



GEOGRAPHY 5194 – Drought: A Persistent Climate Hazard

GEOG 5194: Group Studies in Geography

Autumn 2022. 3 Units.

Elective for Atmospheric Sciences, GEOG-BS (Physical Geography and Spatial Analysis) and GEOG-BA (Environment and Society) Majors

Last updated August 18, 2022

Instructor: Dr. Zachary Leasor

Office: 1048 Derby Hall

Email: leasor.4@osu.edu

Weekly Class Meeting: MoWe 11:10 A.M. – 12:30 P.M., Derby Hall 1116

Office Hours: Dr. Leasor's office hours will be held Mondays from 1:00 – 3:00 P.M. and by appointment. You can attend office hours either in person (1048 Derby Hall) or virtually by appointment (using Zoom):

<https://osu.zoom.us/j/3835662423?pwd=YkNUcDNZZXRYeWFYdWxwdG5xSmxkZz09>

Meeting ID: 383 566 2423

Password: 654695

If the above times do not work for you, please email me to setup a meeting at a time that works for you.

Course Description

Drought is a complex climate hazard at the intersection of the atmospheric and terrestrial components of the hydrologic cycle. Precipitation deficits and subsequent drought conditions can occur in any climate type and during any season. Drought poses a significant risk for society because it results in agricultural losses, reduced water resources, negative economic impacts, and human health concerns. To compound this risk, drought impacts tend to persist longer than other natural climate hazards. This course will provide students with an introduction to drought and highlight key research questions in hydroclimatology. This course will introduce different types of droughts and their definitions, examine the physical processes that lead to drought, and explore methods of monitoring drought. Students will be introduced to critical research questions within the drought community through in-class discussions, practical applications of hydroclimatic data, and a final research paper.

Learning Objectives

By the end of this course, students should successfully be able to:

- (1) identify conceptual and operational definitions of drought
- (2) summarize and analyze scientific literature through collaborative discussions

(3) interpret climate data to evaluate drought events

(4) design and communicate a report summarizing a local drought event

Credit hours and work expectations: This is a **3-credit-hour course**. According to Ohio State policy, students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: You are expected to attend class and participate in course activities. Classes will include reading discussions, activities, presentations, and feedback on assignments that is essential for performing well in this course. If you have a situation that might cause you to miss class, please try and discuss it with me prior to the class you will miss. Any absences without prior approval or a doctor's note will not be excused. Attendance will count for half of your participation grade (10% of your total grade). **Each unexcused class absence will result in a 1-percentage point deduction from a student's total grade.**

Prerequisites: ATMOSSC 2940, GEOG 5900, OR Instructor Approval

Textbook and other materials: There is no required textbook for this course. Readings for this class will be assigned by the instructor on Carmen. These readings will be drawn from peer-reviewed articles in climatology, atmospheric science, and geography journals that are relevant to drought topics.

Evaluation

Grading scale

93–100:	A
90–92.9:	A-
87–89.9:	B+
83–86.9:	B
80–82.9:	B-
77–79.9:	C+
73–76.9:	C
70–72.9:	C-
67–69.9:	D+
60–66.9:	D
Below 60:	E

How your grade is calculated

Your grade will be based on four parts:

Participation	20%
Reading Discussion Boards	20%
Assignments	40%
Final Paper	20%

Participation. This is an in-person course. There will be short lectures, class discussions, activities, and presentations during the weekly course time. **I will not be recording class content to post online.** Therefore, in-class attendance is expected with active participation during these activities. Participation

will count for 20% of your grade. Attendance will count for half of your participation grade (10% of your total grade). In-class participation is essential for helping students learn and apply course concepts. In-class participation will count for the other half of your participation grade. Therefore, students are expected to participate in class paper discussions and in-class activities.

Reading Discussion Boards. There will be a series of reading discussion boards posted on Carmen that are worth a total of 20% of your grade to complement the readings and in-class activities. These are meant to help the students and reward class preparedness. On weeks with an assigned reading, you will be required to post on the reading discussion board prior to class time (11:10 AM) on the assigned due date. Submissions will be locked on Carmen after this time. I will upload the readings and discussion questions to Carmen at least one week before the posted due date. For each discussion board, students should provide answers to discussion questions and include any additional questions they have about the readings. There will be a total of 10 reading discussion boards to complete throughout the semester.

Assignments. Three short homework assignments will require students to apply what they have learned in class. Each assignment and a midterm presentation of your results are each worth 10% of your total grade. All homework assignments will be administered through Carmen. They are due before the start of class (TBD; tentative due dates shown on the course schedule). **There will be a 5% deduction per day for late assignments. Homework assignments turned in more than one week after the due date will receive a zero.** These assignments will take place during the first half of the semester before the midterm presentation. The assignments will allow students to work with drought data provided by the instructor. At the beginning of the semester, students will be assigned groups to work with for these assignments. **These groups will stay the same for all three assignments because the assignments are cumulative. The midterm presentation is based on the findings from your drought analysis.** The assignments given to each group will be identical, except for the drought data which is being used. Each group of students will complete the assignments using different drought data for a selected location. These assignments will require simple data analysis and it is expected that students have at least an intermediate background in Python. Other programming languages (R, Matlab, etc.) may also be used to complete the assignments. More information regarding the assignments will be provided by the instructor.

