

**ST: Watershed Hydrology, GEOL 40095/50095/60095  
Spring 2014, Kent State University, Department of Geology**

**Instructor:** Dr. Anne Jefferson, [ajeffer9@kent.edu](mailto:ajeffer9@kent.edu), 330-672-2746, McGilvrey 235C  
**Office Hours:** Monday 11-12; Tuesdays 12-1; Wednesdays 9:30-10:30, Fridays 9-11

**Course Meetings:** Mondays, 2:15 to 3:30 pm, McGilvrey 234

**Final Exam:** Wednesday, May 7<sup>th</sup>, 12:45 – 3:00 pm

**Field Trip:** There is a required field trip on Saturday and Sunday, April 5<sup>th</sup>-6<sup>th</sup>.

**Course Website:** <http://learn.kent.edu>

**Required Materials:** Brooks, K.N., Ffolliott, P.F., and Magner, J.A., 2013, Hydrology and the management of watersheds (4<sup>th</sup> edition), Wiley-Blackwell, 533 pp.

Watershed hydrology is the study of water movement, storage, and transformation across landscapes. In this course, we will address basic questions like: “Where does the water go when it rains?” “What pathways does it take to the stream channel?” and “How long does water reside in a watershed?” Focusing on plot, hillslope, and watershed scales, we will focus mainly on surface and near-surface water to understand how hydrologic processes are regulated by landscape characteristics, human activities and climate dynamics and how hydrology impacts patterns of water quality and geomorphology.

**Learning Objectives:** After completing this course, students will be able to:

1. Explain the physical processes of precipitation, infiltration, evapotranspiration, overland and subsurface flow, stream flow, and groundwater flow;
2. Describe and analyze the flow paths and transit time of water and solutes in a watershed;
3. Explain and apply field measurements and analytical computations used to quantify hydrologic processes; and
4. Assess the influences of climate and land use change on hydrologic processes.

**Preparation for class:** You are expected to have read and be familiar with the material to be covered in class when you arrive. Please read assigned readings (from the textbook or other), as classes will build on this material.

## Assessment

---

Grades will be distributed based on the percentage of points earned. Point values needed to achieve a given grade may be adjusted downward at the end of the term, but will not be adjusted upward.

A/A- = 90-100%, B+/B/B- = 80-90%, C+/C/C- = 70-80%, D+/D = 60-70%, F < 60%

<i>Undergraduates</i>	
Exams (2)	300
Exercises (5)	500
Participation	100
	<hr/>
	900

<i>Graduates</i>	
Exams (2)	300
Exercises (5)	500
Participation	100
Paper summaries (15)	150
	<hr/>
	1050

**Exams** will cover material from lecture, exercises, class discussions, and the assigned readings. Questions may be short answer, essay, data analysis, or mathematical. Each exam will be 150 points and will be completed in class without reference to books or notes. Exams cannot be made up without advance permission of the instructor or without a documented medical excuse or family emergency.

Midterm	3 March
Final Exam	7 May, 12:45-3:00 pm

**Exercises** will be given 5 times during the semester and will involve measurements and calculations to be completed in the field, lab, and on the computer using a spreadsheet program and on-line software. Each exercise will be worth 100 points and topics and tentative due dates are listed below. On their due date, exercises will be due at the beginning of class. Late assignments will be penalized 10% per 24 hours. If the assignment is multi-part, I suggest you turn in all completed parts on time and take the late penalty only for parts where you need more time.

<b>Topic</b>	<b>Planned Due Date</b>
1. Precipitation/Snow Hydrology	3 February
2. Evapotranspiration/Infiltration	17 February
3. Stream and groundwater flow	10 March
4. Wetlands/water quality data analysis	2 April
5. Isotope hydrograph separation	30 April

**Participation** points will be awarded for participation in the classroom sessions, field experiences, and engagement with the hydrologic science academic community. Students can earn up to 100 participation points, through the following activities.

1. Participate in the weekend field trip – up to 50 points
2. Attend and participate in classroom sessions – up to 30 points
3. Assist with hydrograph separation project outside of class sessions – up to 20 points
4. Attend a Geology Colloquium and turn in a 1-page summary (undergraduates only) – 5 points per summary, maximum of 50
5. Attend at CUAHSI cyberseminars (live or recorded) and turn in a 1-page summary – 5 points per summary, maximum of 50. Cyberseminars are available here: <http://www.cuahsi.org/Cyberseminars.aspx> and more seminars will be announced during the semester – 5 points per summary, maximum of 50

### **Paper Summaries**

Graduate students will be required to select, read, and summarize one hydrology journal article each week, broadly related to the topics covered in class that week. Students will submit 1-2 page summaries of each article. *The first five summaries are due 12 February, the next five summaries are due 19 March, and the final five summaries are due 30 April.* Late summaries will be penalized 10% per 24 hours.

