

# GEOL 355: BASIC HYDROLOGY

## Fall 2012 Syllabus

**Class hours:** MWF 2-2:50 pm Wubben-Science 161

**Instructor:** Dr. Gigi Richard, Associate Professor of Geology  
**Office hours:** Tues 1-3pm, W 9:30-10:30am, Th 11-12, Fri 9:30-10:30am, Wubben 223C  
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**Required Textbook:** Ward and Trimble, 2004, Environmental Hydrology, 2<sup>nd</sup> ed. Lewis Publishers, CRC Press. ISBN: 1-56670-616-5

Supplemental readings will be provided in class or placed on reserve at the library when appropriate. You will be expected to read the assigned sections of the textbook.

**Expectation:** An undergraduate student should expect to spend on this course a minimum of **two hours outside the classroom for every hour in the classroom**. The outside hours may vary depending on the number of credit hours or type of course. More details are available from the faculty member or department office and in CMU's *Curriculum Policies and Procedures Manual*.

**Course Description:** Hydrology is the scientific study of the waters of the earth including water in the atmosphere, on the earth's surface and underground. Water has unique properties that make it vital to life on earth in the physical environment and within the Earth's biota. In this course we will explore the components of the hydrologic cycle including processes of precipitation, evaporation, transpiration, infiltration, ground-water flow, surface runoff and streamflow. We will study the physical processes and explore basic methods of measuring and estimating rates of hydrologic processes as well as explore our personal interaction with the hydrologic cycle.

**Learning Objectives:** Upon successful complete of this course, you should be able to:

- Define, explain and correctly use terms and concepts used to describe basic physical hydrologic processes including evaporation, transpiration, precipitation, infiltration, ground-water flow and surface runoff.
- Explain the hydrologic cycle and the ways that humans impact and interact with it.
- Solve basic hydrologic problems to estimate the magnitude and frequency of hydrologic events.
- Use basic accepted hydrologic modeling to quantitatively measure and estimate the role of physical processes in the hydrologic.
- Evaluate water resource management problems with awareness of the interdisciplinary nature of water resource management and decision-making in the Western U.S.
- Read hydrologic research publications critically and discuss your thoughts

**How to succeed in this class:** In this class you will take an active part in the learning process. In some ways, this will make the course more challenging. However, I hope this approach will make the course more fun and interesting. Because of the interactive nature of the course, attendance and participation will be necessary for you to completely achieve the course goals.

A successful student will do the following:

- Turn off their cell phones when they enter class.
- Attend class **promptly** and **regularly**. Changes to the schedule and/or assignments may be announced in class. It is your responsibility to keep informed.
- Be prepared, alert and ready to **take notes** in class. Preparation includes reading the assignments and doing the homework.

- Speak up in class. Ask questions, make comments! Call me, email me, come to office hours or raise your hand in class!
- Respect your classmates and keep an open mind to what others have to say. Class discussions will be a more productive exchange of ideas if everyone feels comfortable speaking and knows that their classmates respect what they have to say.
- Complete the assigned reading before class and be prepared to demonstrate your understanding of the material or to present questions on the material that you don't understand. Pop quizzes are likely.

**Grading:** Your final grade will be based on the following scheme:

|                    |      |
|--------------------|------|
| Communication      | 10%  |
| Homework           | 20%  |
| 3 Exams (16.7% ea) | 50%  |
| Final Exam         | 20%  |
| <hr/>              |      |
| Total              | 100% |

Letter grades will be assigned using the standard scale: A 90-100%; B 80-89%; C 70-79%; D 60-69%; F< 60%

**Homework:** Homework will be assigned regularly. Keeping up with the homework is the best way to be prepared for class and for the exams. Be prepared to discuss the homework problems in class each day. Some assignments will require additional reading, short essays and access to and understanding of spreadsheet software.

- Homework will be due at the **beginning** of the lecture on the due date.
- Organization and neatness will be a significant part of your grade!
- Late homework will accrue a 10% deduction of the total possible points off your earned grade for each day late. **Late assignments will only be accepted until the graded assignment has been returned.**
- You are encouraged to discuss homework with classmates, HOWEVER simply copying someone else's homework solution is a breach of academic honesty (see section on Academic Integrity below).
- There may be unannounced quizzes given at any time during a lecture period. The score on these quizzes will be added to the homework score.

