Catalog course description. HYDROLOGY FOR WATER RESOURCES MANAGEMENT (3). A quantitative introduction to surface and subsurface hydrology with a focus on decision making for the water resource professional. PREREQS: MTH 251 or consent of instructor.

Course Description. Hydrology for Water Resources Management (HWRM) is a course in hydrology designed for students without backgrounds in engineering or the physical sciences. Requiring just one term of calculus (MTH 241 or 251) and upper-division or graduate standing, the course will provide students with a quantitative introduction to surface and subsurface hydrology. Its purpose is not to produce hydrologists but to give students exposure to hydrology so that they can become better water resources professionals and critical thinkers.

Topics covered include: units, dimensions, and conversions; fluid mechanics; the hydrologic cycle; groundwater and vadose zone hydrology; open channel flow; watershed hydrology; land-atmosphere interactions; water quality. Real-world examples will be used when appropriate. Relevance of hydrology to humans, their institutions, and natural ecosystems will be interwoven throughout the course.

Assessment
Student performance in this course will be assessed through:
- Class participation
- Completion of assignments and problem sets
- Quizzes and a final exam

Grading.

<table>
<thead>
<tr>
<th></th>
<th>424 (%)</th>
<th>524 (%)</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>35</td>
<td>35</td>
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<tr>
<td>Homework</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Class participation</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Take-home final exam</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Graduate Problem Sets</td>
<td></td>
<td>10</td>
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The percentages used for determining the final grades at the end of the term are:
242 Students. A = 100-93, A- = 92.9-90; B+ = 89.9-87, B = 86.9-82, B- = 81.9-80; C+ = 79.9-77, C = 76.9-73; C- = 72.9-70; D+ = 69.9-68; D = 67.9-62; D- = 61.9-60; F = < 60. Note: For P/N or S/U students, 70% is required for P or S.

542 Students. Same as above, except that F = < 70%.

**Homework assignments** will normally consist of numerical problems and be done without help from your classmates. They will be submitted as hard copies.

**Quizzes** will be closed-book, about 30 minutes long, and cover only the lecture and reading materials since the last quiz. They will not have numerical problems but will be designed to test your understanding of the concepts and principles discussed. On quiz day (based on 80-minute classes –meeting twice weekly) we will have about 50 minutes of regular class, then 30 minutes at the end for the quiz. Since only 4 quizzes will count, you can miss one or drop your lowest grade if you take all 5. **No make-ups will be given.**

The final exam will be a take-home exam.

**Etiquette.** My commitment to you is to return assignments promptly, and be on time, organized, ready for class. I will treat you with courtesy and respect and answer your questions. I ask the same of you, and out of courtesy to your colleagues that you not eat, talk, read, or walk around during class. There will be no cell/smart phone use (including text messaging) during class. Please set phones on vibrate. Use of computers (online or not) is allowable as long as it does not prove disruptive to your classmates or me. You can address me by my full first name, or by calling me ‘Professor’, ‘Doctor’, or Prof. or Dr. Campana. This is not Europe, so you do not have to use Prof. Dr. Campana.

**Participation is an important aspect of this class.** Class participation points are not ‘automatic’; attendance is important but engagement in the class is more so. You are expected to read class material before it is covered in class and become actively engaged in class discussions. If it becomes apparent to me that most of the class is not reading the material, I reserve the right to institute unannounced quizzes that will count towards your final grade.

**Office Hours.** I endeavor to keep my office hours as shown. If for some reason I cannot keep them I will let you know. You are always welcome to make an appointment to see me outside normal office hours, or, if my door’s open, drop in to see if I am available.

**Course Objectives**
1) Provide an overview of hydrology
2) Identify and explore the various facets of physical hydrology by solving problems
3) Illustrate specific situations with case histories
4) Expose students to the use and interpretation of simple hydrologic models
5) Equip students with the tools to become critical thinkers
## Learning Outcomes

