

CSES 7600: Agroclimatology

College of Agriculture

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Office hour: By appointment via Zoom

Fall 2021
10:00-11:15am M, W
Classroom: Funchess 210 or Zoom
Credits: 3

Course Description

This course covers climatological and hydrological processes and their impacts on food and agriculture, water resources, and ecosystems, climate data analysis, and climate resilience.

Course Objectives

The purpose of this course is to help students familiarize fundamental concepts of climatology and hydrology, how to use these fundamental knowledges to solve real world problems, and how to think and read critically on scientific literatures. The learning objectives include understand climatological and hydrological phenomenon, processes and their effects on food and agriculture, water resources, and ecosystems, analyze hydro-climatological data using a computing language, and understand the concept of climate resilience.

Course Outcomes

By the end of this course, students will learn theoretical and applied knowledge of climatology, hydrology, data analysis, and basics in modeling, and improve their ability to evaluate literature, thinking critically, present, and write scientifically.

Course Content and Calendar*

This course includes three sections covering both fundamental concepts and practical applications, including basic climate phenomenon and processes, energy and water fluxes over land surface, climate data, forecasting, impact modeling, 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: Radiation and plant development	

8	Topic: Surface energy flux	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: Climate hazards and drought	
20	Topic: Building climate resilience	Homework 5
21	Topic: Final review	

Practice and Assessment

Homework exercises: students will work on five homework exercises to practice concepts and methods learned in the class.

Project: 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. An Introduction to Environmental Biophysics, 2nd edition. Springer, 1998.
- Hatfield, J.L., Sivakumar, M.V.K. and Prueger, J.H., 2018. Agroclimatology: linking agriculture to climate, agronomy monographs 60, 2018.
- Peer-reviewed papers from scientific journals or technical documents

Grading Scale

<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

Attendance

Remote instruction

The class will meet twice a week **face to face (F2F)** or through **Zoom** with each class being 1 hour 15 minutes. When we meet on Zoom, your attendance, attention, and participation are expected. Zoom participation requires you to keep your video on and your microphone muted when you are not speaking. Although you may be participating from your domicile, our Zoom meetings are professional interactions. You should dress and behave as you would in a normal F2F classroom. To the extent possible, please minimize distractions in the background. I reserve the right to dismiss anyone from a Zoom meeting whose environment or behavior is distracting or problematic. If you have any issues with sharing your video feed, adhering to this policy, or anything else related to your use of Zoom please notify me via email in the first week of class. I'm happy to consider and provide accommodations, but you will need to be in communication with me.

COVID19-related absence

Your health and safety are my top priorities. Please do the following in the event of an illness or COVID-related absence:

- Notify me in advance of your absence if possible
- Keep up with coursework as much as possible
- Submit assignments electronically as much as possible
- Notify me if you require a modification to the deadline of an assignment or exam
- Finally, if fulfilling the necessary requirements becomes impossible due to illness or other COVID-related issues, please let me know as soon as possible so we can discuss your options.

If I become ill or unable to lead the class, a backup instructor will be identified who will communicate any changes or updates to the course schedule or mode of instruction as soon as possible.