

# FOR462: WATERSHED SCIENCE & MANAGEMENT

Course Syllabus  
University of Idaho - FALL 2013

## Course Objectives/Learning Outcomes:

1. The primary objective of this course is to develop a process-based understanding of how changes to land surface characteristics affect fluxes of mass and energy within a watershed, so that science-based management principles may be effectively applied to watershed systems.
2. The secondary course objective is to improve critical problem solving, quantitative and data analysis skills used by natural resource scientists and managers.

<b>Instructor:</b> Ryan Niemeyer Office: CNR 119 Email: <a href="mailto:niem3790@vandals.uidaho.edu">niem3790@vandals.uidaho.edu</a> Office Hours: Tues: 9:00 – 10:20, Thurs: 10:30 - 11:30 or by appointment	<b>Teaching Assistant:</b> Anne Moscrip Office: CNR 119 Email: <a href="mailto:mosc4685@vandals.uidaho.edu">mosc4685@vandals.uidaho.edu</a> Office Hours: MW: 8:00 - 9:15, MW: 10:30 - 11:30 or by appointment
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**Meeting Location and Times:** TLC 022, MWF 9:30 – 10:20

**Field Trip:** A half-day field trip to view watershed management and environmental restoration projects is required. Two options for the trip date will be announced.

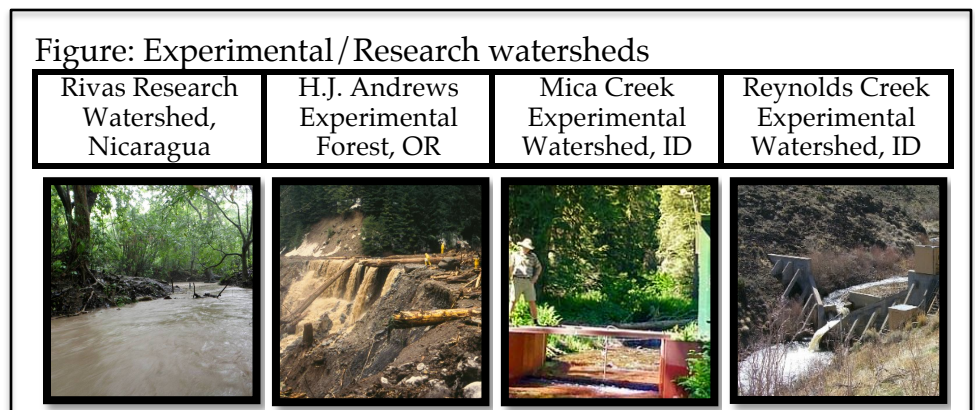
**Text:** *Hydrology and the Management of Watersheds*, 3rd Ed. Kenneth Brooks, Peter Ffolliott, Hans Gregersen, and Leonard DeBano. Note: 2nd edition is acceptable. The text is strongly recommended, but not required and will be on reserve (3 hr) at the library. There also will be assigned readings during the semester that will be posted on BbLearn (aka BlackBoard).

**BbLearn:** Lecture notes, assignments, readings, exams from previous years, and helpful resources will be posted on BbLearn (<https://bblearn.uidaho.edu/>). This material will be posted throughout the semester as we reach the material.

## Major Topic Outline:

1. Class Overview / Watershed Mgmt. Intro. / Unit Conversion
2. Watershed Basics
3. Hydrologic Models
4. Basic Meteorology
5. Snow
6. Soils
7. Evaporation and Transpiration
8. Infiltration and Runoff
9. Groundwater
10. Vegetation and Streamflow
11. Erosion
12. Stream Channel
13. Water Quality

Figure: Experimental / Research watersheds



**Grading:**

Category	Percent of Total
Assignments	40%
In-class Exercises	10%
Quizzes	10%
Mid-term Exam	20%
Final Exam	20%

Numerical Grade	Letter Grade
90+	A
80-90	B
70-80	C
60-70	D
<60	F

**Note:** borderline grades (e.g.: 89.9, 70.6) will be determined at the discretion of the instructor based on individual effort and class attendance.

