CEE 427: Capstone Design Project  
Course Syllabus

Class Meetings:  
MW 1 hour lecture  
F 3 hour laboratory

Instructor:  
Dr. Keith Dennett  
Office: SEM 226  
Phone: 784-4056  
Email: kdennett@unr.edu  
Office Hours: TBD

Prerequisite:  
ENGR 100, ENGR 301, CEE 120, CEE 426

Catalogue Description:
Design of CEE systems to meet technical and nontechnical constraints (e.g. feasibility, sustainability, economic); analysis, synthesis, alternatives, recommendations. Ethics and professionalism. Completion of team projects developed in CEE 426; presentation and report. (Major Capstone course.)

Course Materials:
- Lecture and other materials posted on WebCampus
- Handouts given in class
- Software tools appropriate to project
- Design codes appropriate to project

Synthesis:
CEE 427 is the second of a two-course sequence that comprises the capstone design experience. The capstone sequence provides a culminating experience requiring students to integrate principles studied previously, work with other students as a team to identify and solve an engineering problem, and become aware of civil engineer responsibilities in society. In CEE 427, with the guidance of their CEE Faculty Advisor and PE mentor, student teams will complete projects that were approved under the guidelines specified in CEE 426. The culminating deliverables for CEE 427 are a professional engineering report that includes project design calculations, drawings, specifications and other external considerations; an oral project presentation to the class; and a poster presentation for the College of Engineering Innovation Day.

Weekly class meetings will include project related topics that will assist students in the execution of their projects, as well as other professional practice topics. Class time is reserved for student teams to meet and work on their projects.

Course Objectives
1. Students will learn ethical and professional responsibility.  
2. Students will be introduced to important non-technical aspects of civil and environmental infrastructure projects such as economic analyses, feasibility and sustainability, environmental impact assessment, social impact assessment, politics and public funding.
3. Students will work on a realistic design project in a team setting with colleagues from diversified preparatory backgrounds. Student teams will apply project management skills to complete their projects according to a schedule defined in CEE 426.
4. Students will apply design concepts, design codes and engineering tools appropriate to their selected design project.
5. Students will practice effective communication through preparation of a professional engineering report and oral project presentation.

Relation of Course to Silver Core Objectives

Application of ethical behavior and decision making is an essential component of professional engineering practice. Ethics instruction has been provided in prior required courses for the BSCE and BSENV majors: ENGR 100 (1 week), CEE 120 (1 week), ENGR 301 (2 weeks), and CEE 426 (1 week). Students will revisit the American Society of Civil Engineers (ASCE) Code of Ethics, and review specific case studies in the context of the code’s fundamental principles and canons. This course satisfies Core Objectives 12 of the Silver Core Curriculum:

CO12. Ethics: Students will demonstrate understanding of the ethical principles in general or in application of specialized knowledge, results of research, creative expression, or design processes. Students will demonstrate an ability to recognize, articulate, and apply ethical principles in various academic, professional, social, or personal contexts.

The capstone design project is a culminating experience in which students apply technical, design, and communication principles learned in previous courses along with project management and teamwork skills to complete an open-ended, realistic design project subjected to a variety of technical and non-technical constraints. The major deliverable is a professional engineering report that includes project design calculations, drawings, specifications and other external considerations. As such, the course satisfies Core Objective 14 of the Silver Core Curriculum.

CO14. Application: Students will be able to demonstrate their knowledge and skills developed in previous Core and major classes by completing a project or structured experience of practical significance.

Student Learning Outcomes (ABET a-k)

Student learning outcomes for this course are based on the requirements specified by the Accreditation Board for Engineering and Technology (ABET) for degree programs in civil and environmental engineering.

(a) An ability to apply knowledge of mathematics, science and engineering.
(c) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (CO 14)
(d) An ability to function on multidisciplinary teams
(e) An ability to identify, formulate, and solve engineering problems.
(f) An understanding of professional and ethical responsibility (CO 12)
(g) An ability to communicate effectively.
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(j) A knowledge of contemporary issues
An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. (CO 14)

Course Topics and Schedule

Formal instruction time will be allocated to course topics according to the following approximate schedule.

