

GEOG 5921, BOUNDARY LAYER CLIMATOLOGY
Spring 2016, 3 credits, Call number: 24545/24546
Lectures: TuTh 12:45-2:05 PM, McPherson Lab 1046

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Office Hours: TuTh 10-11am, or by appointment

Textbook: “**Boundary layer climates**” by T.R. Oke, Routledge, 2nd edition, 1988. The textbook will be used before the midterm. After the midterm, we will read some new research papers (pdf files will be available on the course website).

Course website <http://lightning.sbs.ohio-state.edu/geog5921/index.htm>

Course Objectives:

This course covers fundamentals of the energetic atmosphere-surface interactions, i.e. radiation fluxes, turbulent heat moisture and momentum fluxes, and subsurface conductive fluxes. The 'surface boundary layer' is the part of the atmosphere affected by energetic interactions of turbulence and radiation fluxes with the surface. Humans live in the surface boundary layer. Atmospheric pollutants are concentrated near the surface and diffuse into the atmosphere by turbulence regulated by daily and seasonal cycles of surface solar heating and depending further on surface properties. Large scale atmospheric motions are largely attributable to surface energy exchanges. Students will gain the conceptual framework necessary for an understanding of surface atmosphere interactions and their potential effects on weather development and human impacts.

Methods for accomplishing these objectives:

The objectives of the course will be accomplished through the lectures, homeworks, 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:

Attendance, professionalism, and active participation (will drop your first absence)	10%
Homeworks (one per week – 7 total – will drop your worst score)	20%
One midterm	30%
One in-class presentation	30%
One term paper	10%

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 take note that 80% of your grade is based on in-class assignments, presentation

and attendance/participation. Therefore, *you are highly encouraged to attend all classes or your final grade will suffer*. The grading policy is very forgiving: the lowest scores on the assignments will be dropped when calculating your final grade. Therefore, no make-up assignment will be given. A doctor's note is necessary to excuse an absence from a class or on an examination date. To accommodate any unexpected emergency, your first absence will be dropped. This exemption does not apply to midterm exam or in-class presentation. If you miss them, no make-up will be given. The term paper may not be handed in late. Lecture notes will be posted on the course website.

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. Attend classes – 80% of your grade is based on in-class assignments, presentation and attendance/participation.
2. Actively participate in the in-class presentations and discussions.
3. Check the course website frequently for updates.
4. Relax and have fun.

Final Exam: There will be no final exam.

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

Course Schedule (see course web page <http://lightning.sbs.ohio-state.edu/geog5921/index.htm> for updates).

COURSE LECTURE OUTLINE

Date	LECTURE
01/12	Syllabus and Introduction
01/14	Importance of the atmospheric boundary layer (1)
01/19	Importance of the atmospheric boundary layer (2)
01/21	Surface energy balance (1) HW#1: A Climate Scientist Battles Time and Mortality
01/26	Surface energy balance (2)
01/28	Surface water balance HW#2: Surface energy balance
02/02	Vertical structure of the atmospheric boundary layer
02/04	Modeling the atmospheric boundary layer (1) HW#3: Vertical structure of atmospheric boundary layer
02/09	Modeling the atmospheric boundary layer (2)
02/11	Stratocumulus-topped boundary layer HW#4: Modeling boundary layer turbulence Sign-up and instructions for in-class presentation
02/16	Boundary layer of shallow and deep convection
02/18	Land surface processes HW#5: The heat island effect in U.S. big cities
02/23	Air pollution
02/25	Climate feedbacks and abrupt climate change HW#6: Boundary layer precursor of droughts
03/01	Midterm Review
03/03	MIDTERM
03/08	Global climate change (1): The global warming hiatus
03/10	Global climate change (2): Abrupt climate change
03/15	Spring Break (NO CLASS)
03/17	Spring Break (NO CLASS)
03/22	Ocean-atmosphere interaction (1): A tropical thermostat for global warming?
03/24	Ocean-atmosphere interaction (2): El Nino, La Nina and Southern Oscillation
03/29	Ocean-atmosphere interaction (3): Boundary layer of hurricanes
03/31	Land-atmosphere interaction (1): Vegetation feedback

04/05 Land-atmosphere interaction (2): Deforestation and afforestation
04/07 Land-atmosphere interaction (3): Heat island effect and heat waves

04/12 Ice-atmosphere interaction (1): Arctic amplification
04/14 Ice-atmosphere interaction (2): Melting of Arctic sea ice

04/19 Ice-atmosphere interaction (3): Melting of Greenland ice sheet
04/21 Ice-atmosphere interaction (4): Melting of mountain glaciers

04/26 **Term paper due**
04/28 **NO FINAL EXAM**