

CSES 5800/6800: Climate, Water, and Life

College of Agriculture

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Fall 2023
10:00-11:15am Tu, Th
Classroom: Funchess 247
Credits: 3

Course Description

The course will introduce essential climate and hydrological processes and phenomena, and their impacts on water resources, food and agriculture, and ecosystems. Major topics include climate variability and change, radiation, temperature, humidity, precipitation, land surface energy and water fluxes, climate hazards and resiliency, and their linkages with organisms and human society.

Course Outcomes

By the end of this course, students will learn basic concepts and analytical tools in climate and hydrologic sciences, and improve their ability to evaluate literature, thinking critically, present, and write scientifically. The learning objectives include understanding climatological and hydrological phenomenon, processes and their effects on food and agriculture, water resources, and ecosystems, and basics in hydro-climate data analysis and modeling using the newest computational tools.

Course Content and Calendar*

This course includes three sections covering both fundamental concepts and practical applications, including 1) basic climate phenomenon and processes, 2) energy and water fluxes over land surface, 3) climate data, modeling, resiliency, and decision support. Below is the course calendar. *This calendar may be modified when the class progresses.

No	Agenda/Topic	Note
1	Topic: Introduction topics	
2	Topic: General circulation	
3	Topic: Climate variability	
4	Topic: Climate change	Homework 1
5	Topic: Solar radiation	
6	Topic: Net radiation	
7	Topic: Energy balance	
8	Topic: Radiation and plants	Homework 2
9	Topic: Temperature	
10	Topic: Water vapor	

11	Topic: Cloud and precipitation	
12	Topic: Precipitation analysis	Homework 3
13	Topic: Soil properties and heat flux	
14	Topic: Soil Water	
15	Topic: Introduction to evapotranspiration	
16	Topic: Evapotranspiration estimation	Homework 4
17	Topic: Runoff	
18	Topic: Water balance	
19	Topic: Drought	
20	Topic: Heat wave	Homework 5
21	Topic: Overview of climate data	
22	Topic: Building climate resiliency	
23	Topic: Key messages from the IPCC report	
24	Topic: Final review	Final exam

Practice and Assessment

- *Homework exercises*: students will work on five homework exercises to practice concepts and methods learned in the class.
- *Project (CSES6800)*: students will propose and conduct a project or literature review related to climate (single line spacing, minimum 5-pages excluding references). They need to submit a 1-2 page project outline, discuss the outline with their advisor and course instructor, and present their work and finish a project report or literature review at the end of the class. The project will help them advance their skill on evaluating literature, thinking critically, presenting, and writing scientifically.
- *Exam*: there will be one final exam (open book).

References

- Bonan, G., 2015. Ecological Climatology: Concepts and Applications. Cambridge University Press.
- Shuttleworth, W.J., 2012. Terrestrial Hydrometeorology. John Wiley & Sons.
- Campbell, Gaylon S., and John M. Norman. 1998. An Introduction to Environmental Biophysics, 2nd edition. Springer.
- Eli Tziperman, 2022. Global Warming Science: A Quantitative Introduction to Climate Change and Its Consequences, Princeton University Press.
- Journals and online resources (noted in the lectures).

Grading Scale

CSES5800:

<u>Grading method</u>	<u>Percent</u>
Homework	60%
Exam	40%

CSES6800:

<u>Grading method</u>	<u>Percent</u>
Homework	50%
Exam	30%
Project:	20%

<u>Grade</u>	<u>Percentage Range</u>
A	90 to 100
B	80 to 89
C	70 to 79
D	60 to 69
F	59 or lower

Classroom Policies

Excused Absences: Students are granted excused absences from class for the following reasons: Illness of the student or serious illness of a member of the student's immediate family, death of a member of the student's immediate family, trips for student organizations sponsored by an academic unit, trips for University classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance and religious holidays. Students who wish to have an excused absence from this class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required.

Make-Up Policy: Arrangements to make up missed major examination (e.g., hour exams, mid-term exams) due to properly authorized excused absences. Except in unusual circumstances, such as continued absence of the student or the advent of University holidays, a make-up exam will take place within two weeks from the time the student initiates arrangements for it. Except in extraordinary circumstance, no make-up exams will be arranged during the last three days before the final exam period begins. The format of the make-up exam will be (as specific by the instructor).

Face Coverings: Auburn University permits individual faculty members to require face coverings in their classrooms. Students in this class are required to wear face coverings that appropriately cover the nose and mouth to limit the spread of infectious disease. Failure to comply with the requirement represents a potential Code of Student Conduct violation and may be reported as a non-academic violation. Please consult the [Policy on Classroom Behavior \(Links to an external site.\)](#) for additional details.

Comply with the provisions of the Americans with Disabilities Act: Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to make an individual appointment with the instructor during the first week of classes – or as soon as possible if accommodations are needed immediately. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

Academic Honesty: All portions of the Auburn University Student Academic Honesty code (Title XII) found in the Student Policy eHandbook (Links to an external site.) will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Classroom Behavior: The Auburn University Classroom Behavior Policy is strictly followed in the course; please refer to the Student Policy eHandbook (Links to an external site.) for details of this policy.

Emergency Contingency: If normal class and/or lab activities are disrupted due to illness, emergency, or crisis situation (such as an H1N1 flu outbreak), the syllabus and other course plans and assignments may be modified to allow completion of the course. If this occurs, an addendum to your syllabus and/or course assignments will replace the original materials.