CSE 1905

Design for Grand-Challenge Innovation

Fall 2013 (second half)
10 October – 5 December 2013
Thursdays 2:30 – 3:45pm
1 credit
Location: 140 Kolthoff Hall (Oct)
102 Fraser Hall (Nov/Dec)

Instructors:
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Overview

Grand Challenges facing society include problems such as food security, climate change, clean water, clean energy, and cyber security. This 1-credit, half-semester class has two parts. In the first four weeks, CSE student teams explore design thinking and its application to global grand challenges. In the second four weeks, CSE and Carlson School of Management students work in teams to propose a solution; via a competition, teams will seek funding for their idea.

Goals

Students taking this class will

- Demonstrate knowledge of current Grand Challenges, and of how university learning can help someone address those Challenges.
- Practice design thinking (discovery, ideation, rapid prototyping).
- Working in groups, use design thinking to identify a problem to focus on and a solution they wish to implement.
- Plan steps they could take after the class ends, to implement their ideas.

Via a competition ("10^9"), teams with strong ideas will be funded to carry out their ideas.

Requirements

Freshman standing in CSE. Passionate about solving big problems and helping others. Desire to apply university learning to "real world" problems. Work well in groups. Enjoy challenges and learning new skills.

What?

This class is about problem solving. To identify problems and potential solutions, we employ listening to others, brainstorming, and rapid prototyping. We aim to focus on important problems ("Grand Challenges").

So What?

(1) Grand Challenges are major problems facing society for the coming decades or longer. They are worth learning about and working on. (2) The approach used here, called design thinking (listening with empathy, prototyping, etc.), is useful in many fields and nearly any career. (3) Student teams in the class will propose projects they would like to implement. Via a competition, we will identify and **fund** the best projects.

Now what?

Students taking this class will apply for funding via the 10^9 ("10 to the 9th") competition: *In 1000 hours and with up to $1000, how can you positively impact 1000 people on a Grand Challenge topic*. Teams can also enter other competitions, such as the Acara Challenge. This class provides a 1-credit introduction to finding a problem & solution. Students work in teams, with freshmen from Carlson School of Management.

Description

This class is about problem solving. The class will introduce students to a framework for working on large, complex problems. This framework, called design thinking, includes techniques to identify problems and potential solutions, listening to others, brainstorming, and rapid prototyping. Those approaches are lifelong skills that students of all majors will be use again and again. The class aims to focus on problems that matter ("Grand Challenges"), but connecting these larger problems to our everyday experiences.

This half-semester class will be jointly taught with Carlson School of Management. The first four class sessions will be only CSE students; the last four sessions will include both CSE and CSOM students working together.

Expectations

Be engaged, be honest, be disciplined, be on time. This class is about taking risks. Don't be afraid to try new ideas. Failure is part of taking risks; how do you learn from your efforts and do better the next time?

Assignments

Grading for this class aims to reflect effort, creativity, and willingness to wholeheartedly try new ideas. We are not grading on "did you get the right answer?", but instead are looking at whether you truly engaged with the assignment. See "expectations" section; this class is about enthusiasm, effort, and rigorous, honest evaluation of what works and doesn't work.

Many homework assignments will be graded on a check/check-plus/check-minus scale. Assignments will be submitted online. Each assignment will have a deadline, and should be completed fully, professionally, and on time. If assignments are submitted up to 24 hours late, 25% of the points will be taken off. Assignments submitted over 24 hours late will be given a grade of zero. Students are expected to complete all assignments. "Three strikes" policy: Any student with more than two zeros (i.e., a student failing to turn in three or more assignments on time) will automatically receive a grade of "F". Assignments that are turned in but reflect little effort will receive a grade of zero. See the first expectation listed above: be engaged.

Grade weighting:
10% Class participation
30% homework assignments (due each week)
30% Final prototype from first part of class, plus reflection essay (due November 5)
30% Final presentation (20%) plus final essay (10%) from the second part of class

The final presentation is December 5. The final essay is due December 12. Students are expected to be at all classes. (Attendance is a prerequisite for participation & engagement.) If you miss a class, you must have a doctor's note.

University of Minnesota's Uniform Grading Policy is as follows.

A	Achievement that is **outstanding** relative to the level necessary to meet course requirements.
B	Achievement that is **significantly above** the level necessary to meet course requirements.
C	Achievement that **meets** the course requirements in every respect.
D	Achievement that is **worthy of credit**, even though it fails to meet fully the course requirements.
F	Represents failure and signifies that the work was either: 1) completed but at a level **not worthy of credit**, or 2) **not completed** and there was no agreement between the student and instructors that the student would be awarded an Incomplete.

