmosphere and how it has changed with time; (2) know the factors causing solar radiant energy variations on earth and be able to describe global radiation balance; (3) be able to explain the physical processes leading to the formation of atmospheric features including clouds, precipitation, winds and storms; (4) have a good understanding of the physical behavior of gases, and of the different forms of energy and their role in atmospheric motion and weather systems; (5) have a good understanding of environmental issues pertaining to the atmosphere including the "greenhouse effect", ozone depletion, air pollution and urban climate modification; and (6) be able to describe the general distribution on the world of temperature, precipitation and climates - and the factors and physical mechanisms which cause these distributions to occur as they do.

**Methods for accomplishing these objectives:**

The objectives of the course will be accomplished through the lectures, homework/assignments, in-class presentations, and examinations. The lectures will include some material not covered in the textbook and may incorporate math to the level of algebra. Determination of your grade will be as follows:

Pop quizzes or attendance check (11 total – will drop your worst score)	10%
Weather diary (45 days)	10%
Three midterm exams (40% each, will drop your worst score)	80%
• All exams will be multiple-choice. Midterms are not cumulative.	

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](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 attention to the “Review of last lecture” slide at the beginning of class and the “Summary” slide at the end of class. Those are the materials you need to remember, and will be asked about in exams.
2. Check the course website frequently for updates.
3. Enjoy the weather diary.
4. Relax and have fun.

**Final Exam:** No final exam

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

## COURSE LECTURE OUTLINE

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Date    LECTURE

01/07 Syllabus and course introduction

01/09 Overview I: Extreme weather and climate

01/14 Overview II: Success and failure of weather and climate prediction

01/16 Overview III: Why is it so difficult to predict weather and climate?

01/21 Evolution of the Earth's atmosphere

01/23 The incoming solar energy

01/28 What is the Greenhouse Effect?

01/30 Vertical Structure of the atmosphere

02/04 What set the atmosphere in motion?

02/06 How does air move around the globe?

02/11 Midterm 1 Review

02/13 MIDTERM 1

02/18 The global water cycle

02/20 How do the clouds form?

02/25 Why does it rain on us?

02/27 Tropical Cyclones

03/03 Thunderstorms and Lighting

03/05 Mesoscale convective systems

03/10 Spring Break (NO CLASS)

03/12 Spring Break (NO CLASS)

03/17 Midterm 2 Review

03/19 MIDTERM 2

03/24 Twisters

03/26 Downbursts

03/31 How do the blizzards form?

04/02 How does air move around the globe?

04/07 What are the El Nino and La Nina?

04/09 Air pollution

04/14 Land surface change

04/16 Global warming (**Weather Diary due**)

04/21 Midterm 3 Review

04/23 MIDTERM 3