WATER QUALITY AND POLLUTION  Fall 2016
WATS 4530  (CRN 41723)
MWF 10:30-11:20        BNR 278

Instructor:  Nancy Mesner (nancy.mesner@usu.edu)    797-7541, 770-2363 (cell)
Office:  NR 232                     Office Hours:  11:30 – 12:00 MW or by appointment

Office:  NR 232                     Office Hours:  11:30 – 12:00 MW or by appointment

TA:  TBA

The class Canvas site contains all course information, assignments, announcements, etc.
Check this site regularly for updates, announcements and any changes in the schedule.

About this class:

This course is designed to provide a foundation for understanding and managing water quality in freshwater ecosystems, with specific focus on the biological effects of water pollution. The course should provide a good foundation for students wishing to work in areas of water quality management and pollution control, but should also be useful for students whose career paths are directed toward other areas of resource management.

The course takes a broad approach. We will cover water quality law and policy, specifically how these policies and associated tools are used to assess, protect or improve water quality conditions. A major part of the course covers specific categories of pollutants that affect freshwater ecosystems, including the sources, transport processes and biological fate of these pollutants. Finally, students will apply the tools and knowledge gained in this course by investigating a local river (likely the Little Bear) and its watershed through field trips, small group projects, homework assignments and class lectures that draw upon actual data.

Course objectives:

1. To gain a solid factual knowledge of the sources, movement and fate of water pollutants in freshwater systems;

2. 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;

3. To apply the knowledge and skills learned in the class by conducting a watershed analysis with a specific focus on water pollution control and mitigation.
COURSE FORMAT AND REQUIREMENTS

The course relies on lectures and readings to provide a basic understanding on the concepts used in water quality research and management. We will have occasional guest lectures from agency personnel and other watershed scientists. Most Fridays will include a discussion of that week’s assignment – either a quantitative homework assignment or a response paper due that day. The class has one required and one or more optional field trips. Small group projects allow students to investigate different aspects of watershed management through a local lens.

Instructor responsibility: My goal is to provide a meaningful and respectful learning environment. I will prepare and present course material that is current and relevant and will grade and return assignments in a timely manner. I will be available for students during regular office hours or by appointment. I will help students synthesize and integrate the different elements of the class to create a broader understanding of water quality processes and management.

Student responsibilities: Active but respectful participation is expected of all students during class discussions, class activities, field trips and group projects. Students should be prepared for classes by keeping up with assignments and readings. The assignments and blog posts about class readings are due before class (see below). Although attendance is not required except on exam days and the field trip, regular attendance is generally a good predictor of a successful class experience.

Field trip: The class will have one required field trip on Sept 10, 2016 and possibly one or two optional field trips that will be scheduled during the semester. Students are expected to make arrangements to attend the Sept 10 field trip. Some (but not all) group projects may require additional field time.

Your grade will be based on the following:

Homework
All readings and assignments are listed on the class schedule. Unless otherwise indicated, the readings and assignments should be completed prior to class.

Class readings and class online discussion: These reading assignments are chosen to provide background information and context for the class lecture. You should read these before class. Prior to each lecture with a reading assignment, you should also submit a post in the discussion section of Canvas about the reading. Please comment on what you think was the take away message, other responses to the reading, and any questions you have about the material. You may wish to respond to your classmates’ comments. Your posted comments will not be graded for grammar or content, but will be incorporated in your class participation score for the class.

Quantitative homework assignments: Some homework assignments will focus on development of quantitative skills. These assignments are typically drawn upon data from a local river and its
watershed and are designed to lead you through many of the steps used in a watershed analysis through a water quality perspective.

You are expected to turn in your own work but you are encouraged to seek help ahead of time. I’m available during office hours, by appointment, or by email. Don’t be shy about contacting me since this is my job.

We will discuss the homework in class on the due date. You should submit your assignment in Canvas prior to that class. If you want to rework any of the assignment after this discussion, you may submit a revised homework assignment prior to the next class. This resubmitted assignment will be graded with no penalty IF you submitted the original assignment on time.