**Communication/Class Participation:** As you can see, communication is 10% of your grade and includes your participation in class and communication with the instructor. Class participation includes attending class both physically and mentally prepared. Discussion and group problem solving will be an important part of class sessions. Each student is required to either ask a question or make a comment in class (relevant to the course material), or come visit me in my office each week. Each week will count as a portion of the Communication portion of your grade.

**Exams:** In addition to evaluating your understand of the basic concepts of hydrology, exams (including the final) will also contain questions that assess your developing ability to think like a hydrologist and to apply scientific reasoning and hydrologic principles to everyday problems. **Note!** You **must** be present in class on days when exams are given. Exceptions will be made only with my **prior** approval.

**Academic accommodation for students with disabilities:** In coordination with Educational Access Services, reasonable accommodations will be provided for qualified students with disabilities. Please meet with the instructor the first week of class to make arrangements. Nancy Conklin, the Coordinator of Educational Access Services, can be contacted at 248-1826, or in person in Houston Hall, Suite 108.

**Academic Integrity:** Students will be held to a high standard of academic integrity and as such are expected to “do their own work” in accordance with the Colorado Mesa University Academic Policies Guide, <http://www.coloradomesa.edu/academics/policies.html>, statement on Academic Integrity. Representing someone else’s work as your own, that is, without proper citation or acknowledgement is considered plagiarism. In other words, it is not acceptable to copy a classmate’s work, or anyone else’s work from the web, a book, magazine, newspaper, journal, etc. A report will be filed with the Vice President of Academic Affairs for any confirmed case of plagiarism.

**Tutorial Learning Center=TLC in HH 113:** The TLC is a FREE academic service for all Colorado Mesa University students. Tutors are available on a walk-in basis for many courses. Do you have a quick question? Do you need homework clarification or feedback on a paper? Are you reviewing for a test? Help is available at the TLC!

At the main campus, come to Houston Hall 113 to meet with one of our friendly peer tutors. They are open on Monday, Wednesday and Thursday from 8am-6pm; Tuesdays from 8am-7pm, and Fridays from 8am-5pm. They are also open Sundays from 1pm-6pm! Tutoring at branch campuses and distance tutoring is also available. Check out the website for schedules and locations at [www.coloradomesa.edu/tutoring](http://www.coloradomesa.edu/tutoring) or call 248-1392 with any questions.

**Success!!** For more information and ideas about how to be a successful student at CMU, please see the following document...

[http://www.coloradomesa.edu/academics/documents/StudentSuccessatCMU\\_WCCC.pdf](http://www.coloradomesa.edu/academics/documents/StudentSuccessatCMU_WCCC.pdf)

Also available on the K: drive for this class.

