The ever evolving Design Innovation Course

ME310 is a year-long project-based design engineering course that began at Stanford University and has been operating continuously for over forty years. Originally created to provide engineering students with real world engineering challenges, the course has evolved over the ages to meet the changing demands of the labor market. Over its lifetime, the course has shifted from practical engineering experience to design of mechatronic systems to design innovation and global collaboration. Meanwhile, ME310 has gone beyond the hedges of Stanford University and is now being taught in four different continents and eight different countries. The course is now focused on teaching students the innovation methods and processes required for designers, engineers, and project managers of the future. Upon the completion of the course, students have acquired the skills necessary to be global innovation leaders.

When a corporate partner engages with ME310, they receive a global student team of 6 to 8 students dedicated to their innovation challenge over a period of 8 months. Through the projects, students go through an intense and iterative process of need finding, ideation, and rapid prototyping to create and evaluate new concepts. Company involvement provides the reality check necessary for teams to improve their innovation abilities. In the end, teams deliver functional proof-of-concept prototypes along with in-depth documentation that not only capture the essence of designs but the learnings that led to the ideas.

Furthermore, every team in ME310 collaborates with another team from a foreign university for the duration of the project. The partnership adds diversity to the project teams and students are given the opportunity to experience true global collaboration, a skill required in today's connected world. All teams in ME310 start their projects at Stanford University where they participate in a design thinking workshop and experience the entrepreneurial culture of Silicon Valley.

Students collaborate in the Stanford ME310 Design Loft.
(re)Define the Problem
Iterate to generate more and refine concepts

Test
Learn from the prototypes

Needfinding and Benchmarking
Understand the users, design space

Prototype
Rapid prototyping to explore ideas

Brainstorm
Generate as many ideas as possible

ME310 approach to design innovation
Stanford Design Innovation Process

The core pedagogy of ME310 is the Stanford Design Innovation Process that has fueled much of the entrepreneurial culture in the Silicon Valley. At the heart of the process is the notion that in order to innovate, one must understand the needs of the user and the context surrounding the design. Unlike most other engineering design courses, ME310 requires the students to get out into the field and interview users to understand people’s values as well as thoroughly benchmark existing products and technologies. Students are then required to both thoroughly analyze the existing situation as well as build intuition for their design space. By understanding the past and present, the students are able to design what the future can be.

The design process in ME310, unlike many other design and development processes, is cyclical. By going through the process multiple times, not only does it maximize student learning, it maximizes project insights for the student teams. The iterative nature assures that teams are not stuck on one idea for too long and that ideas are being continuously tested through rapid prototyping and testing. Throughout the project, student teams repeatedly diverge, expand their horizons to discover new ideas, and converge, realize their ideas to develop new insights. “Fail early and fail often so you can succeed faster,” is one of the mantra for ME310.
Improving the open-air driving experience

Digital assistive device for executives

Personal Air-conditioning for the office

Next generation portable internet device
Project topics for innovation

Projects in ME310 have come from companies small and large in various industries including consumer electronics, automotive, telecommunications, healthcare, aeronautics, software, households products, transportation, even cosmetics. Increasingly focused 3-5 years in the future, project topics are often broad enough so that students must not only solve but define the problem while delivering surprise and delight to the corporate partners. At the same time, projects should be well defined so that students are working within a realistic context, the best training ground for innovators of tomorrow. Example project topics from the past include:

- Digital assistive device for executives
- Improving the open-air driving experience
- Personal Air-conditioning for the office
- Advanced telepresence for distributed teams
- New paradigms for automotive human-machine interaction
- Distributed ideation and design tools
- New products and services for mobile healthcare
- Consumer grade video conferencing for connecting families
Diversity drives innovation

Students in ME310 come from different backgrounds and disciplines including various forms of engineering, industrial design, business, and economics. The diversity assures that teams take multiple perspectives on any given challenge, increasing the probability of breakthrough discoveries and innovation. Many of the students are in their first or final year of the Master’s program (or the equivalent) and some are working towards their doctoral degrees. All students have core competencies in their respective fields and many have prior design project experience in academia or industry.

The instructors in ME310 are just as diverse as the students offering multiple points-of-view on engineering, design, and project management. All of them are passionate about letting the students design and innovate and will go beyond their professorial duty to assure that students are given the best possible environment to work in. Student teaching assistants are also part of the teaching team, providing peer support and advice only possible by someone who has recently completed the course. The teaching team consists of over thirty professors, instructors, and teaching assistants who actively support the hundred or so students participating in ME310.

In addition to the teaching team, industry liaisons and coaches are part of the teaching process in ME310 bringing a wealth of knowledge and experience to the students. Liaisons are members of the company who interface with the students on a regular basis to provide the teams the corporate knowledge relevant to the project. Coaches are typically alumni of the course with relevant industry experience assigned to the student teams to provide feedback and access to relevant information through their social network.

After the Global Paper Bike Competition at Stanford University.