**Assignments:** Assignments will consist of numerical, data analysis, and critical thought exercises. Students are encouraged to work together, but all work handed in must be your own. Homework is due at the **beginning** of the class period. If you have an emergency and cannot complete the assignment, notify Anne or Ryan **before** class, not after. Homework turned in the following class period will automatically lose 25%, two class periods after will lose 50%, and will not be accepted after that. Please show all work on a separate sheet, organize your answers and **prepare your work neatly**. Be sure to double check your answer and determine if your answer is reasonable. There will also be two guest lectures that require a short answer response worth half an assignment grade each.

**Quizzes:** Scheduled quizzes will be given periodically during the semester. The quiz with the lowest grade will be dropped. No make up quizzes will be offered.

**Exams:** There will be a mid-term exam taken in class that will cover the first six major topics and a take-home final exam that will be cumulative. The final exam must to be completed independently and it will be due Wednesday December 19<sup>th</sup> at 5 pm.

**In-class Exercises:** Attendance will not be part of the student's grade however there will be thirteen in-class exercises – one for each of the thirteen major topics. In these exercises students will be given the opportunity to work through problems, discuss watershed management issues, and learn from their fellow students. Credit will be determined by the effort put forth (see rubric below). Two will be “thrown out” (i.e. you can miss two). Credit can be made up with a one-page (double-spaced) reflection paper on the topic covered, but **the student** must initiate this first with the instructor.

**In-class exercise grading rubric:**

5-Actively engages in exercise and discussion with peers.	4-Engages in most of exercise, some interaction with peers.	3-Engages in part of exercise, limited interaction with peers.	2 – Does almost none of the exercise, virtually no interaction w/ peers.	1-No interaction with peers and does none of the class exercise.
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**Disability Support Services Reasonable Accommodations Statement:** Reasonable accommodations are available for students who have documented temporary or permanent disabilities. Please notify your instructor(s) during the first week of class regarding accommodation(s) needed for the course. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306.

Contact information: Phone: 885-6307, Email: [dss@uidaho.edu](mailto:dss@uidaho.edu)

**Plagiarism:** Plagiarism will not be tolerated and will result in a grade of F in the course. If you are unsure of what constitutes plagiarism please consult the Department of Forest, Rangeland, and Fire Sciences plagiarism policy listed under Popular Links on the departmental website: <http://www.uidaho.edu/cnr/frfs>

**University of Idaho Classroom Learning Civility Clause:**

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (5-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (5-4285).

**Schedule (subject to change)**

**Numbering:** first number is major topic, second is sub module (i.e. 4.2 is the 4<sup>th</sup> major topic and 2<sup>nd</sup> sub module)

Date	Subject	Reading	Notes
Aug 26	1.1: Class overview, 1.2: Water mgmt. intro		
Aug 28	1.3: Status of water resources, 1.4: Unit conversion	Brooks et al. ch. 1: p.3-17, "Watershed Management"(Bb), BbLearn (explore)	Intro sheet due
Aug 30	2.1: Hydrologic cycle, 2.2: Watershed fundamentals		
Sept 2	No class (Labor Day)		
Sept 4	3.1: Hydrologic models	Brooks et al. ch. 17, Haefner - Ch. 1 (Bb)	Assign. 1 due
Sept 6	4.1: Atmospheric humidity, 4.2: Precipitation processes	Brooks et al. ch. 2: p.23-28	
Sept 9	4.3: Precipitation distribution, 4.4: Precipitation measurement	Brooks et al. ch. 2: p.28-30	Assign. 2 due
Sept 11	4.5: Precipitation analysis	Brooks et al. ch. 2: p.34-37	
Sept 13	4.6: Precipitation estimation	Brooks et al. ch. 2: p.31-33	Quiz 1
Sept 16	4.7: Interception and throughfall	Brooks et al. ch. 2: p.38-44	
Sept 18	5.1: Snow basics, 5.2: Snow measurement	Brooks et al. ch. 15: p.373-376	
Sept 20	5.3: Snow and radiation, 5.4: Snow and turbulent fluxes	Brooks et al. ch. 15: p.376-387	Assign. 3 due
Sept 23	5.5: Snow energy balance, 5.6: Vegetation and snow cover	Brooks et al. ch. 15: p.387-394	
Sept 25	6.1: Soil classification, 6.2: Soil properties	Hillel p. 1-17	
Sept 27	6.3: Soil water status		Assign. 4 due
Sept 30	7.1: Evapotranspiration intro	Brooks et al. ch. 3: p.47-51	Quiz 2
Oct 2	7.2: Evaporation and transpiration	Brooks et al. ch. 3: p.51-61	
Oct 4	Guest lecture: Dr. Jerry Long –	Brooks et al. ch.19: p.505-519	