- Assignment 1 (10%): Metadata (description of data source and data type, strengths and weaknesses of the data, simple time series analysis)
- Assignment 2 (10%): Drought climatology (use the US Drought Monitor to classify historical drought events; quantify the onset, termination, length, and severity of drought events)
- Assignment 3 (10%): Climate analysis (case study of selected drought events, examine how weather and climate conditions contributed to the drought)
- **Midterm Presentation (10%):** As part of the cumulative completion of the assignments, each group of students will be required to provide a midterm presentation of their drought analysis. Each presentation will be 12-15 minutes in length, and it is expected that all students present parts of their analysis. We will use class time for midterm presentations and allow time for questions and a discussion surrounding each drought analysis. Further details will be provided during the semester.

Final Paper. The second half of the course will require students to write a final paper on a drought topic of their choice. This is worth 20% of your grade. **There will be NO final exam for this course.** Students should use the background knowledge gained in this course with the readings to pick a topic that interests them and provide a thorough review of this topic. This will require students to assimilate research from peer-reviewed journals and identify key findings surrounding their topic. Students should submit their topic proposal to be approved by the instructor no later than November 9. More information will be provided during the semester.

Drought News Briefing. I will start each class on Mondays with a “drought news briefing.” During this time, I will spend some time (no more than 30 minutes) discussing current drought events occurring across the world. This will include news stories, forecasts, innovative drought products, and other items that are relevant to this course. These briefings are meant to initiate discussion and connect current events to the materials covered in class. I encourage students to send any interesting drought stories they find throughout the week, and I will include these in the news briefing. Participation is encouraged but not required as part of your grade.

COURSE SCHEDULE

*****The readings included in the schedule below are tentative and may change throughout the semester*****

Week	Day	Class Content	Readings	Assignments	Week
Aug. 22	W	Syllabus and intro	Syllabus		1
Aug. 29	MW	Conceptual definitions of drought	Wilhite (2000); Hao et al. (2017)	Reading Discussion Board	2
Sep. 5	W	Drivers of drought: precipitation and atmospheric demand	Vicente-Serrano et al. (2020)	Reading Discussion Board	3
Sep. 12	MW	Drought evolution and persistence	Wood et al. (2015)	Reading Discussion Board	4
Sep. 19	MW	Drought indices I	Heim (2002); Svoboda and Fuchs (2017)	Reading Discussion Board	5
Sep. 26	MW	Drought indices II	Hayes et al. (2011); Hoffman et al. (2020)	Assignment 1 due; Reading Discussion Board	6
Oct. 3	MW	Drought indicators I	Krueger et al. (2019)	Reading Discussion Board	7
Oct. 10	MW	Drought indicators II	Barker et al. (2016)	Assignment 2 due; Reading Discussion Board	8
Oct. 17	MW	Drought impacts	Wilhite et al. (2007); Kchouk et al. (2022)	Reading Discussion Board	9
Oct. 24	MW	Drought in Ohio / Drought Special Topics		Assignment 3 due	10
Oct. 31	MW	Midterm Presentations I			11

Nov. 7	MW	Midterm Presentations II		Drought Paper Topic Due	12
Nov. 14	MW	Drought and climate change I	Ault (2020); Chiang et al. (2021)	Reading Discussion Board	13
Nov. 21	M	Drought and climate change II			14
Nov. 28	MW	Drought research: Instructor presentation	Quiring (2009); Leasor et al. (2020)	Reading Discussion Board	15
Dec. 5	MW	Final day of class is Wed. 12/7: Semester wrap-up & open office hours for final paper			16
Dec. 8		Final paper due on Thursday, 12/8 at 11:59 PM (No final exam)			17

Course technology

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [CarmenCanvas accessibility](#)
- [CarmenZoom accessibility](#)

Academic integrity policy for this class

OHIO STATE'S ACADEMIC INTEGRITY POLICY

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](#), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and

guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on Title IX

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options at titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu. Title IX is part of the Office of Institutional Equity (OIE) at Ohio State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information on OIE, visit equity.osu.edu or email equity@osu.edu.

Your mental health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you find yourself feeling isolated, anxious or overwhelmed, please know that there are resources to help: ccs.osu.edu. You can reach an on-call counselor when CCS is closed at (614) 292-5766 and 24 hour

emergency help is also available through the 24/7 National Prevention Hotline at 1-(800)-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.