WATER QUALITY AND POLLUTION  
WATS 4530 and WATS 6530  

Fall 2021

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This course provides a foundation in the science and management of water quality in freshwater ecosystems. Course content targets students wishing to work in areas of water quality management and pollution control, but should also help students whose career paths are directed toward other areas of resource management.

Course objectives:

1. To gain an understanding of the social, historical, and regulatory context for water quality management, with specific reference to the United States.

2. To gain a basic understanding of the sources, movement, and fate of major groups of water pollutants in freshwater systems;

3. To develop the specific skills and competencies used by scientists and watershed managers to understand and quantify biological and other impacts of water pollution, and to protect or restore water bodies from water pollution impacts.

The course takes a broad approach:

- Weeks 1-2 - social, historical and regulatory context for water quality management
- Weeks 3-4 - watershed processes and techniques for assessing water quality
- Weeks 5-9 - sources, transformations & fates of major water pollutant groups
- Weeks 10-11 – WQ impacts from different landscapes, land uses, and human activities
- Weeks 12 – 15 – approaches for water pollution mitigation and WQ management.

Course format:

All class materials, assignment and announcements will be posted on Canvas. The following links in Canvas should contain all the material you need for this class. Please let me know if you find omissions or errors.

- the Weekly Modules provide access to the following: Pre-recorded lectures, Lecture powerpoints, Readings and the discussion blogs, homework assignments, information about Zoom meetings, quizzes, handouts and optional readings and videos.
- the Home Page provides contact information, general info about the course structure, and any changes that we've made during the semester.
- I use Canvas Announcements to reach the entire class about changes in assignments, special events, etc. Links to these are listed on the Home page and you should also receive these as emails, so check regularly.
- We will have 2 optional Zoom discussions each week (Mondays and Thursdays) which will be our primary face to face time. These are tentatively scheduled for Mondays at
5:30 MT and Thursdays at noon MT. After surveying the class during week 1, I will finalize the times.

- The Zoom link on your Canvas page provides login information for each meeting.
- All Zoom discussions will be recorded and posted in Canvas.
- The Monday session will provide context for that week’s materials, offer tips and examples for the homework assignment, and answer any other questions.
- The Thursday session will provide help with specific homework questions, clarification on lecture material, projects, etc.

You may also contact me with questions or concerns at any time. I prefer email (Nancy.mesner@usu.edu) but you can also text me (435 770 2363). I try to get back to people within 24 hours.

Class structure and requirements:

Pre-recorded Lectures

These lectures cover the content that I consider most relevant and important for this class. In each week’s module I will post links to:

- recordings of the lectures on that week’s materials (recorded in 2010)
- a pdf of the lecture slides.
- “Time Stamp” tables should help you locate material in each lecture.
  - The first slide in each lecture pdf is always the Time Stamp table.
  - Each table lists major topics, and for each topic the beginning and end times in the video and the associated slides.

Weekly quizzes:

Each week you will have an online quiz. Quizzes cover materials presented in the weekly lectures. The quizzes are short (10 questions) and open book/notes. The quizzes will be posted on Tuesdays by 5:00 am and will close on Sundays by midnight. You will have 1 hour to complete each quiz although people typically require less than 30 minutes.

Class readings and discussions

You will have one required reading each week. By the end of Tuesday of each week, post your comments on the reading in the Class Discussion. I’ve included a question relevant to that reading, as well as other possible ways to respond. By the end of Thursday of each week, please reply to the comments of at least two of your classmates.

- You will receive up to 6 points for your original comments, and 2 points each for your replies.
- You will not be graded on grammar or style for these posts.
- No credit for comments that are not positive and respectful.

I have also posted additional readings for most weeks. I encourage you to look these over as they provide additional context or more current thinking about each week’s topic.
Quantitative homework assignments (most weeks)

Weekly homework assignments are designed to provide some experience and practice in various skills and techniques used by water quality managers and scientists. Many of the assignments require Excel and may utilize real data, maps, or other information which is also provided with the homework assignment.

- Assignments must be submitted to Canvas by the late Sunday evening of each week.

Water quality monitoring project:

Water quality management relies on data that accurately reflects conditions in a water body or watershed. Inadequate or biased data results in poor management outcomes. I want everyone in this class to have some experience with water quality monitoring to help you better evaluate datasets you are asked to use on future projects.

- For those of you with water quality monitoring experience, please submit a synopsis of this experience and your assessment of the value of this program in meeting project goals.

