

**Syllabus WATS 3700 Fundamentals of Watershed Science
Spring Semester 2007**

MWF 12:30 pm -1:20 pm BNR 314

Learning facilitator: Dr. Helga Van Miegroet, Associate Professor

Office: NR 226 (797-3175)

E-mail: helgavm@cc.usu.edu

Scheduled Office Hours: M 1:30-5 pm; W 1:30- 4 pm (or by appointment)

Because these office hours may not fit every student's schedule, or I may be busy with another student when you come by the office, I strongly advise anybody to contact me by E-mail to make alternative arrangements if necessary

Teaching Assistant: Amanda Schulz

E-mail: aeschulz@cc.usu.edu

Cell Phone (315) 559-2690

Office: JQL 147

Scheduled Consulting Hours: M 11am -12:20 pm in the CNR Atrium

Course Objectives:

The multiple demands on and uses of the limited water supplies and the impact of human activities on water quality require careful management of this resource. The latter requires a good understanding of the physical, chemical, biological, and ecological interactions that occur within drainage basins and the way and extent these affect the quantity and quality of water.

The objective of this course is to introduce you to the concepts that define watershed science as a professional discipline and to familiarize you with the principles of watershed management. We will focus on a variety of topics that define the interdisciplinary nature of watershed science. These include geography, climatology, hydrology, soil science, geomorphology, ecology, biogeochemistry, and water law. This is a course designed to accomplish several goals: (1) to help you develop and overall appreciation of current water-related issues facing society; (2) to provide CNR majors with the necessary background related to the management of our natural resources, and (3) to provide those majors with the necessary foundation for advanced coursework in watershed science and hydrology.

Text: There is no formal textbook for this class. Instead, readings have been put on electronic reserve.

Assignments and grading:

The final grade will be based on the total number of points scored out of a total possible of 100. Points are distributed in the following manner:

Homeworks = **15**; Writing Assignments = **20**; Midterm Exams = **45**; Final Exam = **25**

Homework Assignments: Throughout the semester a number of problem sets will be assigned to familiarize you with some of the basic principles and methods used in watershed science. Some of these exercises may be assigned as group projects.

Midterms: There will be two midterm exams. You will be examined on your knowledge of the assigned readings and the material presented during lecture, prior to and up to the time of the exam, including those readings associated with the writing assignments.

Final Exam: Will be **comprehensive** exam that will cover **all** assigned readings and course materials up to the end of the course. However, the exam may have more questions or more detailed questions on the material covered between the midterm and the end of the course.

Writing Assignments: You will be asked to submit 4 short writing assignments (1 to 2 pages in length) in conjunction with some of the material covered in this course. You will be expected follow a set of guidelines regarding content and format that will be provided to you.

Rhetoric Associates Program: To help students improve their writing skills, this class has been selected to participate in the Rhetoric Associates (RA) Program. For the first 3 writing assignments, (1) you will submit a good first draft that will be evaluated by the RA; (2) you will then meet in a conference with the RA to discuss possible improvements of your paper and suggestions for revision; (3) you will submit the **original** draft (with RA's comments) **and** the **final** version of your paper to the instructor for grading. Final papers will not be accepted without the original draft and RA comments (except for last writing assignment where only final draft is submitted to the instructor). There are two due dates for each paper: first draft to the RA and final version to the instructor. Please note time and place of your conference: students that fail to show up for their appointments with the RA will be marked down. Both first and final drafts must be submitted in class on the specified due dates.

Rhetoric Associates:

Adam Kynaston	E-mail: adamkynaston@cc.usu.edu	Phone: (801) 628-0211
Audrey McConkie	E-mail: amcconkie@cc.usu.edu	Phone: (435) 760-0624
Nikki Kendrick	E-mail: annek@cc.usu.edu	Phone: (801) 673-3238

Important Dates:

Martin Luther King Day:	Monday, 15 January 2007	<i>NO CLASS</i>
Midterm I:	Wednesday, 14 February 2007 @ 12:30 – 1:20pm	
Presidents Day:	Monday, 19 February 2007	<i>NO CLASS</i>
“Virtual Monday”	Tuesday, 20 February 2007	All Monday classes are taught
Spring Break:	12-16 March 2007	<i>NO CLASS</i>
Midterm II:	Friday, 23 March 2007	@ 12:30 – 1:20pm
Final Exam:	Monday, 30 April 2007	@12:30 pm (2 hrs)
Writing Assignment # 1	first draft due: Wedn, 24 Jan	Final + original version due: Mon, 5 Feb
Writing Assignment # 2	first draft due: Fri, 23 Feb	Final + original version due: Wed, 7 March
Writing Assignment # 3	first draft due: Mon, 2 April	Final + original version due: Fri, 13 April
Writing Assignment # 4	FINAL (only) draft due: Mon, 23 April	
Homework Assignment #1	due: Monday, 22 January	
Homework Assignment #2	due: Wednesday, 31 January	
Homework Assignment #3	due: Monday, 5 March	

NOTE: Homeworks are due **in class on the assigned due date**, points will be taken off for late submissions; Papers (original and final drafts) must be submitted on time and will not be accepted late; Students unable to attend the midterm exam at the scheduled times **must** contact me **prior to the exam**. Arrangements for make-up exam will only be made as an **emergency** measure for **justifiable** reasons. The final exam must be taken as scheduled.