Project Related Topics

1. Specialty topics in CEE design (5 hours)
2. Economic analysis (3 hours)
3. Environmental impact assessment (3 hours)
4. Social impact assessment (2 hours)
5. Feasibility and sustainability (2 hours)
6. Evaluation of alternatives and decision making (2 hours)
7. Technical writing and final report rubric (1 hour)
8. Final project presentations (4 hours)

General Professional Practice

1. Political aspects and public funding (2 hours)
2. Professional licensure (1 hour)
3. Lifelong learning and graduate school (2 hours)
4. Ethics in CEE practice (2 hours)

Assignments and Grading Criteria

Grades will be allocated on the basis of progress reports that demonstrate successful project management and final project deliverables.

Project deliverables, approximate timeline, and grade allocations are as specified.

- Weekly progress reports (30%)
- Final professional engineering report (Week 13) (50%)
- Final project presentation (Weeks 14-15) (20%)

Attendance Policy: Students are required to attend class and be seated prior to the class start time. Although points are not allocated specifically for attendance, the accumulation of 3 unexcused absences may result in a drop of one letter grade. Instructor may excuse illness-related absences.

Grading Scale: Composite averages in the following range indicated will guarantee you at least the grade indicated. The minimum average required for each letter grade may be lowered at the discretion of the instructor. The +/- scale will be applied.

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Academic Honesty Policy
Every student enrolled at the University of Nevada, Reno agrees to abide by, and make every effort to meet, the academic and behavioral standards of the university. The maintenance of academic standards is a joint responsibility of the students and faculty of the university. Freedom to teach and to learn is dependent upon individual and collective conduct to permit the pursuit and exchange of knowledge and opinion. Faculty have the responsibility to create an atmosphere in which students may display their knowledge. This atmosphere includes an orderly testing room and sufficient safeguards to inhibit dishonesty. Students have the responsibility to rely on their knowledge and resources in the evaluation process. The trust developed in the maintenance of academic standards is necessary to the fair evaluation of all students.

**Academic dishonesty** is against the university standards as well as the system community standards. Academic dishonesty is defined as *cheating, plagiarism, or otherwise obtaining grades under false pretenses*. Plagiarism is defined as submitting the language, ideas, thoughts, or work of another as one’s own; or assisting in the act of plagiarism by allowing one’s work to be used in this fashion. Cheating is defined as: (1) obtaining or providing unauthorized information during an examination through verbal, visual, or unauthorized use of books, notes, text, and other materials; (2) obtaining or providing information concerning all or part of an examination prior to that examination; (3) taking an examination for another student, or arranging for another person to take an exam in one’s place; (4) altering or changing test answers after submittal for grading, grades after grades have been awarded, or other academic records once these are official.

Disciplinary procedures for incidents of academic dishonesty may involve both academic action and administrative action for behavior against the campus regulations for student conduct. The procedures involve the determination by the faculty member pursuing concerns over alleged cheating or plagiarism as to whether administrative action is warranted, in addition to making a determination as to any academic consequence. Academic action may include: (1) canceling the student’s enrollment in the class without a grade; (2) filing a final grade of “F”; (3) awarding a failing mark on the test or paper in question; (4) requiring the student to retake the test or resubmit the paper.

If the student wishes to appeal the academic action of the faculty member, a special hearing board will be constituted to investigate the incident and determine whether the student is responsible for dishonesty and, if so, the appropriate academic action as a consequence for this act. The student will be entitled to receive notice of the academic charges and the opportunity to reply to or to rebut the charges before an unbiased board. For more details, see the University of Nevada, Reno General Catalog.

**Disability Services:** Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations.

**Academic Success Services:** Your student fees cover usage of the Math Center (784-443 or www.unr.edu/mathcenter/ ), Tutoring Center (784-6801 or www.unr.edu/tutoring/ ), and University Writing Center (784-6030 or http://www.unr.edu/writing_center/). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

**Statement on Audio and Video Recording:** Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission
to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.