Product Design Capstone

ME 4684 + 4685

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What is ME Product Design Capstone?

• Series lasts the full academic year
• 1\textsuperscript{st} semester: \textbf{ME 4684}
• 2\textsuperscript{nd} semester: \textbf{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... so you must have instructor permission to enroll.
Recent Changes to this Capstone Sequence
(in case you’d heard otherwise from past students)

1. The product design capstone sequence can start in either autumn or spring!
   • Start in AU & finish in SP! ...or...
   • Start in SP & finish in AU!

2. Product Design capstone is now open to all ME students!
   • Yes, even those who have previously received credit for ME 5682.01 & 5683!
   • (If you already have 5682.01 credit, we enroll you under a different course number but you come to the same classroom with everyone else)
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

**ME 4685: 2nd semester**
- 2 credits
- Once weekly lab (110 minutes)
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
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.
  • Share why you want to join this capstone
  • Attach your resume

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