Honor System: All assignments and exams are to be completed individually, unless otherwise stated by the instructor. Students are expected to adhere to the standards of academic honesty. Cheating, falsification of information, or plagiarism (using the work of others as your own) will be grounds for failing grade in this course. Standards of the University concerning academic honesty are described in the Student Policy Handbook, Article V, section 3, paragraphs a, b, and c.

Accommodations for Disabilities: This university is required by law to help disabled students participate fully in all programs, activities and services. If you have a disability that requires note-takers, interpreters for the deaf, extended testing time, etc., let instructor know or contact the Disability Resource Center (DRC) directly. They are in room 101 of the University Inn (797-2444, discenter@cc.usu.edu). Course material can be provided in alternative formats such as large print, audio, diskette, or Braille in cooperation with the DRC. (Disabilities must be documented by the DRC).

**WATS 3700 Fundamentals of Watershed Science
Schedule of Topics and Readings**

Date	Topic	Readings	Assignments
Mo Jan 8	Introduction	#1, #2	Reading for
Wed Jan 10	Introduction	#1, #2	Class Discussion
Fri Jan 12	Water properties	#3, #4	(of article in SLTrib)
	http://www.sltrib.com/search/ci_4928252		
Mo Jan 15	NO CLASS		
Wed Jan 17	Water balance	#3, #4	
Fri Jan 19	Units and conversions	#4	
Mo Jan 22	Climatology	#1, #5, # 6	HW1 due
Wed Jan 24	Climatology	#1, #5, # 6	Paper1 – first draft
Fri Jan 26	Climatology	#1, #5, # 6	
Mo Jan 29	Soil and Groundwater (soil water avail)	#7, #8	
Wed Jan 31	Soil and Groundwater (plant transpire, landuse	#7, #8	HW2 due
Fri Feb 2	Soil and Groundwater	#7, #8	
Mo Feb 5	Watershed Properties	# 9	Paper 1 – FINAL
Wed Feb 7	Watershed Properties	# 9	
Fri Feb 9	Watershed Properties	# 9	
Mo Feb 12	Paper discussion; Review		
Wed Feb 14	MIDTERM 1		MIDTERM 1
Fri Feb 16	Watershed Hydrology	# 5, #10, #11	
Mo Feb 19	NO CLASS		
Tue Feb 20	WS Hydrology - Infiltration	# 5, #10, #11	
Wed Feb 21	WS Hydrology - Flow generation	# 5, #10, #11	
Fri Feb 23	WS Hydrology - Hydrographs	# 5, #10, #11	Paper2 – first draft
Mo Feb 26	WS Hydrology- Flow analysis	# 5, #10, #11	
Wed Feb 28	Landuse issues in WS Hydrology	# 5, #10, #11	
Fri Mar 2	Hillslope Processes - Erosion	# 12	
Mo Mar 5	Hillslope Processes - Mass Wasting	# 12	HW3 due
Wed Mar 7	Hillslope Processes - Assessment	# 12	Paper 2 – FINAL
Fri Mar 9	Slope Stability - Discussion	# 12	
March 12-16	NO CLASSES – Spring break		
Mo Mar 19	Hillslope Processes - Landuse	# 12	
Wed Mar 21	Paper discussion; Review		
Fri Mar 23	MIDTERM 2		MIDTERM 2

Mo Mar 26	Channel Processes	# 13	
Wed Mar 28	Channel Processes	# 13	
Fri Mar 30	Channel Processes	# 13	
Mo April 2	Channel Processes	# 13	Paper3 – first draft
Wed April 4	Channel Processes	# 13	
Fri April 6	Channel Processes	# 13	
Mo April 9	Stream & Lake Ecosystems	# 14, #15, #16, #17	
Wed April 11	Stream & Lake Ecosystems	# 14, #15, #16, #17	
Fri April 13	Stream & Lake Ecosystems	# 14, #15, #16, #17	Paper3 – FINAL
Mo April 16	Water Quality	# 18	
Wed April 18	Water Quality	# 18	
Fri April 20	Water Quality & Clean Water Act	# 18	
Mo April 23	Riparian systems and wetlands	#19, #20, #21	Paper4 – FINAL
Wed April 25	Watershed Management	# 22	
Fri April 27	Integration, Synthesis, Review		
Mo 30 April	FINAL EXAM	11:30 am-1:20 pm	

**WATS 3700 Fundamentals of Watershed Science
Readings On Electronic Reserves**

**Look under Instructors “VANMIEGROET” for AWER (WATS) 3700 “Fundamentals...”
Password “VAN3700”**

#1 Satterlund, D.R. and P.W. Adams. 1993. Chapter 1. Water Resources and Water Problems pp. 3-21 IN: *Wildland Watershed Management*.