## GEOL 355 Fall 2012 - Tentative Schedule

| Week     | Date     | Topic         | Reading Assignments   | Homework Due Dates              |
|----------|----------|---------------|---|---------------------------------|
| 1        | M        | 20-Aug        | Intro/syllabus  | SYLLABUS                        |
|          | W        | 22-Aug        | Intro to water and hydrology  | 1.1 - 1.4                       |
|          | F        | 24-Aug        | Global Water, Hydrologic Cycle  |                                 |
| 2        | M        | 27-Aug        | Finish hydro cycle, Water Balance Approach  | 1.6                             |
|          | W        | 29-Aug        | Water Balance Ex Problems, Discuss Pimenel et al. 2004                                    | Hmwk #1 - Pimentel reading      |
|          | F        | 31-Aug        | Water Balance Examples, Watershed Delineation Exercise                                    |                                 |
| 3        | M        | 3-Sep         | Watershed delineation Exercise - Labor Day  |                                 |
|          | W        | 5-Sep         | Precipitation - occurrence & processes  | 2.1 - 2.3                       |
|          | F        | 7-Sep         | <b>No class meeting</b>   |                                 |
| 4        | M        | 10-Sep        | Precipitation - measurement and data  | 2.4                             |
|          | W        | 12-Sep        | Precipitation - data examples   | Hmwk #3 - Watershed Delineation |
|          | F        | 14-Sep        | <b>EXAM 1 - Water Balance, Precip</b>   |                                 |
| 5        | M        | 17-Sep        | Precipitation - IDF Curves - Intro Precip Data Lab  | 2.7                             |
|          | W        | 19-Sep        | Precipitation Data Lab - meet in Lib 212  |                                 |
|          |          | 21-Sep        | Precipitation - PMP, Areal Avg of Precip - Arith mean and Thiessen polygons               | 2.6, 2.8                        |
| 6        | M        | 24-Sep        | Precipitation - Isohyetal method  |                                 |
|          | W        | 26-Sep        | Interception, stemflow, throughfall   | 10.4                            |
|          | F        | 28-Sep        | Soil Properties and Classification - grain-size distribution and soil texture, porosity,  | 3.1-3.3                         |
| 7        | M        | 1-Oct         | Soil Properties - soil moisture, density, field capacity, wilting point, capillary forces |                                 |
|          | W        | 3-Oct         | Soil Properties - Hydraulic conductivity.   |                                 |
|          | F        | 5-Oct         | Infiltration - influencing factors.   | 3.4, 10.8                       |
| 8        | M        | 8-Oct         | Infiltration - importance, rates, Horton's capacity curve Review for Exam 2               | 3.5-3.6                         |
|          | W        | 10-Oct        | <b>EXAM 2 - Precip, Soil Properties</b>   |                                 |
|          | F        | 12-Oct        | Infiltration - Horton's curve - example   |                                 |
| <b>9</b> | <b>M</b> | <b>15-Oct</b> | <b>NO CLASS - Fall Break</b>  |                                 |
|          | W        | 17-Oct        | Infiltration - field measurement, infiltrometer, phi-index method                         | 3.7-3.8                         |
|          | F        | 19-Oct        | Evaporation - Intro to process, define terms  | 4.1-4.2, 10.6                   |
| 10       | M        | 22-Oct        | Evaporation - influencing factors, PET vs AET, estimation methods                         | 4.5                             |
|          | W        | 24-Oct        | Evaporation - measurement methods - Pan evap , Thornthwaite & Penman methods              |                                 |
|          | F        | 26-Oct        | Evapotranspiration - Lysimeters, remote sensing, Penman-Monteith                          | 4.3, 4.6, 4.7                   |
| 11       | M        | 29-Oct        | Evapotranspiration - Blaney-Criddle Method  |                                 |
|          | W        | 31-Oct        | Evapotranspiration - Blaney-Criddle Example. Review for Exam 3                            |                                 |
|          | F        | 2-Nov         | <b>EXAM 3 - Infiltration and Evaporation</b>  |                                 |
| 12       | M        | 5-Nov         | Surface Runoff - mechanisms   | 10.10                           |
|          | W        | 7-Nov         | Streamflow - the hydrograph & the catchment   | 5.3-5.4                         |
|          | F        | 9-Nov         | <b>Upper Colorado River Basin Water Forum</b>   |                                 |
| 13       | M        | 12-Nov        | Streamflow - measurement  |                                 |
|          | W        | 14-Nov        | Streamflow - data - USGS  |                                 |
|          | F        | 16-Nov        | Streamflow - Flood frequency  | 12.4                            |
| 14       | M        | 19-Nov        | Streamflow - Flood frequency  |                                 |
|          | W        | 21-Nov        | <b>NO CLASS - Thanksgiving</b>  |                                 |
|          | F        | 23-Nov        | <b>NO CLASS - Thanksgiving</b>  |                                 |
| 15       | M        | 26-Nov        | Streamflow - Rational Equation  | 5.6.2                           |
|          | W        | 28-Nov        | Ground water  | 11.1-11.4                       |
|          | F        | 30-Nov        | Ground water  |                                 |
| 16       | M        | 3-Dec         | Ground water  |                                 |
|          | W        | 5-Dec         | Ground water  |                                 |
|          | F        | 7-Dec         | <b>Review and Discussion</b>  |                                 |
|          | M        | 10-Dec        | <b>Mon 10 Dec, 3-4:50am, FINAL EXAM</b>   |                                 |