GEOG 434: Hydrology and Environment
Course Syllabus

Course Information

Course Number: GEOG 434, Fall 2024

Course Title: Hydrology and Environment

Section: 501

Credit Hours: 4

Time and Location: MWF 11:30 am-12:20 pm, OMB 103

Course Prerequisites: GEOG 203 or equivalent.

Class Webpage: https://canvas.tamu.edu/

Instructor Details

Instructor: Dr. Shobha Yadav

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Office hours: Tuesday 11 to 12 pm or by appointment

Course Description and Objective: The main objective of this course is to provide you with an understanding of all components of the hydrologic cycle as well as how these elements may fluctuate both geographically and temporally under the impact of the environment and human activity. For life to exist on Earth, water is essential. This course will emphasize the importance of water in the sky, on the earth's surface, and in the soil's root zone. Precipitation, evapotranspiration, infiltration & storage, runoff, and all other hydrologic processes influencing surface and groundwater resources will be examined. This involves examining how climate, soils, vegetation, land-use patterns, and human activity all affect hydrologic systems. We'll look into the:

1) **processes** controlling each component of the hydrologic cycle.
2) **spatial and temporal distribution** of each component of the hydrologic cycle in the atmosphere and over the earth's surface (i.e., how and why it varies)
3) **measurement and modeling** of each component of the hydrologic cycle (i.e., how is it measured, how accurate are the measurements and models, what are the known biases in measuring and modeling this component)
4) **issues** related to how humans manage each component and how human activities influence it.

The readings and lectures will cover the fundamental principles that are necessary for understanding hydro-climatology. The project will require you to quantitatively analyze real-world hydrologic problems and help you develop research skills (data analysis, problem-solving, etc.).

Course Learning Outcomes: After completing this course, you should be able to accomplish the following activities (skill objectives) and have the following knowledge (knowledge objectives):

Knowledge objectives (Things you should know by the end of the course):

- Describe the processes that are responsible for each component of the hydrologic cycle.
- Describe the spatial distribution of each of the components and why they are distributed in this manner (i.e., how and why). You should also be able to describe the temporal trends in each component.
- Describe how each component of the hydrologic cycle is measured and modeled and the biases (errors) in each of the measuring and modeling techniques.
- Discuss the major water resource issues and critique the proposed solutions to these issues.
- Critique published research on hydrology and hydro-climatology and be able to describe the strengths and weaknesses of the data and methodology utilized by the authors.

Skill objectives (Things you should be able to do by the end of the course):

- Interpolate precipitation data.
- Analyze trends in precipitation data.
- Calculate the recurrence interval for precipitation events of a given magnitude.
- Model evapotranspiration.
- Calculate infiltration and runoff.
- Estimate peak discharge.
- Model the climatic water balance.
- Perform library research.
- Deliver a clear and concise oral presentation on the research that you completed during the semester.

Textbook and Materials:

- **Recommended:** Physical Hydrology. S. L. Dingman. 3rd Ed. 2014. Waveland Press. ISBN: 978-1-4786-1118-9
- Additional readings on Canvas
- iClicker

The textbook will cover the basic material for each unit and the other assigned readings (which will be drawn from the scientific literature) will provide more depth on certain topics.

Grading:

Class Activities 20%
Exams 30%
Labs 25%
Research Project and Presentation 25%

Grades will be assigned based on the following cutoffs: A = > 90%, B = 80-89%, C = 70-79%, D = 60-69%, F = <60%.

Pre-class assignments and in-class activities (20%): To introduce the topics we will be discussing and working on each day, there will be a short quiz based on the assigned reading and/or video prior to every class. The readings and videos for each day will be assigned in the class. Similarly, we will use iClickers and in-class activities to assess your preparation and

understanding, generate discussion, encourage participation, and deepen your comprehension of the course material. Some activities will award full points for participation, while others will give half points for participation and full points for correctness. Please note that there will be **no make-up for missed participation**, whether **due to technical difficulties or absences**. More detailed instructions will be provided in the class. If you miss the class, you will receive a grade of zero.

Exams (30%): There will be 2 exams throughout the semester (not cumulative). Exams will be based on the material covered in the lectures, the readings, and in-class exercises. Students seeking an excused absence on a test day must notify the instructor by the end of the next working day following the absence, as described in Texas A&M University Student Rules. For an absence considered excused by the university (see Student Rules), the student will be required to make-up the missed exam. **At the instructor's discretion, the make-up exam might be in a different format (e.g., essay, etc.) than the original exam.** Please see the instructor in advance if you know you cannot take a test on the scheduled date.

