Product Design Capstone

ME 4684 + 4685

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What is ME Product Design Capstone?

• Series lasts the full academic year
• 1st semester: ME 4684
• 2nd semester: ME 4685
• Employs a user-centered design approach to develop a product that solves a real problem for real people in our community
• Class size is limited to 20 students... so you must have instructor permission to enroll.
Exciting Changes for the 2018-19 School Year!

1. The sequence will start in both autumn AND spring semesters!
   • Start in AU & finish in SP! ...or...
   • Start in SP & finish in AU!

2. This capstone is now open to all ME students!
   • Yes, even those who have previously received credit for ME 5682.01 & 5683!

3. The lecture portion of this capstone will meet independently from ME 5682.01
How is the Product Design Capstone scheduled?

**ME 4684: 1st semester**
- 4 credits. 1 credit may be applied to Technical Electives
- Once-weekly lab & twice-weekly lecture
- Lecture is the same content as the ME 5682.01 elective
- **Class Times for SP19:** Lecture M/W 9:35-10:55am, Lab TH 9:35-11:25am

**ME 4685: 2nd semester**
- 2 credits
- Once weekly lab (110 minutes, exact time TBD)
What happens in the “lecture” for this capstone?

• The “lecture” portion will give you the background and theory of user-centered product development, product architecture, manufacturing, etc.

• Topics will be the same as in the 5682.01 elective, but we’ll meet separately.

• Includes lots of reading, some short writing, thinking, discussing, analyzing.

• In-class activities & mini projects will give you the chance to explore the material at a deeper level… and build some camaraderie with your classmates.
But wait... aren't all the other ME capstones about designing products too?

- It's true, most (all?) students in ME capstones will end up designing a product of some sort! The point of capstone is to gain design experience.

- Our focus is on the user-centered design process, and we include many topics that don't typically make it into engineering design classes:
  - Conducting User Research: go talk to real people!
  - Framing the Problem: work with the people to define the opportunity at hand, and spend a significant amount of time framing the challenge
  - Open-Ended Projects: YOU choose your project direction & solutions
How are the project structured?

• You get to choose many aspects of your project focus
• You get to choose your teammates (teams of 3-4 people)
• With autonomy comes responsibility!
• Teams are funded by the department, at the same rate as other capstones
• Professor Abell will **not** tell you what to do... So you must be self-motivated!
• Teams start by choosing a user group or project focus-- NOT a specific product
• 1st semester: focus on research, context, and problem definition
• 2nd semester: generate solutions, emphasis on iteration, lots of prototyping
What will we do during our project?

1. Work with users to understand their problems, needs, motivations, context
2. Define the opportunity: frame the problem as an engineering challenge to address the users' needs
3. Conduct multiple iterations of concept generation, with an emphasis on visual communication (aka: drawing!)
4. Focus on a fluency of ideas: create many ideas so you can evaluate & choose the best ones to move on to prototyping
What will we do during our project?

5. Create quick, cheap prototypes (test many ideas w/out getting attached!)
6. Continually solicit user feedback for continuous improvement
7. Create many iterations of functional prototypes
8. Conduct an evaluation of the final prototype
9. Present your work: how to communicate a technical idea to a broad audience
What projects have students done in the past?

Teams have worked with...

• **musicians** to improve transport and storage of fragile instruments
• **firefighters** to design a hose management system
• **beekeepers** to design a device to more effectively weigh beehives
• **The Cincinnati Zoo** to develop an enrichment device for Asian Elephants
• **Mid-Ohio Food Bank** to develop a rainwater collection system for urban farms
• … many more!
Example: On-the-scene shadowing of firefighters at a training exercise
Example: Problem Definition Activities

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<td><strong>Disorientation</strong></td>
<td><strong>Castrating Bodies</strong></td>
<td><strong>Hoses</strong></td>
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<td>* Primarily Sound &amp; Fire = noisy ** Cardinal Directions forgotten**</td>
<td>* Lost in House ** Unknown layout?**</td>
<td>* Can't see ** Not knowing where other FF are**</td>
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<td><strong>Carrying Bodies</strong></td>
<td><strong>Airports caught on stairs</strong></td>
<td><strong>Lack of universal tool (suction)</strong></td>
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<td>* Heavy people</td>
<td>* Multifloors</td>
<td>* Can't predict ** Can't fail**</td>
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<td><strong>Fog</strong></td>
<td>* Hoses easily tangled ** Get caught on corners**</td>
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Example: Visual Idea Generation
Example: Low-Resolution Prototypes
What do past students say is UNIQUE about the Product Design Capstone?

• "It gives us a better understanding of how to solve real world problems"
• "Very user oriented"
• "You spend nearly as much time researching the problem as you do solving it"
• "Intense user research: YOU define the problems you are going to address"
• "The independence is awesome!"
• "You have an opportunity to choose a project that's interesting to you & your group"
• "You get to come up with your own project & explore your creativity"
What do past students say is the BEST thing about this capstone?

• "Small class size"
• "It's relatively self paced"
• "The ability to drive direction and delegate responsibilities independently"
• "It challenges you to go out and figure things out for yourself"
• "It answers the question of, 'how does it work & why?'"
• "You get to go very in depth with the product design process"
• "We get to solve almost any problem in almost any way we want. True freedom is really refreshing"
What do current students say is CHALLENGING about this capstone?

- "Not jumping ahead to solve the problem before you define it"
- "There are almost no constraints initially, so it can be daunting to figure out what you need to do to solve a problem"
- "Trying to figure out the true root cause of a user's problem"
- "It touches on a lot of different skills, including drawing"
- "Being diligent about working & meeting with your teammates"
- "Keeping things on schedule- your own schedule"
- "You are responsible for your own fate. You must manage time to be successful"
This all sounds great! How do I proceed?

- Enrollment is by permission of instructor, limited to 20 students.
- Email Professor Abell directly to express interest and gain permission to enroll, or to ask questions / set up a meeting to talk further.

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