Course Syllabus

(Last updated: January 1, 2020)

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Schedule: Lecture: MCE 1001, TH 9:10-12:05
Dr. Burian’s Office Hours: TH 13:00–14:00
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Prerequisites by topic: C- or better in CVEEN 3100 AND Full Major status in Civil Engineering. To be taken in the last year of the program after a minimum of two design technical electives have been completed.

Course Description: The focus of the course is on key aspects of the functioning of the civil engineering professional in the consulting design environment. A comprehensive Capstone Design Project serves as a vehicle and context for delivery of the key concepts.

Resources:
- Hansen, K.L. and Zenobia, K.E., Civil Engineer’s Handbook of Professional Practice, John Wiley & Sons, Inc. and ASCE Press, 2011
- AutoCAD ™, 3D Modeling (e.g., SketchUp), ArcInfo/GIS, ATS CityMobil, Podaris

Course Outcomes:
Via first-hand experiences, the student will be able to:
1. Describe the civil engineering design process, its phases, and provide examples of project delivery schemes.
2. Participate in the design of an engineering system or component.
3. Prepare an engineering design report and orally present an engineering project.
4. Identify characteristics of effective team members, leaders, and organizations.
5. Demonstrate self-sufficiency to learn independently.
6. Discuss the business of consulting practice including: marketing, finance, management, business development, and technical.
7. Identify the connections between civil engineering projects, public policy, licensure, ethics, service, sustainability, and professional responsibility.
8. Identify the ethical, legal, and professional responsibilities of professional engineers.

Topics:
1. The design process and its stages
2. Leadership
3. Team organizational structure and functioning
4. Writing proposals and reports
5. Consulting practice and business concepts
6. Project delivery and quality management
7. Professional, ethical, legal, and service responsibilities of professional engineers
8. Sustainability
Student Responsibilities:
The expectations of each student include but are not limited to:

1. Participate fully in daily class activities
2. Contribute to team duties on time
3. Interact in a positive manner with the class, instructor, team, and clients
4. Monitor the team’s progress and help keep it on track
5. Expect, encourage, and perform at a high level of quality and professionalism
6. Apply relevant knowledge, skills, and aptitudes

The team and project nature of the course creates a need for a fairly strict policy in regards to attendance and conduct both in arriving on time and contributing for the full time. It is required that all students be present and fully participative in each lesson. Absences are not permitted; advance notice is required regardless of whether you request an authorized absence. Issues associated with health will certainly be considered. However, the student needs to not only communicate with the instructional team but to also understand that exceptions to the course policy are not to be taken for granted.

Conducting personal business during class (such as other course or employment-related work) is not acceptable and will result in performance reduction. The most difficult part will be when you have deadlines for other courses and/or employment. However, the weekly in-class time for this course is to be devoted to the course only. What you decide to do outside of class is entirely your choice. Tardiness and unexcused absences (whether in part or total for a lesson) may lead to a performance reduction of the equivalent of 0.05 in the overall adjustment factor for each instance, i.e., half of a letter grade.

Use of any form of tobacco, alcohol, or other drugs in the classroom is not acceptable. Cell phones and other devices should be turned off except for those needed to accomplish course-related tasks. If you need to answer your phone during class, you need to leave the room; re-admittance may or may not be permitted. Other activity that diminishes the professional quality of the class-room may result in evaluation adjustment according to the lead instructor’s judgment.

Student presentations and meetings are an integral part of the course and may be recorded for grading, accreditation, dissemination, and archival purposes. Due to the intimate nature of many aspects of peer and client feedback during such activities, individual recording of class activities is discouraged, must abide by all federal and state requirements, be consented to by all parties, and be approved by the instructional team no later than 48 hours prior to the event.

Performance Reports:
- Each student will maintain a weekly log of professional activities. These logs will be submitted according to the procedure and time discussed in-class.
- Students will frequently be asked to brief the class on the status of their work.
- Team member citizenship (peer review) assessment will be conducted two to three times during the semester. The results of the peer reviews will be used in determining the individual adjustment factor related to team scores. The factor will be applied to the entire range of team activities.

Professional Skills Component:
In addition to contributing to the team project, each student will demonstrate comprehension of several professional skills topics that may include topics from the following list:
- Public policy
- Risk and uncertainty
- Life-long learning
- Contemporary issues
- Professional ethics and licensure
- Leadership in the practice and business of civil engineering
The deliverables must be completed satisfactorily to pass the course.

Performance Evaluation (Course Grade):
Overall performance evaluation (grade) will be assigned based upon the instructor’s interpretation of each individual student’s submittals and contribution to the project requirements during the semester. All assignments must be completed satisfactorily to pass the course.

