

GEOGRAPHY 1900
EXTREME WEATHER AND CLIMATE
Winter/Spring Semester 2015

Instructor: Prof. Jeff Rogers (rogers.21@osu.edu) Office: Derby Hall 1048
Phone: 292-0148 Office Hours: Tues, Thurs. 4:00 - 5:00 p.m. *or contact me!*

Geog 1900 lectures, grades, & important messages are available on: <http://carmen.osu.edu>

Lectures and Recitations:

GEOG	1900	LEC	18781	Smith Lab	1005	5:30 – 6:50 PM	Tu Th	Jeff Rogers (rogers.21)
GEOG	1900	LAB	18782	Derby Hall	0070	7:05 – 8:55 P.M	Tues	Alex Wovrosh (wovrosh.1)
GEOG	1900	LAB	18783	Derby Hall	0070	7:05 – 8:55 PM	Thurs	Alex Wovrosh (wovrosh.1)

Course Text: "Understanding Weather and Climate" 6th edition by E. Aguado and J.E. Burt (2012). Note that the 3rd, 4th, and 5th editions of this book are available cheaply from Amazon.com and are virtually identical to the 6th edition. Use one of them instead.
Course Packet: "Introduction to Weather and Climate" available only from the official OSU Bookstores (High Street Barnes and Noble, Central Classrooms).

Course Objectives

Geography 1900 will especially emphasize the interactions occurring between the atmosphere, oceans, and earth's surface and show how exchanges of matter and energy take place between them, creating and sustaining life and providing a rich variety of weather and climate. The course is an introduction to weather and climate but with some emphasis on extreme events and their influence on humans and society.

This course is a Natural Science course in the University General Education Curriculum. The goals of natural science courses are to help students understand 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 outcomes are to (1) help students understand the basic facts, principles, theories and methods of modern science, (2) help students understand key events in the development of science and recognize that science is an evolving body of knowledge, (3) help students learn the inter-dependence of scientific and technological developments, and (4) help students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world. This will be accomplished through lectures and labs examining the technology used in gathering weather and climate data, how these data lead to understanding the behavior of the atmosphere and climate and in the development of scientific laws and principles of atmospheric science.

The primary objective of this course is to introduce you to the *atmosphere* of planet Earth and the processes by which it operates to produce *weather* and the *climate* types found across the earth. As part of the course we will explain the (i) physical processes acting in the earth-atmosphere system and (ii) describe its weather features and (iii) climatic characteristics. This will involve understanding concepts such as energy receipt, and redistribution in the earth-atmosphere system, the physical forces that create wind, wind systems and ocean currents, 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, monsoons, thunderstorms and tornadoes. The distribution and causes of 21st 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. 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.

Evaluation of Student Effort

The two 80 minute **lectures** per week will introduce basic course concepts and explanations. The single 110-minute Laboratory is designed to work on Lab assignments and exercises from the Course Packets book, involving topics associated with lectures and the text. Lab sessions will be used for discussion of these exercises and for discussion and elaboration of issues brought up in lectures.

Attendance is required for lectures and recitation; occasional pop quizzes will occur during some lectures.

Grading: Determination of your grade will be based as follows:

- (1) three midterm exams will be worth 40% of your final grade,
- (2) a comprehensive final exam (**Friday May 1**) will be worth 30%, and
- (3) Laboratory assignments will be worth 22% of your grade (see paragraph below),
- (4) Lecture quizzes will be worth 8% of your grade.

On all Laboratory assignments and exams you are expected to work alone and be turned in on time.

Assignments incur a 10% penalty through 5:00 p.m. on the first day after their due date and a 25% penalty through 5:00 p.m. on the second day, 50% on the 3rd day and after that they will not be accepted. *Lab grades tend to be much higher than exam grades and they too are curved at the end of the semester so that the class median Lab grade is C+.*

Medical Excuses

A written medical excuse is necessary to excuse missing an assignment due date and the work must be turned in within a week. Students are allowed one medical excuse after missing a midterm exam. Missing more than one exam at its scheduled time will result in a grade of zero on those exams. Incompletes are only given for extended illnesses (with proof) occurring late in the quarter.