The summaries should consist of the following components:

1. Definitions of technical terms new to you in the assigned paper (3-5 is sufficient)
2. Objectives of the paper as given by the authors. What reasons are given to support the importance and/or relevance of the research objectives and/or findings?
3. Methods: Are the methods used appropriate and adequate for the questions or hypotheses being addressed? Identify any methods that are not clearly presented or that you do not understand.
4. Results: Outline the main results presented in the paper. How do the results relate to the questions or hypotheses set forth in the objectives? Identify any unclear results.
5. Discussion: How well does the discussion reflect the results? Are interpretations of the data presented in the results section justified, or to what extent are the interpretations and discussion speculative? Does the paper adequately represent both the strengths/weaknesses of the research findings?
6. Overall: What do you consider as the main strengths of the paper? What are some weaknesses? What is interesting about the paper? What did you learn? What relevance does this paper have to issues or topics that have been discussed in class? What other areas of hydrologic research can you relate this paper to, either in terms of basic or applied science?

*This format is adapted from Mazeika Sullivan and Kristin Jaeger at OSU.*

## University Policies

---

- **Registration:** The official registration deadline for this course is September 8, 2013. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashLine) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.
- **Withdrawal:** To view the add/drop schedule and other important dates for this class, go to the Students Tools and Courses tab in FlashLine and choose either View or Print Student Schedule. To see the deadlines for this course, click on the CRN or choose the Drop or Add a Course link and click on the green clock next to the course under Registration Deadlines.
- **Academic Dishonesty:** University policy 3-01.8 deals with the problem of academic dishonesty, cheating, and plagiarism. None of these will be tolerated in this class. The sanctions provided in this policy will be used to deal with any violations. If you have any questions, please read the policy at [http://www.kent.edu/policyreg/policydetails.cfm?customel\\_datapageid\\_1976529=2037779](http://www.kent.edu/policyreg/policydetails.cfm?customel_datapageid_1976529=2037779) and ask for help. If you are academically dishonest in this class, you will at a minimum receive 0 credit for the assignment or exam and be referred to Plagiarism School. Greater sanctions are also possible.
- **Student Accessibility:** University policy 3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit [www.kent.edu/sas](http://www.kent.edu/sas) for more information on registration procedures).

## Course Policies

---

- **Lab and Field Exercises:** You are expected to come to lab prepared to participate in scheduled activities. You should bring a notebook, pencils, eraser, a ruler, and a calculator to all class sessions. For field sessions, you should be dressed appropriately for the weather and for outdoor terrain and vegetation.
- **Late and Absence Policy:** Your attendance and participation in all class sessions is expected. Late policies for assignments are listed above.
- **Professional Behavior:** This is a class for advanced undergraduate and graduate students who are preparing to be geoscience professionals. I expect professional behavior and communication from you, and I will try to model those behaviors for you. These behaviors include promptness and attentiveness in the classroom, and typed, grammatically-correct writing, free of spelling errors and slang. This includes email communication. Assignments not meeting these standards may be returned for revision and resubmission.

## Course Topics and Schedule

---

*This schedule is subject to adjustment. Attend class and check Blackboard for updates.*

<b>Dates</b>	<b>Topic</b>	<b>Readings</b>	<b>Assignment</b>
13-15 January	Watersheds, hydrologic cycle and water budget	Ch 1-2	
22-27 January	Precipitation and Snow Hydrology	Ch 3	
29 January – 3 February	Evapotranspiration and Interception	Ch 4	<i>Exercise 1</i>
5 – 10 February	Infiltration and flowpaths	Ch 5	<i>Grad paper summaries</i>
12 – 17 February	Streamflow	Ch 6	<i>Exercise 2</i>
19 – 24 February	Groundwater	Ch 7	
26 February	Watershed Modeling	Ch 16 (1 <sup>st</sup> half)	
<i>3 March - Exam #1</i>			
5 – 12 March	Riparian zones, wetlands, and lakes	Ch 13 + lake reading	<i>Exercise 3</i>
17 – 19 March	Water Quality	Ch 11	<i>Grad paper summaries</i>
<i>Spring Break</i>			
31 March – 2 April	Soil erosion and sediment supply	Ch 8-9	<i>Exercise 4</i>
<i>5-6 April – Weekend Field Trip</i>			
7 – 21 April	Isotopes and tracers in watershed hydrology	Ch 16 + Vitvar et al. + other reading	
23 – 30 April	Watershed Management	Ch 12 and 14	<i>Exercise 5 Grad paper summaries</i>
<i>7 May, 12:45 – 3:00 - Final Exam</i>			