<table>
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<th>Undergraduate students will:</th>
<th>Through:</th>
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<tbody>
<tr>
<td>Consistent with human geography (H1 to H3) and physical geography (P1 to P3) learning outcomes of the BS degree in Geography and Geospatial Science. Elements specific to this course are shown in learning outcomes 4 to 9.</td>
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<tr>
<td>1. P1. Describe and interpret key concepts of physical geography: weather and climate; ecology; surface processes; hydrology, oceanography; soils (e.g., hydrologic cycle; runoff, groundwater, flood management, drought, etc.).</td>
<td>Homework assignments, quizzes</td>
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<td>2. P2. Demonstrate these principles in the appraisal and modeling of Earth's bio-physical processes, (e.g., hydrologic modeling, groundwater modeling)</td>
<td>Homework assignments, quizzes</td>
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<td>3. P3. Use analytic tools, including quantitative and geospatial, to measure, compare, and synthesize data related to dynamic processes influencing land, water, and ecosystems at various scales (e.g., geospatial analysis of water availability and drought risk)</td>
<td>Homework assignments, quizzes</td>
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<td>4. Learn basic units and dimensions used in hydrology</td>
<td>Exercises, quizzes; and assignments; class discussions</td>
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<td>5. Develop critical thinking skills by seeing how arguments can be slanted or biased</td>
<td>Citing and discussing articles from the popular media; examining organizations’ websites and literature; class discussions; exercises.</td>
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<td>6. Learn how to frame problems so that solutions can be obtained</td>
<td>Exercises, quizzes; class demonstrations; online games</td>
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<td>7. Perform basic hydrologic calculations germane to topics</td>
<td>Exercises; quizzes; class demonstrations.</td>
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<td>8. Present/communicate results in an effective manner</td>
<td>Class discussion; study of ‘real world’ examples</td>
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<td>9. Develop a water ethic</td>
<td>Class discussion; self-assessment</td>
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**Additional learning outcomes for graduate students:**

| 10. Practice critical thinking skills by developing and defending arguments about water resources | Exercises; class demonstrations; online games |
| 11. Solve hydrologic problems using calculations. | Exercises, class demonstrations; online games |
**CLASS SCHEDULE** *(SUBJECT TO REVISION)*

*(NOTE: WEEKLY READINGS SHOULD BE DONE PRIOR TO THE FIRST CLASS MEETING OF THAT WEEK)*

EPH = *Elements of Physical Hydrology* (YOUR TEXT); HW = HOMEWORK ASSIGNMENT DUE QUIZ = QUIZ

**WEEK 1**  EPH: FRONT MATERIAL; CHAPTEERS 1 & 2; APPENDICES 1 & 2.  CHAPTER 2 in Fluvial Hydrology (PDF ON CANVAS)
- T  Introduction; units & dimensions
- R  Continued; Properties of water

**WEEK 2**  EPH: CHAPTER 2; APPENDICES 2 & 3
- T  Land – atmosphere Interactions
- R  Continued **HW 1**

**WEEK 3**  EPH: CHAPTER 3
- T  Fluid dynamics **Quiz 1**
- R  Fluid dynamics

**WEEK 4**  EPH: CHAPTER 4
- T  Open channel hydraulics
- R  Continued **HW 2**

**WEEK 5**  EPH: CHAPTER 5
- T  Catchment hydrology: stream and floods
- R  Continued **Quiz 2**

**WEEK 6**  EPH: CHAPTERS 6 & 7
- T  Groundwater
- R  Continued **HW 3**

**WEEK 7**  EPH: CHAPTERS 7 & 8
- T  Groundwater; Vadose zone hydrology **Quiz 3**
- R  Vadose zone hydrology

**WEEK 8**  EPH: CHAPTER 8
- T  Vadose zone hydrology
- R  Variable source areas **HW 4**

**WEEK 9**  EPH: CHAPTER 9
- T  Hillslope and catchment hydrology **Quiz 4**
- R  Water quality 1

**WEEK 10**  EPH: CHAPTER 10
- T  Water Quality 2
- R  Connections **Quiz 5**

**WEEK 11**  FINAL EXAM
**Learner Expectations**

1. Be respectful of other students, especially our guest lecturers, by attending class on time and staying the entire period.

2. Read assignments before they are discussed in class.

3. Participate in learning activities and complete tasks on time.

4. Come prepared to take the final exam (there are no make-up exams).

5. Cell/smart phone use, text messaging, Facebooking, Tweeting, blogging, doing homework for other courses, reading newspapers or other material unrelated to this course’s content, headphones, etc. are prohibited during class. Leave the classroom if you want to do these.

6. Follow University, departmental, and course policies described above, including proper use and citation of peer-reviewed research.

**Students requiring special accommodations.** Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at [http://ds.oregonstate.edu](http://ds.oregonstate.edu). DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**University and College Policies**

**Civility.** The College of Earth, Ocean, and Atmospheric Sciences follows the university rules on civility and honesty. Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

“The goal of Oregon State University is to provide students with the knowledge, skill, and wisdom they need to contribute to society. Our rules are formulated to guarantee each student’s freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive, or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action office.”

**Goal.** Oregon State University seeks to provide students with the knowledge, skill, and wisdom they need to contribute to society. University rules seek to assure each student’s freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. For more information please see [http://oregonstate.edu/studentconduct/offenses-0](http://oregonstate.edu/studentconduct/offenses-0).

**Cheating.** Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception:

- **Cheating** – use or attempted use of unauthorized materials, information or study aids;
- **Fabrication** – falsification or invention of any information;
- **Assisting** – helping another commit an act of academic dishonesty;
- **Tampering** – altering or interfering with evaluation instruments and documents;
Plagiarism – representing the words or ideas of another person as one’s own.