Students with Disabilities

Any student that feels he/she may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Ave., phone 292-3307, <http://www.ods.ohio-state.edu>

Academic Misconduct

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, students are expected to complete all academic and scholarly assignments and exams with fairness and honesty. It is the responsibility of the Committee on Academic Misconduct (COAM: <http://oaa.osu.edu/coamresources.html>) to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. In Geography 1900, per the recommendation of the COAM, academic misconduct will be deemed to have occurred if evidence is found by the instructors of (1) suspicious behavior during examinations, (2) fabrication of data in Laboratory assignments, (3) not performing your own work (copying another person's work in Lab or during exams). Listen closely to your instructors so that you understand where "authorized collaboration" (i.e., working in groups) ends and where collusion begins. The assignments that you complete as a student are your "intellectual property," and you should protect your intellectual property just as you would any of your other property. Never give another student access to your intellectual property unless you are certain why the student wants it and what he/she will do with it. Note that "suspicious behavior" in #1 above includes, but is not limited to, having any electronic device visible to the instructors during an exam.

LECTURE OUTLINE

DATE LECTURE TOPICS

READINGS 6th ed

1/13	Course introduction. Science and the scientific method. Discovery of downbursts.	
1/15	Atmospheric Composition and how it has evolved with time.	Pp 4-12, 19
1/20	Vertical structure of Atmosphere in terms of temperature, pressure, and other factors	Chap. 1
1/22	Observing the atmosphere: how we know what we know about the atmosphere	pp. 94-100
1/27	Atmospheric pressure and density, the equation of state	pp 32-42
1/29	Energy in the atmosphere, forms of heat & heat transfer, radiant and solar energy	pp 30-38
2/3	Causes of seasons, Earth's energy budget, the enhanced greenhouse effect	pp 39-70
2/5	Measuring Earth's temperature and causes of temperature variations	
2/10	Mid-term Exam I (all material through 2/3)	
2/12	Causes of daily and annual variations in air temperature	pp. 75-97
2/17	Atmospheric motion: how temperature & pressure differences cause the wind;	Chapter 4; pp 249-252
2/19	Extreme local winds and wind systems, foehns, Chinooks; upper level winds	
2/24	The hydrologic cycle, atmospheric humidity (water vapor), its measurement; how dew & fog form	Chapter 5
2/26	How clouds and fog form in the atmosphere; the different types of clouds	pp 153-157; chapter 6
3/3	How rain, snow and other forms of precipitation form in the atmosphere	Chapter 7
3/5	Mid-Latitude weather: Air masses; warm and cold fronts, Rossby waves, jet streams & wave cyclones	Chapters 9 & 10
3/10	Mid-term examination II (material through 3/3)	
3/12	Mid-latitude extreme weather & its causes: droughts, floods, heat waves, cold snaps	
Spring Break		
3/24	Tropical weather: The tropical Hadley circulation and the monsoons of Asia, Africa & the U.S.	pp. 226-249
3/26	Tropical oceans & weather: Hurricane formation & evolution; what are El Niño & La Niña?	pp 255-265; chap. 12
3/31	Severe & unusual Mid-Latitude weather: Thunderstorms, squalls, derechoes	Chapter 11
4/2	The formation of tornadoes and lightning & severe weather climatology	Chapter 11
4/7	The modern Climates of the world, where & why they occur and how they are classified.	Chapter 15
4/9	Mid-term examination III (material through 4/2)	
4/14	Urban Air pollution: its causes and effects on humans; indoor air pollution	Chapter 14
4/16	Weather, Climate, and Human Health	
4/21	Worldwide (and Ohio) climates of the past, how we learn about them & what they teach us	
4/23	Human impacts on climate and current and future climate variability	Chapter 16

FINAL Examination (mandatory time): Friday, May 1, 2015 at 8:00 p.m. to 9:45 p.m. (night!!)