

## **Geog 1900H, Extreme Weather and Climate**

**Autumn 2017, 4 units, Call number: 34506**

**Lectures: TuTh 9:35-10:55 AM, Derby Hall 1116**

**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.** (has been ordered at the OSU bookstores. Note that the 4th, 5th and 6th editions of this book are available cheaply from Amazon.com and are virtually identical to the 7th edition. You can use one of them instead.)

**Lab Manual: Ready for purchase at the OSU Bookstore** (Barnes and Noble High St.)

### **Course Objectives:**

The primary objective of this course is to introduce you to the nature of the atmosphere and the processes by which it operates to produce weather and the distribution of the climates of the earth. As part of the course we will explain the physical processes acting in the earth-atmosphere system and describe its weather features and climatic characteristics. This will involve understanding concepts such as energy receipt, loss, and redistribution in the earth-atmosphere system as well as the understanding of the role of atmospheric moisture in energy exchange as well as cloud and precipitation formation. Course lectures will describe the causes of atmospheric storms that are constantly occurring on a variety of spatial scales, including wave cyclones, hurricanes, thunderstorms and tornadoes. The physical causes of, and spatial variation 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 distribution of past climates, methods for reconstructing them and potential explanations for them will be discussed. The course will also consider how mankind has both intentionally and unintentionally become a factor in the physical processes of weather and climate. The course will provide you with a sense of the ways in which scientists study the atmosphere, including some of the methodologies they use and the tools and techniques that they employ.

**This course is a Natural Science (Physical Science) course in the University General Education Curriculum (GEC).** Courses in natural sciences foster an understanding of the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world. As part of this natural science course, the learning objectives are to (1) understand the basic facts, principles, theories and methods of modern science, (2) understand key events in the development of science and recognize that

science is an evolving body of knowledge, (3) learn of the inter-dependence of scientific and technological developments, and (4) recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world. Many students will find that the basic concepts and ideas discussed in the course will have applications toward their fields of interest as well as applications in their daily lives.

### **Methods for accomplishing these objectives:**

The objectives of the course will be accomplished through the lectures, laboratory assignments, pop quizzes, 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:

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|--|-----|
| Laboratory assignments (will drop your worst score)  | 30% |
| Attendance and Pop quizzes (10 total – will drop your worst score)                               | 15% |
| • A pop quiz will be at the end of a lecture and only cover materials discussed in that lecture. |     |
| Weather diary (45 days)  | 10% |
| Three midterms (22.5% each – will drop your worst score)   | 45% |
| • 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.

Please note

- A large portion of the materials that appear on the midterms will be covered in lecture only. Therefore, *you are highly encouraged to attend all classes or your final grade will suffer*.
- Lecture notes will be posted on the course website. The latest version is generally posted by noon the day of the lecture.
- The grading policy is very forgiving: we will drop your worst scores from every category. We also give two bonus assignments which increase together 10% of your final grades. **Therefore no make-up, curve, or round-up will be given for labs, quizzes, exams or final grades.**
- **Absence: An official letter from your supervisor or a doctor's note is required to excuse any absence. Please give the letter to your TA to arrange for a make-up.**
- The hands-on labs constitute a relatively independent component of the course. **Any question about the labs should be directed to the TA.** Lab assignments should be turned in to the TAs. Late papers will not be accepted.

### **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, cell phones 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. Attend classes – A large portion of the materials that appear on the midterm exams will be covered in lecture only.
2. Pay special attention to the “Review of last lecture” slide at the beginning of each class and the “Summary” slide at the end of class. Those are the materials you need to remember, and will be asked about in the exams.
3. Check the course website frequently for updates.
4. Enjoy the weather diary.
5. Relax and have fun.

**Final Exam:** No final exam.

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

## COURSE LECTURE OUTLINE

| Date  | LECTURE  |
|-------|--|
| 08/22 | Syllabus and course introduction   |
| 08/24 | Overview I: Extreme weather and climate  |
| 08/29 | Overview II: Success and failure of weather and climate prediction                       |
| 08/31 | Overview III: Why is it so difficult to predict weather and climate?                     |
| 09/05 | Evolution of the Earth's atmosphere  |
| 09/07 | The incoming solar energy  |
| 09/12 | What is the Greenhouse Effect?   |
| 09/14 | Vertical Structure of the atmosphere   |
| 09/19 | What set the atmosphere in motion?   |
| 09/21 | How does air move around the globe?  |
| 09/26 | Midterm 1 Review   |
| 09/28 | MIDTERM 1  |
| 10/03 | The global water cycle   |
| 10/05 | How do the clouds form?  |
| 10/10 | Why does it rain on us?  |
| 10/12 | Autumn Break (No Class)  |
| 10/17 | Thunderstorms and Lightning  |
| 10/19 | Twisters   |
| 10/24 | Mesoscale convective systems   |
| 10/26 | Downbursts   |
| 10/31 | Midterm 2 Review   |
| 11/02 | MIDTERM 2  |
| 11/07 | Where do the hurricanes come from?   |
| 11/09 | How do the blizzards form?   |
| 11/14 | What are the El Nino and La Nina?  |
| 11/16 | Is there really a global warming happening?  |
| 11/21 | How will the climate likely be at the end of this century?<br><b>(Weather Diary due)</b> |
| 11/23 | Thanksgiving (No Class)  |
| 11/28 | Mitigation of global warming   |
| 11/30 | Midterm 3 Review   |
| 12/05 | MIDTERM 3  |
| 12/07 | <b>NO FINAL EXAM</b>   |