*Paper Bike is an intense two-week introductory design exercise in ME310.*
A key tenet of Stanford Design is that the work environment can have a significant influence on innovation outcomes. Every student team around the world is provided a dedicated space in the design loft at each of the schools. The design loft is the heart and soul of ME310 where the community comes together and collaborates. Most of the lofts are equipped with tools for rapid prototyping and global collaboration. The dedicated space allows student teams to design their workspace in a way that suits their working style and transform it into a space they want to spend time in. The end result is a space dedicated to the culture of innovation.

Opposite: ME310 design loft at Stanford University
Top: Common space in the ME310 Garage in Aalto University
Bottom: Students brainstorm at École des Ponts ParisTech
Why ME310 for Companies

Some of the past corporate partners in ME310
Breakthrough ideas

Many companies realize that corporate culture and context can stifle the innovative abilities of their employees. Even the most creative employee can be unproductive when put in the wrong environment. Within the environment of innovation in ME310, projects often produce surprising and delightful results that go beyond the expectations of corporate partners and the teaching team. As valuable as the ideas are the new perspectives that students discover on the problems and challenges. ME310 projects can be great source of inspiration for companies trying to innovate.

Work with the innovators of tomorrow

All the schools participating in ME310 are leading schools in their respective countries and fields, and the legacy of ME310 draws the best and hardest working students to the course. Furthermore, most of the students are in their early to mid-twenties entering the target age-range for many consumer oriented companies. The perspectives these students provide are priceless for companies trying to understand their generation. The ME310 network is also a great place to meet fellow innovators in industry and an opportunity to connect with other companies interested in reinventing the future.

The Stanford Design Innovation process

Design thinking, the design innovation methodology and process pioneered by IDEO, is engrained in the DNA of the Stanford design community and Silicon Valley at large. The process of rapid iteration and user-centered design is what has made many of the Silicon Valley startups so successful. Participation in ME310 is an in-depth exposure for companies to the process and the culture of design thinking through their own innovation challenges. Companies in the past have organized workshops and visits in addition to partnerships in ME310.
What ME310 Delivers

The core deliverables for the student teams in ME310 are structured around prototypes, presentations, and documentation. By continuously weaving back and forth between the different phases of the design process, student teams are continuously challenged to move the design forward through prototypes, record their discovered knowledge through documentation, and preserve and communicate their vision through presentations.

Prototype in many forms

Prototypes are the main vehicle of innovation in ME310, starting from the roughest prototypes in the fall to the refined prototypes in the spring. Throughout the course, students create numerous prototypes to articulate their vision and test their design assumptions. Through iterative prototyping, broad project statements are refined into concrete concepts, which are demonstrated through the final functional proof-of-concept prototype.
Extensive Documentation

Teams pour significant effort into documenting their learnings along the way. For each prototype created and tested to failure, there is significant learnings that not only influence the final innovation the teams create, but also provide the corporate partners with a valuable body of knowledge from which to extend the ME310 team efforts into new innovation projects. Every ten weeks, the design teams reflect and create a major design document for delivery to their corporate partners.

Visionary Presentations

One of the largest challenges is driving innovation is effectively sharing the team’s vision of the future. Three times during the project, the student teams deliver formal presentations to the design community, including the corporate partners. Through these presentations, teams communicate the highlights of their innovation efforts and demonstrate the best of their prototyping efforts as the teams paint a compelling view of where their project support the corporate partner needs.
Corporate Engagement Options

Global Design Innovation Project

ME310 for the 2010-2011 academic year will begin in late September and finish in mid June. The corporate projects will begin in late October at Stanford University where all students will attend the three-day ME310 kickoff workshop. Mid-project presentations will be held in mid-December and mid-February while intermediate documentations are due mid-December and mid-March.

There is a nominal course fee for a full ME310 engagement. These funds go to support the global design teams in both travel and prototyping budgets, as well as providing the global infrastructure that enables these teams to deliver consistent innovation to our corporate partners.

There are limited project spots available which are reserved on a first come first serve basis. For more information please contact the ME310 Executive Director, Dr. John Feland at john.feland@stanford.edu or +1-650-868-0114. Additionally you can find the contact information for all of our global partners at http://me310.stanford.edu.
310embedded

As our corporate partners realize the power of design thinking, they are increasingly looking for ways to embed our corpus of innovation behaviors within the corporate context. ME310 has responded with the creation of 310embedded, in which firms seeking to increase internal innovation run ME310 style projects within the enterprise. These projects are staffed by employees and heavily supported by ME310 Global Teaching Staff. A typical 310embedded engagement starts with the same kickoff workshop that the student teams receive with routine and deep contact with teaching and coaching throughout the life of the project, providing the best opportunity to successfully transfer design thinking into your corporate culture.

Custom Workshops

For companies looking for a more modest engagement, ME310 also offers custom corporate workshops, either hosted at Stanford in the design loft or on site at the corporate partner. These workshops provide a wonderful way to introduce your leadership and teams to the same design thinking methods used by the course to drive consistent innovation outcomes.

Get involved in ME310 2010-11