Persons with disabilities that require accommodations will be assisted on an individual basis. Please contact Disability Services (626-1333) and the instructor in advance to arrange for such accommodations.

Cheating is not allowed in the course and will not be tolerated. Anyone found cheating will receive a grade of zero on that assignment; we will also notify the dean's office. If such behavior occurs more than once, the student will automatically receive a grade of F in the class, and the dean's office may enforce additional sanctions.

Harassment and disruptive and disturbing behavior will not be tolerated; students will be asked to leave immediately if such behavior occurs. Such behavior is defined in the Student Conduct Code.

Schedule

Here is a description of what we cover in each class, and the homework assignment. GC = Grand Challenge. NAE = National Academy of Engineering.

To help guide your efforts, homework assignments below offer an approximate time duration (see notes in "grading"). Typically, during the semester a 1-credit course requires 1 hour per week in class plus 2 hours per week of outside-of-class work. Since this 1-credit class is offered during half of a semester, the time requirements for the weeks we meet are 2 hours per week in class plus 4 hours per week outside of class.

The class meets Thursdays 2:30 – 3:45pm. We have the room reserved 2:30 – 5:00. We anticipate that student teams will work together on homework during the 3:45 – 5:00 time slot. During the second part of the class (with Carlson students), the Carlson students will also be available to work in teams during the 3:45 – 5:00 time-slot.

The schedule below is subject to modification during the semester as the instructors see necessary and to reflect teams' progress and changing needs.

Week	Date & location	In-class	Homework
1 CSE	10 Oct Kolthoff	**Introduction.** Design thinking exercise (listen, ideate, prototype, refine). Introduction to Grand Challenges.	Design thinking exercise (listen, ideate, prototype, refine) related to your GC (1h). Watch 3 NAE videos on GCs (0.3 h). Rank order your preferences for which GC you will focus on <food, energy, water, computer security>. (0.2 h). Read the NAE description of your GC (0.5h). Find a Star Tribune article on your GC; write 2-3 sentences on what/so what/now what (1h).
2 CSE	17 Oct Kolthoff	**Discovery**. Establish teams. Ice-breaker exercise. Practice interviewing and doing empathy maps.	Interview 3 people about their experiences with your GC <food, energy, water, computer security> (1h). In group, make empathy maps. (1h). Pick a point of view (POV) (1h). Read another team's POV and offer feedback. (0.5h)
3 CSE	24 Oct Kolthoff	**Ideate.** Powers of 10; How would ___ solve this? (Google, Oprah,...); Madlibs; 2x2 matrix (2 h). Discussion on how to prototype.	Build a prototype. Share it with your 3 interviewees, hear their feedback.
4 CSE	31 Oct Kolthoff	**Prototype.** Discuss experiences (challenges, victories) in prototyping, and how to improve and refine prototype.	Refine your prototype. Write an essay on your process in coming to the prototype, what are its strengths and weaknesses, and what you would do differently next time. Identify 3 classes you could take that would help you learn how to build your prototype.
5 CSE + CSOM	7 Nov Fraser	**Brainstorm** First CSE/CSOM joint class. Form teams. Ice-breaker. CSE and CSOM teams summarize to each other what they learned thus far. Individually, then in groups, brainstorm ideas.	Discuss how to apply the skills you have learned to a new process. Layout a schedule for how to spend the next few weeks, to come to a good idea.
6 CSE + CSOM	14 Nov Fraser	**Filter and select** Filter ideas down to the one to work on as a group.	Ideate and prototype on the one idea. Prepare to stand up and talk about your idea (and how you came to that idea) for 5 minutes.
7 CSE + CSOM	21 Nov Fraser	**Practice presentation** Teams give practice presentations and receive peer feedback. Teams refine their prototype.	YouTube video describing your idea. Watch 5 other teams' video, offer constructive feedback. Then, refine your own video and post a new (revised) video. Turn in a list of how you edited in response to feedback received.
	28 Nov	**Thanksgiving. No class.**	
8 CSE + CSOM	5 Dec Fraser	**Final presentations**. In class presentations are the competition for funding of teams' ideas.	Final paper (due December 12 [one week after last class]): Reflections on what you learned, what worked & didn't work, what you would do differently, and what comes next.

Course website

Assignments, grades, and other materials will be posted to the course website on Moodle. This website can be accessed via **http://myu.umn.edu**, then clicking on "my courses". All grades, including the final course grade at the end of the semester, will be posted to the class website as soon as they are available.