

## CVEEN 6480 Water Resources Planning and Management Course Syllabus

- Instructor:** Steven J. Burian, Ph.D., P.E., Professor of Civil & Environmental Engineering
- Schedule:** 3.0 Credit Hours. Online Course. Completion of One Module Per Week
- Communication:** For all course related communication please use one of the following modes:
1. Email through Canvas or [steve.burian@utah.edu](mailto:steve.burian@utah.edu)
  2. Zoom Office Hours: See Canvas for schedule or to make an appointment
  3. Phone: 801-585-5721 - by appointment (Dr. Burian will not be in the office to take calls)
- Prerequisites by topic:** Graduate standing in Civil Engineering OR instructor consent. Recommended courses in hydraulics and hydrology. Must be competent in using Excel and computer tools.
- Course Description:** Growing population, increasing demand, climate variability, and pollution threaten the sustainability of water resources systems. In addressing these uncertain pressures, water managers must operate within relevant social, economic, institutional, environmental, and legal contexts across local to global scales. To address these challenges, this course prepares graduate students, and advanced undergraduate students, in engineering, science, or planning fields to practice in the water sector. Specific topics include management institutions, planning approaches, hydrology, water availability, water demand estimation, water conservation, water supply and storage alternatives, reservoir management and operations, hazard resilience, river basin planning modeling, financial planning, and multi-criteria decision analysis. The course is delivered as a project-based learning experience focusing readings, activities, assignments, and guest speakers to help students create integrated solutions to achieve water resources sustainability.
- Course Objectives:** After completing this course, students will be able to:
1. Describe key elements of water development history, infrastructure, institutions, law, planning approaches, challenges, and solutions within the context of sustainability.
  2. Explain and apply approaches to estimate present and future water demand.
  3. Estimate hydrologic response using data-driven and deterministic tools.
  4. Access and analyze water data.
  5. Identify and recommend appropriate structural and non-structural approaches to manage water supply, water-related hazards, and environmental water-related problems.
  6. Use Excel, Water Evaluation and Planning (WEAP), multi-objective visualization, and other software to quantitatively analyze water resources planning problems.
    - i. Calculate water system performance metrics (e.g., reliability, resiliency, vulnerability) from time series data.
    - ii. Apply principles of game theory and decide how much water to use to irrigate.

- iii. Recommend reservoir operations and release policies when given a time-series of historical inflows, water uses, delivery targets, and economic consequences of deliveries and shortages.
- iv. Identify pareto optimal alternatives to water management problems.
7. Identify potential management options, select appropriate quantitative metrics, and quantitatively and qualitatively evaluate identified options using engineering economics and other analyses against stated metrics.
8. Integrate multiple disciplines including engineering, economics, hydrology, law, social, and environmental considerations as part of water resources management activities.
9. Present work and findings in a variety of formats required of practicing river basin managers, including technical oral presentations, written reports, and web content.
10. Work effectively both individually and in small groups using online collaborative tools.

**Module Topics:**

1. Water management institutions and planning approaches
2. Water use and demand forecasting
3. Hydrology and the water environment
4. Water law
5. Water allocation and game theory
6. Water observations and data
7. Hazards and climate change
8. Planning for resilience
9. Water infrastructure systems and operations
10. Reservoir management
11. Other approaches for water supply
12. Decision support tools
13. Economics of water & financial planning
14. Decision making and dispute resolution

**Assessments:**

Students will be responsible to complete assignments, quizzes, exams, projects, and other learning assessments before the designated deadline. Details, submission requirements, schedules, and deadlines will be provided on the course's Canvas site.

1. Activity Completion and Participation. Each module will include self-guided learning activities – individual and team. Students will solve problems manually and using computer tools. Submissions will be through Canvas. Grading will consider completeness, meeting minimum activity requirements, and having sufficient accuracy and quality.
2. Individual Assigned Problems. Each module will include assigned problems to be solved individually using appropriate techniques and computer tools. Submissions will be through Canvas. Grading will consider correctness and quality of submitted solutions, with points assigned to each problem.
3. Group Assigned Problems. Modules may include an assignment of selected problems to be solved in small groups. Students will solve problems manually and using computer tools. Submissions will be through Canvas. Grading will consider correctness and quality of submitted solutions, with points assigned to each problem.

4. Quizzes. Each module will include one or more quizzes assessing recognition of concepts and terms, and the ability to complete simple methodological steps. The quizzes will be administered through Canvas. Grading will be based on correctness of the responses, autograded by Canvas or manually graded by the instructor.
5. Midterm Exam. There will be one midterm exam, after Module 8. The exam will be administered through Canvas and assess the recall of concepts and terms, and ability to apply techniques, calculations, and tools. Grading will be based on correctness of the responses, autograded by Canvas or manually graded by instructor.
6. Individual Projects. As parts of Modules 5 and 11, students will complete individual projects. These projects will include completion of reports and more substantial technical work than the module problems. Grading will be based on evaluation rubrics.
7. Team Project. Teams will select and complete a project fitting within the course learning objectives. This will be an open-ended assignment - teams will select the appropriate methods, do the desk-research to learn the methods and collect the necessary data, and compile in a report the results and recommendations deriving from the analyses. Grading will be based on evaluation rubrics.