	law and policy in the U.S.		
Oct 7	7.3: Evaporation/transpiration estimation	Brooks et al. ch. 3: p.58-67	Assign. 5 due
Oct 9	Flex day, mid-term review		JL lecture response due
Oct 11	<b>Mid-term Exam #1</b>		
Oct 14	7.4: Estimating actual ET	Brooks et al. ch. 3: p.68-74	
Oct 16	8.1: Infiltration, 8.2: Infiltration processes	Brooks et al. ch. 4: p.77-88	
Oct 18	Guest lecture: Renee Hill – water policy in Costa Rica		
Oct 21	Field trip (tentative)		
Oct 23	8.3: Runoff and streamflow, 8.4: Stormflow	Brooks et al. ch. 4: p.88-95	Assign. 6 due
Oct 25	8.5: Streamflow measurement, 8.6: Streamflow estimation	Brooks et al. ch. 4: p.95-104	RH lecture response due
Oct 28	9.1: Groundwater	Brooks et al. ch. 5: p.107-120	
Oct 30	10.1: Vegetation management and water yield	Denver Post article Brooks et al. ch. 6: 123-137 (veg. change), 147-149 (fire), ch. 15: p.387-391 (snow)	Assign. 7 due
Nov 1	10.2: Vegetation management and streamflow timing	Brooks et al. ch. 6: 135-146 (veg. change), 149-150 (fire), ch. 15: p.391-394 (snow)	Quiz 3
Nov 4	11.1: Erosion and sedimentation	Brooks et al. ch. 7: p.157-164	
Nov 6	11.2: Estimating erosion – USLE	Brooks et al. ch. 7: p.165-177	
Nov 8	11.3: Estimating erosion – WEPP	Brooks et al. ch. 7: p.177-178	Assign. 8 due
Nov 11	11.4: Erosion control, 11.5: Erosion control on roads	Brooks et al. ch. 7: p.178-184	
Nov 13	11.6: Mass erosion	Brooks et al. ch. 8: p.189-208	
Nov 15	12.1: Sediment transport	Brooks et al. ch. 9: p.211-222	Assign. 9 due
Nov 18	12.2: Sediment yield	Brooks et al. ch. 9: p.223-228	
Nov 20	12.3: Stream channel morphology	Brooks ch. 10: p.231-251	Quiz 4
Nov 22	12.4: Stream channel classification	Brooks et al. ch. 10: p.239-251	
Nov 25 - 29	No Class (Thanksgiving Break)		
Dec 2	13.1: Water quality	Brooks et al. ch. 11: p.257-280	
Dec 4	13.2: Water quality management	Brooks et al. ch. 12: p.283-302	
Dec 6	13.3: Summary and future directions		Assign. 10 due
Dec 9	No class - RN in San Francisco (AGU)		
Dec 11	No class - RN in San Francisco (AGU)		
Dec 13	No class - RN in San Francisco (AGU)		
Dec 17	Final exam schedule: 10:00am - noon	<b>No exam during scheduled time. Take-home final due on Dec. 19<sup>th</sup> at 5pm.</b>	