

GEOG 5921, BOUNDARY LAYER CLIMATOLOGY
Spring 2024, 3 credits, Call number: 26046/26045
Lectures: TuTh 11:10AM-12:30 PM, PAES Bldg A105

Instructor: Prof. Jialin Lin

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Office Hours: TuTh 9:50-10:50am, or by appointment

Textbook: “**Boundary layer climates**” by T.R. Oke, Routledge, 2nd edition, 1988 (ordered at university bookstore). We will also read some research papers, which will be posted on the Carmen course website.

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, in-class assignments and homeworks, research project, and examinations. Determination of your final grade will be as follows:

Pop quizzes or attendance check	15%
In-class assignments and homeworks (10 total, will drop your worst score)	30%
Research project (Presentation 15%, Term Paper 10%)	25%
Two midterm exams (15% each)	30%

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.

Lecture notes will be posted on the course website. 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.

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 research project, 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 LECTURE OUTLINE

Date	LECTURE
01/09	Syllabus and Research team
01/11	Introduction to boundary layer climatology HW#1
01/16	Introduction to boundary layer climatology
01/18	Surface energy balance HW#2
01/23	Surface energy balance
01/25	Surface water balance HW#3
01/30	Vertical structure of atmospheric boundary layer
02/01	Vertical structure of atmospheric boundary layer HW#4
02/06	Modeling the atmospheric boundary layer
02/08	Modeling the atmospheric boundary layer HW#5
02/13	Boundary layer of air pollution events
02/15	Stratocumulus-topped boundary layer HW#6
02/20	MIDTERM 1
02/22	Boundary layer of shallow convection
02/27	Boundary layer of deep convection
02/29	Boundary layer of tornadoes, thunderstorms and MCSs HW#7
03/05	Boundary layer of hurricanes
03/07	Boundary layer of wintertime blizzards HW#8
03/12	Spring Break (NO CLASS)
03/14	Spring Break (NO CLASS)
03/19	Land-atmosphere interaction: Land surface processes and heat island effect
03/21	Land-atmosphere interaction: Droughts and heat waves HW#9
03/26	Ocean-atmosphere interaction: Tropical climate

03/28 Ocean-atmosphere interaction: El Nino/Southern Oscillation
HW#10

04/02 Midterm 2

04/04 Research Team 1 Presentation

04/09 Research Team 2 Presentation

04/11 Research Team 3 Presentation

04/16 Research Team 4 Presentation

04/18 Research Team 5 Presentation (**Term paper due**)

04/23 **NO FINAL EXAM**