**Physical Hydrology / Water and the Earth System**

**EPS 522/ENVS 423L**

**Dr. Katie Markovich; kmarkovich@unm.edu**

**Class Meets TR 9:30am-10:45am**

**Room 105 Northrop Hall**

**Lab Meets R 2pm-4:50pm**

**Room 115 Northrop Hall**

Office Hours, TR 11am-noon in Northrop 210 or by appointment

3/4 Credit hours

## Course Objective:

To explain, diagnose, and predict the physical processes that govern: 1) the spatial and temporal characteristics of water in its various storage reservoirs (terrestrial, atmospheric, oceanic) and 2) the corresponding fluxes of water between these reservoirs. To be able to read and interpret the scientific literature on physical hydrology and to be able to work with modern hydrologic datasets. Topics will include the hydrologic cycle, atmospheric thermodynamics, radiation processes, atmospheric circulation, precipitation and snow processes, unsaturated flow, evapotranspiration, groundwater flow, runoff and streamflow, and watershed modeling.

# Textbook

**Required:** Physical Hydrology 2nd Edition, by S. Lawrence Dingman

# Coursework and Participation

## Important Dates

**Exam 1: October 7**

**Fall Break: October 9-10**

**Term Project Due: December 4**

**Final Exam: Week of December 8**

## Procedures for Completing Coursework

The homeworks will be focused on analyzing real-world hydrological data using python and will be assigned approximately once per week, and each assignment will be due the following week. If you miss a homework deadline, you can still do the assignment for 50% credit the following week. No credit will be given if you are more than one week late.

There will be 2 exams, one on **October 7th** and a final exam during the week of **December 8**. The first exam will the first half of the semester, while the final exam will be comprehensive.

A term paper on any topic in physical hydrology will be due on **December 4.** Details on the term paper requirements will be provided early in the semester.

If you anticipate a difficulty meeting a deadline, please let me know as soon as you know, preferably at least a week in advance.

Unless otherwise indicated, all work must be submitted online in the class’s Canvas web site. If you have a difficulty using a tool to complete work, notify me as soon as possible.

For students in the undergraduate 4-credit section, the labs meet weekly on Thursdays and is primarily a recitation to be able to work with the TA and your classmates on the homework assignments. All students are welcome to attend the lab for additional assistance with the homeworks.

# Grading Procedures

400 Level

* Homework will constitute 60% of your total grade
* Each exam will constitute 20% of your total grade

500 Level

* Homework will constitute 40% of your total grade
* Each exam will constitute 20% of your total grade
* The term project will constitute 20% of your total grade

Grading Scale

Final grades will be based on the sum of all possible course points as noted above. Percentage of available points

Grade

90 -100 A

80 -89 B

70 -79 C

60 -69 D

< 60 F

**Accommodations**: UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center (https://arc.unm.edu/) at arcsrvs@unm.edu or by phone at 505-277-3506.

**Title IX**: The University of New Mexico and its faculty are committed to supporting our students and providing an environment that is free of bias, discrimination, and harassment. The University’s programs and activities, including the classroom, should always provide a space of mutual respect, kindness, and support without fear of harassment, violence, or discrimination. Discrimination on the basis of sex includes discrimination on the basis of assigned sex at birth, sex characteristics, pregnancy and pregnancy related conditions, sexual orientation and gender identity. If you have encountered any form of discrimination on the basis of sex, including sexual harassment, sexual assault, stalking, domestic or dating violence, we encourage you to report this to the University. You can access the confidential resources available on campus at the LoboRESPECT Advocacy Center (https://loborespect.unm.edu), the Women’s Resource Center (https://women.unm.edu), and the LGBTQ Resource Center (https://lgbtqrc.unm.edu). If you speak with an instructor (including a TA or a GA) regarding an incident connected to discrimination on the basis of sex, they must notify UNM’s Title IX Coordinator that you shared an experience relating to Title IX, even if you ask the instructor not to disclose it. The Title IX Coordinator is available to assist you in understanding your options and in connecting you with all possible resources on and off campus. For more information on the campus policy regarding sexual misconduct and reporting, please see https://policy.unm.edu/university-policies/2000/2740.html and CEEO’s website. If you are pregnant or experiencing a pregnancy-related condition, you may contact UNM’s Office of Compliance, Ethics, and Equal Opportunity at ceeo@unm.edu. The CEEO staff will provide you with access to available resources and supportive measures and assist you in understanding your rights.