Research Project and Presentation (25%) (4% for each of the 5 separate assignments (total 25%) + PowerPoint file and presentation together (5%)): This is a group activity. The research project will provide you with an opportunity to do an in-depth study on a hydrological topic that interests you. I am expecting you to review the relevant literature. This assignment will be discussed in more detail in class. Additionally, a separate document detailing assignments will be uploaded on Canvas. You are welcome to select any topic that relates to the hydrological cycle (e.g., precipitation, evapotranspiration, soil moisture, runoff, or streamflow). At the end of the semester, you will also turn in a presentation file (for example, pdf or PowerPoint slides). **I will go over the grading rubric in class. The presentations will be evaluated by your peers and me. Note that attendance is mandatory during presentation days (Nov 20 - Dec 02). Points will be deducted if you are not present in the classroom during your fellow groups' presentations.**

Labs (25%): The lab exercises will help you develop the quantitative research skills (data analyses, problem-solving, etc.) that a hydrologist needs. The lab exercises will involve solving real-world hydrologic problems. While you are encouraged to work with your fellow students to solve these problems you must do your own work (no group write-ups or sets of calculations). No late exercises will be accepted. Students who do not hand in their exercise by the due date will receive a grade of zero (unless they have a university excused absence (see Student Rules)). More details on the lab exercises are provided in the lab syllabus. The TA of this course is the instructor of the lab class.

There will not be any extra-credit activities offered in this class.

Late Work Policy: All assignments must be submitted by the due date at Canvas. **NO LATE ASSIGNMENTS WILL BE ACCEPTED. STUDENTS WHO DO NOT TURN IN THEIR ASSIGNMENTS BY THE DUE DATE WILL RECEIVE A GRADE OF ZERO** (unless they have university excused absence (see Student Rules, https://student-rules.tamu.edu/rule07/).

Attendance policy: Class attendance is required. Attendance is regularly counted. Class attendance contributes significantly to academic success. Students who attend classes regularly

tend to earn higher grades and have higher passing rates in courses. Excessive absences may jeopardize students' grades or even their ability to continue in their courses. "The university views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments."

It is very easy to fall behind during a semester. If you cannot take/submit exams/papers/quizzes because of an excused reason, please contact me as soon as possible. Official documentation should be provided to facilitate the decision. If you are aware of a situation in advance that will conflict with an assignment or test date, it is your responsibility to contact me beforehand and let me know. In cases where advance notification is not feasible (e.g., accident or emergency) you must provide notification by the end of the second working day after the absence. This notification should include an explanation of why the notice could not be sent before the class. If the absence is considered excused by the university (see http://student-rules.tamu.edu/rule07), you will be able to make up the missed exam/assignment. The instructor's decision is final regarding this matter. Computer issues are not a valid excuse for not taking an exam or turning in something late. At my discretion, the make-up exam might be in a different format (for example, essay instead of multiple choice) than the original exam.

Communications: The best way to contact me is through email. Please use your **official @email.tamu.edu e-mail** to communicate with you if you have any questions regarding the class. I cannot respond to messages from personal Gmail, Yahoo, etc. accounts. **When emailing me about class put "GEOG 434" in the subject line**. All the class-related announcements including exam information papers, or mistakes I made in the lecture will be communicated through email. Please check your **official @email.tamu.edu e-mail** on a regular basis for potentially important announcements.

Please use my **office hours** (as mentioned above) to discuss anything and/or to ask questions. Email is not a substitute for office hours, but you can email me if you have any questions. I will try my best to answer your questions through E-mail promptly (by the next 2 school days). If you do not receive a response, please follow up with me because we may not have received the e-mail for various reasons. Do not wait until the last minute to ask questions, especially before the examination.

General Expectation: Feel free to bring laptops, iPads, or any other devices to class, as long as they are being used for classroom purposes. However, to ensure a positive learning environment, any rude or disruptive behavior will not be tolerated. If your behavior is considered inappropriate, you will be asked to leave the class.

Copyright: The materials used in this course are copyrighted. These materials include but are not limited to the syllabus, quizzes, exams, slides, in-class materials, handouts, and additional problem sets. Because these materials are copyrighted, **you may not upload your class notes or any other course materials (e.g., this syllabus, any lecture slides, assignments, and/or exam questions) to note-sharing or tutoring/student services websites**. Doing so constitutes a violation of the Aggie honor code, in addition to copyright infringement.