Response papers: The objective of these assignments is to develop your skills in critically reading recent scientific literature relevant to water quality and watershed management. Throughout the semester, you will have 4 of these papers assigned. Students should read the papers carefully, then write a “response paper.” These papers are NOT “book reports”. Rather, these are your opportunity to draw on your knowledge and ability to carefully evaluate the the approaches taken and conclusions drawn by the authors. Further guidance to writing these papers is provided in Canvas.

Response papers should be submitted to Canvas prior to class on the due date. We will discuss the paper that day in class. All students should come to class prepared to lead a discussion. There is no option for submitting a revised response paper.

Small Group Projects: Shortly after our field trip, each student will be assigned to a small group to conduct a project focused on some element of the water quality of the Little Bear or other local watershed. Topics and groups will be assigned after discussion with the instructor. The instructor and TA will provide additional resources, guidance on the development and implementation of the project, and assistance with data analysis. The groups will work collaboratively on the project, will present their results to the class toward the end of the semester and submit a written report of their findings.

Exams: There will be three in-class exams. Each will cover approximately 1/3 of the course material. The exams will be a combination of short essay, short answer and analysis.

Final TMDL response paper: There will not be a final exam. Instead, each student will submit a paper that discusses the strengths and challenges of the TMDL watershed management approach for protecting water quality and for identifying and reducing water pollution impacts. We will discuss this on the last day of class.

Class participation: Class participation grade is based on your participation in daily class and during response paper discussions, your contribution to the online discussions of class readings, your participation in small group projects, and other evidence of being an actively engaged student in the class.
**Class Schedule**

The timing of lecture materials may vary slightly from the initial posted schedule. Due dates may be pushed back, but will never be moved forward. Exam dates will not change. Any updates to the schedule will be announced in class, via Canvas and posted on Canvas.

**Grades will be assigned using the following weighting:**

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<thead>
<tr>
<th>Component</th>
<th>Weighting</th>
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<tbody>
<tr>
<td>Exams</td>
<td>30 %</td>
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<tr>
<td>Quantitative homework assignments</td>
<td>20 %</td>
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<tr>
<td>Literature response papers</td>
<td>20 %</td>
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<tr>
<td>Class mini-project –presentation and paper</td>
<td>15 %</td>
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<tr>
<td>Final TMDL response paper and discussion</td>
<td>10 %</td>
</tr>
<tr>
<td>Participation (blogs, class, small project)</td>
<td>5 %</td>
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- Homework and response papers will be penalized by 3% if they are turned in after the start of class on the due date and an additional 3% if turned in after the “resubmit” date.
- Scheduling conflicts with exams, presentations or field trips must be discussed and resolved with the instructor ahead of time.
- In case of emergencies or sudden illness before exams, presentations or field days, students must notify the instructor or the TA by phone or email as soon as possible (preferably before class).

**Texts:**

This class does not have a required textbook. All required readings will be made available on the class Canvas site. Most class readings will come from papers from the scientific literature or from the following books:


*Perry, J. and E. Vanderklein 1996. Water quality: management of a natural resource, Blackwell Science, 639 p* is another source we will draw on. This book provides a management perspective by focusing on specific landscapes and the links between land uses and impacts to water quality.

*Handbook for Developing Watershed Plans to Restore and Protect Our Waters. EPA 841-B-08,002.* Sections of this EPA manual will be made available on the class Canvas site. Students can also download their own copies or order a personal copy at no expense at [http://water.epa.gov/polwaste/nps/handbook_index.cfm](http://water.epa.gov/polwaste/nps/handbook_index.cfm).
Suggested prerequisites:

This class assumes a basic understanding of hydrology, chemistry and ecological processes. Students who have taken general chemistry, limnology or aquatic ecology, intro to watershed science (e.g. WATS 3700), statistics (e.g. STAT 3000) should have plenty of background. If you have little background in these disciplines, please contact me for some additional readings, some of which are already available on Canvas.

The class also assumes a familiarity with Excel graphing and basic quantitative functions. If you wish to set up a quick review session, please let me know.

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. Alternate format materials (Braille, large print, digital, or audio) are available with advance notice.

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 and 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.