- For those of you without any experience with water quality monitoring, you will conduct a short and simple monitoring program at a water body near you. At a minimum you should measure a single parameter at a single site at least once a week for 5 weeks, but your plan can be more elaborate if you wish. You may borrow equipment from Utah’s Water Watch Program. Further instructions are posted on Canvas.
  - You must first submit a brief monitoring plan that includes your monitoring objective or question(s), parameter(s), site(s), and frequency of monitoring, safety precautions, and measures taken to assure quality assurance and quality control.
  - I will review each plan, will provide any necessary equipment and training, as well as a generic spread sheet for recording your data.
  - You will submit your data and a brief report on your experience.

I will incorporate your submissions into a homework assignment which will be due during week 14. Further instructions are posted on Canvas.

Public outreach document about a water quality project or scientific publication

Instead of a final in this class, each student will produce an outreach piece for a non-technical audience. I’ll provide some lecture material and readings about writing for the public and I’ll also provide you with a TMDL or technical report(s) about a local watershed management effort.

- Students must describe the project in a way that does not rely on technical jargon or specialized knowledge.
- You may choose among various outreach formats (eg. factsheet, a community event, video, website, etc).
- This will be due on the scheduled final date for this class. Instructions will be posted on Canvas.
White paper (graduate students only):

Each graduate student will write a “white paper” that explores a water quality topic of interest to them. Topics must be approved in advance. You will be graded on your demonstrated knowledge of the content, your synthesis and insights into the topic, as well as the paper’s structure, grammar, and syntax.

- Please submit a brief description of your suggested topic by the end of week 4. I’ll meet or email each student separately to assure that the suggested topic is appropriate to the class, and is neither too broad or too narrow.
- The paper will be due at the end of Week 12 (Sunday, November 21).
- Instructions and more information will be available on Canvas.

Grading

Unless otherwise stated, your work should be your own. See guidance below about ethical behavior and consequences for academic dishonesty.

Late assignments will be marked down by 10%.

In calculating your final grades, I will drop one quiz and one reading discussion. Your final class grade is weighted as shown below.

Grades will be assigned for undergraduates using the following weighting

- Reading discussion posts: 20% of total grade
- Homework assignments: 40% of the total grade
- Online quizzes: 20% of the total grade.
- Monitoring project: 10%
- Outreach project: 10%

Grades will be assigned for graduates using the following weighting

- Reading discussion posts: 20% of total grade
- Homework assignments: 40% of the total grade
- Online quizzes: 20% of the total grade.
- Monitoring project: 10%
- Outreach project: 5%
- White paper: 5%

Suggested prerequisites:

This class does not have required prerequisites, but it assumes a basic understanding of hydrology, chemistry, biology, and ecological processes. If you have little background in these disciplines, please contact me for some additional readings or review materials.
**Texts and class readings:**

All required and suggested readings are posted on Canvas. Class readings include excerpts from several text books, and manuals, policy summaries and position papers, and peer reviewed scientific papers. Text books and manuals include:


- **Handbook for Developing Watershed Plans to Restore and Protect Our Waters. EPA 841-B-08,002.** See: [http://water.epa.gov/polwaste/nps/handbook_index.cfm](http://water.epa.gov/polwaste/nps/handbook_index.cfm).


- **Natural Channel Designs, Inc and Tetra Tech.** Implementation Appendix to TMDL plan for the Fremont River.

CODES OF CONDUCT:

This class has an expectation of civility and respect in all Zoom and online discussions and all written assignments.

Academic Integrity: Students are expected to adhere to USU’s Student Code of Conduct for standards of academic honesty (https://studentconduct.usu.edu/studentcode/article5). Cheating or falsifying information are grounds for a failing grade in this course.

Academic dishonesty includes:

- intentionally using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity;
- substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work;
- acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission;
- or engaging in any form of academic fraud.

Accommodations for Students with Disabilities: Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn (435-797-2444). Please contact the DRC as early in the semester as possible for assistance.

Equal opportunity and non-discrimination: The Affirmative Action/Equal Opportunity Office at Utah State University is responsible for overseeing compliance of a wide variety of federal/state laws executive orders and University policies that address equal opportunity in employment and education. Utah State University ensures equal opportunity in all aspects of employment, programs and activities. USU prohibits discrimination based on race; color; religion; sex (including sexual harassment, pregnancy, childbirth, or pregnancy-related conditions); national origin; age; genetic information; sexual orientation or gender identity/expression; disability; status as a protected veteran; or any other status protected by University policy or local, state, or federal law. In addition, USU policy number 339 and Title IX specifically prohibit sexual harassment.

I encourage all students to contact the office of equity website (equity.usu.edu) which provides excellent resources, training and other support for faculty, staff and students.