

CIVE 440 NONPOINT SOURCE POLLUTION

COURSE OUTLINE

Fall 2016

Tuesday and Thursday from 11 am – 12:15 pm in Engineering B2

DESCRIPTION: Principles, processes, and control of nonpoint source pollution. Particular emphasis is placed on non-point source (NPS) problems associated with urban runoff, agricultural influences on water quality, and impacts of mining and forestry. Surface and ground water pollution in diverse aquatic systems including stream, river, lake, reservoir, estuarine environments are considered. Students are exposed to a variety of structural and non-structural management practices.

PURPOSE OF THE COURSE: This course familiarizes students with the nature and extent of non-point source (NPS) problems, the fundamental processes that govern the fate and transport of diffuse pollution, and the design of effective pollution abatement measures.

INSTRUCTOR: Aditi S. Bhaskar, Ph.D.
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COURSE HOME PAGE: available via Canvas at <https://colostate.instructure.com/courses/32783>

OFFICE HOURS: Tuesdays 12:30 – 2 and Thursdays 12:30 - 2 in Scott Bioengineering 250 or by appointment.

TEXTBOOK:

Novotny, V. 2003. *Water Quality: Diffuse Pollution and Watershed Management*. 2nd Edition. John Wiley and Sons, New York.

GRADING: Plus/minus grading will be used with the following weighting:

HOMEWORK	35%
EXAMS (2)	30%
QUIZZES	10%
FINAL EXAM	25%

POLICIES:

Quizzes: I will endeavor to make this a discussion-oriented course. For this approach to be meaningful and effective, it is essential that you read material as it is assigned prior to our class discussions. To encourage you to do this, I will give several short quizzes throughout the semester to assess whether the reading assignments are being completed and comprehended. You will be able to drop two of your lowest quiz scores or missed quizzes from your quiz grade.

Homework Assignments: All assignments should be completed in a professional style. Unless otherwise noted, assignments should be submitted using Microsoft Word and/or engineering paper (written

legibly). If you use Excel for assignment calculations, you must document the equations you used in the calculations. **Late homework will not be accepted**, but the lowest homework grade will be dropped.

Exams: Make-up exams will be given only for university-approved excuses or when you have a note from a medical professional.

Homework Submission: Unless otherwise noted, the last submitted assignment in Canvas will be the one that is graded.

Student Collaboration: I encourage students to work and study together to complete homework assignments, however each student is responsible for completing and submitting their own work. Copied work/answers will be identified by the grader and may result in all involved students receiving 0% for that assignment.

Communication: I prefer to answer questions in person during office hours, but will also accept emails provided that they clearly explain the problem/question and are written in a professional style (including salutation and attention to correct grammar and spelling). I will respond to emails as fast as possible, but students should not anticipate a response any sooner than 24 hours after submission. Please include CIVE440 in the subject line of your email.

Academic Integrity: The course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. CSU policies on academic integrity will be rigorously enforced in this course. Please examine the following references on academic integrity:

<http://tilt.colostate.edu/integrity/honorpledge/>

http://tilt.colostate.edu/integrity/faqs/what_are_rules.cfm

<http://tilt.colostate.edu/integrity/resources/forstudents.cfm>

In accordance with CSU policies, I ask that you include and sign the following statement on all written work: "I pledge on my honor that I have not given, received, or used any unauthorized assistance.

_____ (signature)"

CIVE 440 Learning Objectives:

Upon completion of this course, you should be able to:

1. Define the major components of the hydrologic cycle and describe how they affect surface runoff, subsurface flow, groundwater recharge, and surface and groundwater quality;
2. Describe ways of measuring or estimating the hydrologic fluxes that are important in nonpoint source pollution;
3. Describe the major chemical, physical, and biological processes affecting the fate and transport of nutrients, pesticides, sediment, heavy metals, and other pollutants in the soil, surface runoff, and groundwater;
4. Describe the most important legislation and regulations associated with nonpoint source pollution;
5. Perform rainfall-runoff, erosion, return period, and flood frequency calculations;
6. Design stormwater conveyance channels, filter strips, and settling ponds;
7. Compute retardation coefficients and degradation rates for pesticides;

8. Compute urban pollutant buildup and washoff rates;
9. Describe eutrophication and estimate limiting nutrient loading rates;
10. Perform wetland design calculations for removal of nitrogen and other pollutants;
11. Estimate long-term average annual soil loss using the USLE;
12. Describe the effects of different production systems and land management practices on the hydrologic and water quality response of rural and urban watersheds;
13. Describe the principal components and requirements of a TMDL plan;
14. Describe the advantages and limitations of conventionally used techniques for diffuse pollution control;
15. Understand the impacts of atmospheric pollution on water quality;
16. Design a diffuse pollution control plan for a farm, agricultural watershed, or urban development.

Tentative Schedule

<u>Topic</u>	<u>Week</u>	<u>Approx. Date</u>
Introduction to water quality, legal and regulatory framework for managing NPS pollution: Chapter 1	1	8-23
Causes of diffuse pollution / Basic concepts: Chapters 2-3	2-3	8-30
Hydrology: Chapter 4	4-5	9-13
Erosion and sedimentation: Chapter 5	6-7	9-27
Exam #1	7	10-6
Soil pollution / Groundwater: Chapters 6-7	8-9	10-11
Urban and highway diffuse pollution: Chapter 8	10	10-25
Control of urban diffuse pollution: Chapter 9	11	11-1
Exam #2	12	11-10
Agricultural issues: Chapter 10	13	11-15
Fall Break – no class	14	11-22
Aquatic ecosystems and waterbody assessment: Chapter 12	15	11-29
Overview of TMDLs, Modeling, Watershed management and restoration Chapters 11, 13, 14	16	12-6
Final Exam		Wednesday, December 14 th , 6:20-8:20 PM