CIVE 460: Course Syllabus - Fall 2024

General

The goal of CIV E 460 and 461 is to create a realistic design experience that encompasses a variety of disciplines within Civil and Environmental Engineering.

In the Fall term course (460, 3-0-3/2), the students are introduced to design as a distinct process and are presented with a Request for Proposal (RFP) that defines their main project. The students will examine how they might tackle a design project, what constitutes success or failure, how design projects are managed, and what design tools are at their disposal. All of this will be done in an environment that mimics a typical, multi-discipline design project. In addition to responding to the RFP, the students will be presented with a variety of focused design problems taken from industry experience.

In the Winter term course (461, 3-0-3), the students do the project for which they submitted a proposal. They will be tasked with meeting the schedule of deliverables defined in their proposals. In addition, each team will be required to provide peer review for another team. Teams will have access to staff and consultant advisors. Teams will also be expected to provide owner's representatives with progress updates. While 3 hours of lecture is scheduled per week, it is expected that formal lecture content will be less than 1 hour/week with the extra time devoted to addressing problems as they arise and for students to meet with team, client, staff or consulting advisor(s).

Objectives

The first term course will introduce students to the full design process in the context of Civil and Environmental Engineering. This will involve lectures/presentations from staff, consulting engineers, and owner's representatives. In parallel, a real project will be introduced as a Request for Proposal (RFP) to which the students, working in teams, will develop responses.

In completing the course, the students will:

- Demonstrate an understanding of the civil and environmental engineering design environment
- Recognize and apply universal design principles
- Demonstrate a working knowledge of the design process
- Interpret RFP and identify issues, stakeholders, and objectives
- Apply design concepts
- Demonstrate and understanding of the value of time
- Demonstrate an understanding of the role of design codes and standards
- Devise a strategy that addresses team, methodology, budget, and schedule in answer to an RFP

Course Delivery

Lectures will be conducted as design meetings with agenda distributed in advance and the lecturer as chair. A meeting record will be kept and distributed to all (complete with "Action By" notes). Students will be expected to attend or to send regrets if attendance is not possible.

Formal lectures will address general design topics. These include:

1. What defines successful and unsuccessful design?
2. Major stages of the generic design process: Concept Design, Feasibility, Preliminary Engineering, and Detailed Design.
3. Understanding the design problem as presented in an RFP.
4. Answering an RFP
5. Roles and Responsibilities
6. Quality control and quality assurance in design.
7. Assessing environmental footprint of design (LEED, Envision)
8. Design concepts such as factor of safety, constructability, redundancy, robustness, sustainability, life-cycle cost, risk avoidance.
9. Understanding catastrophic failure.

A number of practitioners have agreed to give focused lectures on subjects near and dear to heir hearts. Scheduling of these is always in a state of flux but everyone will be given advance notice of upcoming guest lectures.

Labs are roughly 50% project work and 50% other (class exercises, presentations by practitioners). For project work students are working in their design teams. Team membership will be left to the students but limited to 5 a maximum of individuals. Each team will have an academic mentor/liaison who will monitor the students' progress. The students will be guided through the development of a response to the RFP that is presented in the first lab. They will also provide peer feedback to another group's proposal. Students will participate in a client debrief on their proposals. They will also produce a technical memo, the content of which is outlined in the RFP.

Assignments present focused design problems or issues, taken from industry experience, for the students to consider. The focus on all assignments will be how the students approach the problem rather than the particular answer that they come up with. Sample assignment problems are:

1. Identify one successful design and one unsuccessful design and provide basis of judgement
2. Design foundation layout given geotechnical report and architectural layout of structure
3. Devise design criteria for loading on a manhole in a multi-modal yard
4. Develop traffic staging for a bridge deck rehabilitation
5. Extract information from set of drawings
6. Develop high-level schedule for design and construction of ped bridge over river
7. Develop limits for a road profile where it crosses a creek within City limits
8. Sketch cross sections for proposed trail in river valley

Texts

Several texts will be referenced. Most are available to the students electronically through the U of A library. Only required text is #7.

1. Practical Concepts for Capstone Design Engineering by Bloetscher and Merehoff
2. The Engineering Capstone Couse by Hoffman
3. Structure or Why Things Don't Fall Down by Gordon
4. Universal Principles of Design by Lidwell, Holden, and Butler
5. ISO 9001:2015 : A Pocket Guide by Watkins
6. Design Methods by Jones (only available in print)
7. Lessons in Professional Liability by the DPIC Companies (out of print but a scanned version will be available to students through the bookstore)

E-Course Site

The E-Class site will have asynchronous lecture material, links to other source material, and meeting (lecture) records. It will also contain the project RFP(s) and supporting documentation.

Grading

Item	Weight (%)
Assignments (individual)	25
Quizzes (individual)	10
Team Charter (team)	5
Proposal (team)	20
Peer Review (team)	5
Self-Assessment (individual)	5
Client feedback (team)	5
Technical Memo (team)	25
Total	100