#### Performance Evaluation (Course Grade):

Overall performance evaluation (grade) will be assigned based upon the weighted sum of select summative assessments:

Overall Grade = (Learning Activities Grade\*5%) + (Individual Assigned Problems Grade\*15%) + (Group Assigned Problems Grade\*10%) + (Quizzes Grade\*5%) + (Midterm Exam Grade\*15%) + (Individual Projects Grade\*20%) + (Team Project Grade\*30%)

The general rubric for performance is as follows:

90 – 100%	<b>Exemplary.</b> Demonstrated exemplary performance beyond the minimum competency level
80 – 90%	<b>Competent.</b> Demonstrated value beyond minimum competency but is lacking in completeness, accuracy, and/or professionalism
70 – 80%	<b>Satisfactory.</b> Slight added value beyond minimum competency, but in need of improvement
<70%	<b>Not Satisfactory.</b> Lacking competency because of <i>significant</i> lack of completeness, accuracy, and/or professionalism

#### Student Responsibilities:

Though the online format allows students greater flexibility to complete their work, this course does have a structure and timeline. As such, the following is expected of all students in this class.

- Students must be **self-motivated, organized, self-reliant, and willing to stay on top of their schedule.** Students should take control of their learning while in this course.
- Students should plan for at least 10 hours of effort each week to complete the required activities. This follows the University of Utah [policy](#) for the expected time the *average* student must dedicate for each credit hour of coursework.
- Students are expected to **follow the [Core Rules of Netiquette](#)** at all times while participating in the class and communicating with others in the online environments.
- Students are **not expected to interact with their classmates in person.** Students are **expected to work with classmates via online communication** options like Canvas Discussions, video conferencing, or another communication technology of choice (Google Meet, Skype, FaceTime, etc.).
- Students will **regularly check for course updates** and will **update their Canvas notification settings** to ensure they receive timely notifications from the course.
- Students will **contact the instructor** in a timely manner if they have any **questions**, are **struggling** with course materials, or **need further assistance.**

- Students will **follow all official University of Utah policies** regarding interpersonal conduct, academic dishonesty, and other rights and responsibilities of students outlined in the [University of Utah Student Handbook](#) and [Code of Student Rights and Responsibilities](#). If you have any questions about this, please contact the [Dean of Students](#).

#### **Instructor Responsibilities:**

Your course instructor is an expert in the topics you will learn about this semester. Your instructor is your mentor and facilitator of the online classroom experience. As such, the following summarizes the commitment.

- The instructor will design the course to **include seminars, learning activities, and assignments that are accessible** and provide students with **opportunities to learn** and practice course content.
- The instructor will ensure that the **course remains a safe space** where students can engage with difficult content thoughtfully and respectfully.
- The instructor will **interact with the class regularly** via announcements, virtual office hours (via video conferencing), emails, feedback on assignments, and comments on Discussions, among other methods.
- The instructor will **respond to students in a timely manner**: within 24 hours.
- The instructor will be **available for individual consultation** via virtual office hours (video conferencing), email, or phone and **will not require students to meet in person**.
- The instructor will **provide relevant feedback in a timely manner**.
- The instructor will **follow all official University of Utah policies** regarding interpersonal conduct, accommodations, and other important expectations.

#### **COURSE POLICIES (see Canvas for a more complete listing of university policies)**

**Late Submission.** Late submission of assignments, exams, projects, and other deliverables is not accepted. If you have a circumstance arise that prevents timely submission contact the instructor immediately. Depending on the circumstances, and agreement between you and the instructor an appropriate late submission timeline will be established.

**Resubmission for Re-Grading.** All grades are final, except in the case of a mistake made by the grader. No other revision of assignment submittals is permitted.

**Authorized Aid.** You must adhere to U of U policies on Academic Integrity and to the ASCE Code of Professional Ethics. Consequences for failure to adhere to those policies will follow the U of U Student Handbook and include the range of receiving a zero grade for the item in question to failure of the course and/or dismissal from the program/university.

**University and College of Engineering Policies.** A summary of the College of Engineering and University of Utah Policies are provided in the Spring 2021 Semester Guidelines available at: <https://www.coe.utah.edu/semester-guidelines>.

**The Americans with Disabilities Act.** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. For students requesting accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services (CDS), 162 Olpin Union Building, (801) 581-5020. CDS will work with the student and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the CDS.

**University Safety Statement.** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

**Addressing Sexual Misconduct.** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same

kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).