**Student Support**: Confidential services for students are available at LoboRESPECT Advocacy Center, Women's Resource Center, and the LGBTQ Resource Center. The Women’s Resource Center supports all students, including those who are pregnant or are parents. UNM’s lactation stations are marked on the UNM campus map.

**Credit-hour statement:** This is a three credit-hour course. Class meets for two 75-minute sessions of direct instruction for fifteen weeks during the Fall 2025 semester. Please plan for a minimum of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

# Schedule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Physical Hydrology Schedule (subject to change) | | | | |
| Date |  | Topic | Reading | Due dates/notes |
| 19-Aug | Tue | Introduction | Ch. 1 |  |
| 21-Aug | Thur | Working with python and git |  | Bring laptop |
|  |  |  |  |  |
| 26-Aug | Tue | Hydrologic Concepts | Ch. 2 | HW1 |
| 28-Aug | Thur | Climate System | Ch. 3 |  |
|  |  |  |  |  |
| 2-Sep | Tue | Climate System | Ch. 3 | HW2 |
| 4-Sep | Thur | Precipitation | Ch. 4 |  |
|  |  |  |  |  |
| 9-Sep | Tue | Precipitation | Ch. 4 | HW 3 |
| 11-Sep | Thur | Snow and snowmelt processes | Ch. 5 |  |
|  |  |  |  |  |
| 16-Sep | Tue | Evapo(transpir)ation | Ch. 7 | HW 4 |
| 18-Sep | Thur | Evapo(transpir)ation | Ch. 7 |  |
|  |  |  |  |  |
| 23-Sep | Tue | Streamflow | Ch. 9 | HW 5 |
| 25-Sep | Thur | Streamflow | Ch. 9 | Project proposal due |
|  |  |  |  |  |
| 30-Sep | Tue | Streamflow | Ch. 9 | HW 6 |
| 2-Oct | Thur | Review |  |  |
|  |  |  |  |  |
| 7-Oct | Tue | Exam #1 |  |  |
| 9-Oct | Thur | No class, Fall Break |  |  |
|  |  |  |  |  |
| 14-Oct | Tue | Vadose Zone | Ch. 6 |  |
| 16-Oct | Thur | Vadose Zone | Ch. 6 |  |
|  |  |  |  |  |
| 21-Oct | Tue | Groundwater | Ch. 8 | HW 7 |
| 23-Oct | Thur | Groundwater | Ch. 8 |  |
|  |  |  |  |  |
| 28-Oct | Tue | Groundwater | Ch. 8 | HW 8 |
| 30-Oct | Thur | Groundwater | Ch. 8 |  |
|  |  |  |  |  |
| 4-Nov | Tue | Hydrologic Modeling | Ch.2.9, 9.5-6 | HW 9 |
| 6-Nov | Thur | Hydrologic Modeling |  |  |
|  |  |  |  |  |
| 11-Nov | Tue | Hydrologic Modeling |  | HW 10 |
| 13-Nov | Thur | Climate change impacts to hydrology | Ch. 10 |  |
|  |  |  |  |  |
| 18-Nov | Tue | Water Resources Management | Ch. 10 | HW 11 |
| 20-Nov | Thur | Water Resources Management |  |  |
|  |  |  |  |  |
| 25-Nov | Tue | TBD |  |  |
| 27-Nov | Thur | No class, Thanksgiving holiday |  |  |
|  |  |  |  |  |
| 2-Dec | Tue | Project presentations |  | Project reports due |
| 4-Dec | Thur | Project presentations and exam review |  |  |
|  |  |  |  |  |
| ? | ? | Comprehensive Exam |  |  |