One tool used to evaluate individual performance achievement is the following model:

\[
\text{Performance} = 0.5 [\text{PI} + \text{FI} \times \text{FT} \times \text{PT}] \times \text{FA}
\]

Where:
- \(\text{PI}\) = total percentage of individual performance scores [Range: 0 to 100%]
- \(\text{PT}\) = total percentage of team performance scores [Range: 0 to 100%]
- \(\text{FA}\) = Attitude and Participation Factor [Range: 0 to 1.10]
- \(\text{FI}\) = Individual Adjustment Factor based upon individual effectiveness to the team [Range: 0 to 1.10]
- \(\text{FT}\) = Team Adjustment Factor associated with overall completeness of the project [Range: 0 to 1.10]

The basic rubric for performance is as follows:
- 90 – 100% Significant added value beyond the minimum competency level
- 80 – 90% Added value beyond minimum competency but is lacking in completeness, accuracy, and/or professionalism
- 70 – 80% Slight added value beyond minimum competency
- 70% Minimum competency but lacking in completeness, accuracy, and/or professionalism

The individual performance scores will be compiled from a sequence of individual assignments. Likewise, the team performance scores will be compiled from a sequence of team deliverables. The individual adjustment factor is used to reflect an individual’s contributions to the team components of the course and citizenship in working towards team objectives. The individual adjustment factor is determined using values from a research-validated instrument and other instruments used at the discretion of the instructional team. The team adjustment factor is intended to adjust the cumulative team scores that represent an overall quality of the entire team’s efforts and deliverables during the course of the term. The factor’s range of values is 0 to 1.10 and will be the same for members of the primary project team. The individual attitude and participation factor is to be used in the event that a student has not completed all elements of the course or has otherwise created a positive or negative issue that is otherwise not accounted for in the course scores. Each instance of an unexcused absence, tardiness, failure to comply with requirements may result in a reduction of 0.05 in the attitude and participation factor.

Authorized Aid:
It is assumed that you subscribe 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 a zero grade for the item in question to possible failure in the course and/or dismissal from the university.
Individual Assignments:
Each student is responsible for each of the following assignments. Failure to complete any of the assignments constitutes failure in the course. Details, submission requirements, schedules and deadlines will be provided on the course’s Canvas site.

1. **Engineering Design and Project Delivery (100 points)**.
   View the presentations regarding the engineering design process, consulting business, and project delivery schemes. Prepare an appropriate two-page summary that may be used as authorized aid for an in-class examination.

2. **Project Vision Statement (100 points)**.
   The Project Vision Statement is an individually written document <1 page in length that describes what you believe the project should look like and incorporate when complete. It should reflect what you think your individual and team’s contribution to the project will be.

3. **Ethical, Legal, and Professional Responsibilities of Licensed Engineers (100 points)**.
   Record a power-point presentation regarding the topic. The summary should demonstrate comprehension. (Bloom’s Taxonomy level of Comprehension or higher)

4. **Conceptual Design (Proposal) Milestone Reflection (100 points)**.
   Respond to essay prompts in a manner that demonstrates critical thinking (Bloom’s Taxonomy level of Analysis or higher).

5. **Schematic Design Milestone Reflection (100 points)**.
   Respond to essay prompts in a manner that demonstrates critical thinking (Bloom’s Taxonomy level of Analysis or higher).

6. **Performance Report (100 points)**.
   Document your time and tasks, submit in means, format, and time discussed in class. Include personal portfolio examples at end of report.

7. **Peer Reviews (100 points each)**.
   Complete formative and summative assessments of yourself and each team member via the instruments provided.

8. **Summative Wrap-Up (100 points)**.
   Attendance at the last day of class is required. A number of wrap-up surveys and essays will be conducted during class.

9. **Final Design Milestone Reflection (100 points)**.
   Respond to prompts in a manner that demonstrates critical thinking (Bloom’s Taxonomy level of Analysis or higher).

10. **Individual Presentation (100 points)**.
    Presentation to client and stakeholders of Conceptual, Schematic, or Final project deliverables (Bloom’s Taxonomy level of Application or higher).

I <blank> (TBD). This item reserved for items that may develop during the semester.
Team Project Components:
Team deliverables include but are not necessarily limited to the items described as follows:

**T1 Team Scope and Time Budget (100 points).**
Each team will submit a written description of what their scope of work on this project will entail. Be sure to cover what is needed, what you will do, how you will do it, and what you will NOT do. The time budget is a table showing the amount of time you are budgeting for each task identified in the scope of work.

**T2 Field Measurements (100 points).**
This assignment will comprise the collection of field measurements of streamflow in City Creek and the deployment of water level sensor. The collected data must be compiled and analyzed in concert with historical data to provide a detailed assessment of flows setting the basis for the alternatives the team will consider.

**T3 Proposal/Conceptual Design Submittal (100 points).**
Develop preliminary concepts and schematics to present to the client, identify additional resource and data needs, project constraints and limitations.

**T4 Basis of Design (100 points).**
The Basis of Design is the document that guides the design of all alternatives. It provides information on minimum standards, safety factors, and criteria that will guide the design effort. For example, for calculation of storm water runoff, the Basis of Design may specify that you will use one-hour runoff for a 100-year storm. The team will submit a report that describes all the elements that will be the basis of their final design. What elements are critical and cannot be changed? What elements are desirable? And, what elements are non-critical but can be modified as necessary? Include code requirements and outline specifications.

**T5 Schematic Design Submittal (100 points).**
Develop preliminary design documents for the concepts approved by the client.

**T6 Final Design Submittal (100 points).**
Prepare (final) engineering documents that present the work deliverables.

**T7 NCEES Application (100 points)**
Class must complete the NCEES application for project award.

**T8 Final Video Presentation (100 points)**
Class prepares a final video for their project – suitable for web site.

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This item reserved for items that may develop during the semester.
University and College of Engineering Policies
A summary of the College of Engineering and University of Utah Policies are provided in the Spring 2020 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. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you 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 Center for Disability Services.

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.

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).