#2 Cech, T.V. 2003. Chapter 1. Historical Perspective of Water Use development pp 1-20 IN: *Principles of Water Resources*.

#3 Manning, J.C. 1997. Chapter 2. Structure and Properties of water. pp. 7-20 IN: *Applied Principles of Hydrology*.

#4 Hewlett, J.D. 1982a Chapter 2. The water and energy cycles. pp. 7-14 IN: *Principles of Hydrology*

#5 Brooks, K.N., P.F. Ffolliott, H.M. Gregersen, and J.L. Thames. 1991a. Chapter 2. Precipitation and Interception. pp. 15-25 IN: *Hydrology and management of watersheds*.

#6 Hewlett, J.D. 1982b. Chapter 4. Atmospheric Moisture and precipitation. pp.25-38 IN: *Principles of Forest Hydrology*

#7 Hewlett, J.D. 1982c. Chapter 5. Subsurface water pp. 44-51 & 62-64 IN: *Principles of Forest Hydrology*.

#8 Brooks, K.N., P.F. Ffolliott, H.M. Gregersen, and J.L. Thames. 1991b. Chapter 3. Evaporation and soil water storage. pp. 37-50 IN: *Hydrology and management of watersheds*

#9 Gordon, N.D., T.A. McMahon and B.L. Finlayson. 1994a. Chapter 4. Getting to know your stream. pp. 83-117 IN: *Stream Hydrology: An Introduction for Ecologists*. John Wiley and Sons, Chichester.

#10 Hewlett, J.D. 1982c. Chapter 7. Surface Water, hydrograph and runoff process pp.93-108 IN: *Principles of Forest Hydrology*.

#11 Brooks, K.N., P.F. Ffolliott, H.M. Gregersen, and J.L. Thames. 1991b. Chapter 4. Infiltration, Runoff and Streamflow pp. 64-77 IN: *Hydrology and management of watersheds*. Iowa State University Press, Ames, Iowa.

#12 Dunne, T. and L.B. Leopold. 1978. Chapter 15 Hillslope Processes pp 506-586 IN: *Water in environmental Planning*. [*]

#13 Gordon, N.D., T.A. McMahon and B.L. Finlayson. 1994b. Chapter 7. Patterns of shifting sand stream pp. 288-319 IN: *Stream Hydrology: An Introduction for Ecologists*.

#14 Murphy, M.L. and W.R. Meehan. 1991. Chapter 2. Stream Ecosystems. pp. 17-46 IN: *Influences of Forest and Rangeland Management on Salmonid Fishes and their habitats*. W.R. Meehan (ed.)

#15 Terrene Institute. 1993. Chapter 2. Lake and Reservoir Ecosystems. pp. 7-28 IN: *Fish and Fisheries Management in Lakes and Reservoirs*.

#16 Allan, J.D. 1995. Chapter 3. Physical factors of importance to the biota. pp. 45-82 IN: *Stream Ecology*. Chapman and Hall. New York [*]

#17 Terrene Institute. 1993. Chapter 3. Fish Ecology. pp. 29-58 IN: *Fish and Fisheries Management in Lakes and Reservoirs*.

#18 Sharpe, W.E. and D.R. DeWalle. 1980. Chapter 8 Water Quality - Section 8.4 Ecosystem Disturbance pp. 241-254 IN: *Forest Hydrology* by R. Lee (ed.)

#19 Mackie, G.L. (2001).. The importance of wetlands. pp 46-50 IN: *Applied aquatic ecosystem concepts*. Kendall/Hunt, Dubuque. [1 pdf file "Parent streams.."]

#20 Zedler, J.B. 2003. Wetlands at your service: reducing impacts of agriculture at the watershed scale. *Frontiers in Ecology and the Environment* 1(1): 65-72.

#21 Hawkins, C.P. 1994. What are riparian systems and why are we worried about them? pp. 1-9 IN: *Riparian Resources*. Natural Resources and Environmental Issue, Volume I. College of Natural Resources, Utah State University. Logan.

#22 Naiman, R.J. et al., 1992. Chapter 6. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest coastal ecoregion. pp.155-173 IN: R.J. Naiman (ed.) *Watershed Management: Balancing Sustainability and Environmental Change*. Springer-Verlag, New York.

[*] Multiple pdf files