University Writing Center (UWC): The UWC is located in suite 1.214 on the second floor of Evans Library. It provides students with one-on-one consultations with a trained writing consultant. They can help you with all aspects of the writing process (e.g., how to start writing, how to proofread your work, how to write an introduction). Please call (458-1445), click (http://writingcenter.tamu.edu), or visit the UWC to make an appointment or to find out more about their services.

Academic Integrity

Aggie Code of Honor: "An Aggie does not lie, cheat, or steal, or tolerate those who do"
https://aggiehonor.tamu.edu/

Texas A&M has an *Academic Integrity Policy* to which both students and faculty must comply. The Aggie Honor System Office handles all cases of academic misconduct. Details about the Aggie Honor Policy can be found at https://aggiehonor.tamu.edu/.

Plagiarism is when you pass off someone else's work (language or ideas) as your own. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism destroys the trust among colleagues without which research cannot be safely communicated.

For more information, see "Scholastic Dishonesty" under the Texas A&M University Student Rules: https://student-rules.tamu.edu/.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact Disability Services, currently located in the Student Services Building, or at (979) 845-1637. For additional information, visit https://disability.tamu.edu/.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention—including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall well-being. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. on weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Academic Freedom and Classroom Discussion

Academic freedom is a cornerstone of the University. Academic freedom in its teaching aspect is fundamental for the protection of the rights of the teacher in teaching and of the student to freedom in learning.

1) Each faculty member is entitled to full freedom in the classroom discussing the subject which the faculty member teaches.
2) Texas A&M will not penalize or discipline members of the faculty because of their exercise of academic freedom.

   Along with this freedom comes responsibility. It is the responsibility of faculty members to ensure that topics discussed are related to the classroom subject. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.
3) It is not the proper role of the university or any outside agency to attempt to shield individuals from ideas and opinions they find unwelcome, disagreeable, or even deeply offensive.

Engaging with new ideas and perspectives helps students grow intellectually and is beneficial to the educational process.

Course Topics and Tentative Schedule: Fall 2024*

I will try to follow this schedule; but I reserve the right to change the topics depending on the pace of the class, unusual planet Earth events, or other happenings.

Date	Topic	Exam/Quiz/Assignment/Holidays/Others
19-Aug	Discussion of the Syllabus, Introduction	
21-Aug	Basic Hydrologic Concepts-Hydrological Cycle	
23-Aug	Structure and Properties of Water & Water Budgets	
26-Aug	Precipitation and Atmospheric Water	
28-Aug	Precipitation and Atmospheric Water	
30-Aug	Precipitation and Atmospheric Water	Project Topic Selection Assignment is Due
02-Sept	**Labor Day: No class**	
04-Sept	Precipitation and Atmospheric Water	
06-Sept	In-class Activity	
09-Sept	Evaporation and Transpiration	
11-Sept	Evaporation and Transpiration	
13-Sept	In-class Activity	Annotated Bibliography Due
16-Sept	Evaporation and Transpiration	
18-Sept	Evaporation and Transpiration	
20-Sept	Groundwater Hydrology	
23-Sept	Groundwater Hydrology	
25-Sept	Groundwater Hydrology	
27-Sept	Groundwater Hydrology	Work Progress Update
30-Sept		
02-Oct	Review Session for EXAM I	
04-Oct	**EXAM I**	
09-Oct	Runoff Generation and Streamflow	
11-Oct	In-class Activity	Data and Methods Due
14-Oct	Runoff Generation and Streamflow	

16-Oct	Runoff Generation and Streamflow	
18-Oct	Runoff Generation and Streamflow	
21-Oct	Snow Hydrology	
23-Oct	Snow Hydrology	
25-Oct	In-class Activity	Result and Discussion Due
28-Oct	Snow Hydrology	
30-Oct	Snow Hydrology	
01-Nov	In-class Activity	
04-Nov	Hydrology and Ecosystem	
06-Nov	Hydrology and Ecosystem	
08-Nov	Hydrology and Ecosystem	Rough Paper Due (Bonus)
11-Nov	Issues in Hydrology and Water Resources Management	
13-Nov	Issues in Hydrology and Water Resources Management	Q-Drop Deadline at 5 pm
15-Nov	Review for EXAM#2	
18-Nov	**EXAM#2**	
20-Nov	Student Paper Presentation	
22-Nov	Student Paper Presentation	
25-Nov	Student Paper Presentation	
27-29 Nov	**Thanksgiving Break**	
02-Dec	Student Paper Presentation Last Day of Fall Semester **Final Paper Due**	

**Note: This outline is only a guide. You should expect departures from this outline.*