Fundamentals of Engineering

Program Highlights

- Develop 3D solutions to design challenges to learn the fundamentals behind mechanical, civil, and biomedical engineering
- Manufacture an artificial limb to replicate natural function and movement in real world situations
- Design and build a scale model structure compliant with code, zoning, and budget requirements
- Learn from professionals in the field about the latest advancements in engineering and technology

Campus Locations

Yale University
- June 21-July 3, 2020
- July 5-July 17, 2020
- July 19-July 31, 2020

UC Berkeley
- June 21-July 3, 2020
- July 5-July 17, 2020
- July 19-July 31, 2020

UC San Diego
- July 26-August 7, 2020

Academic Course Overview

The goal of the program is to give students a taste of multiple types of engineering. In the first six classes, students will spend two days focused on each of the following fields of engineering: biomedical, civil, and mechanical. For each sub-field of engineering, students will learn some key concepts and complete at least one design challenge.

For the last three classes, each student (or team of students) chooses the field of engineering that interests them most and does a larger project or design challenge focused on that area. In past years, students have used Autodesk software packages such as Revit, Inventor, and AutoCAD. Instructors will have the freedom to choose the software they are most comfortable using. Students use a free trial of the software during the program.

By using an experiential learning approach, students will quickly engage in these topics, and the instructor introduces the underlying theory and concepts as students tackle these issues while designing and creating their prototypes.

Guest Speakers & Excursions

In order to provide students real world experience, they will embark on excursions to visit actual engineering firms and speak with professionals to gain insight and advice about pursuing a career in the various fields of engineering.

Excursions at UC Berkeley - Students visit Stantec, a global engineering firm where they spent time reviewing "pull schedules" that allow the orchestra of fields to come together to create a masterpiece: the new UCSF cancer center.

Excursions at Yale University - Students have visited Luchs Consulting Engineers, founded in 1948, is a dynamic Connecticut licensed engineering and land surveying firm providing a full range of engineering services to federal, state, municipal, utility and private clients throughout New England.

Excursions at UC San Diego – Students will visit a construction site to meet firsthand with the architects and engineers to learn how the complex structures are designed given the constraints of the project.

Instructors

Courses are taught by accomplished and passionate faculty recruited from many area colleges, universities and professional forums. Each faculty member is selected for their subject area expertise and proven ability to both challenge and captivate students.

Instructor at UC Berkeley - **Reza Alam, PhD**
Reza is a professor of Mechanical Engineering at UC Berkeley as well as the ABS Chair in Ocean Engineering. His research areas include ocean wave power, underwater wireless communication and underwater drone technology. He is also a primary investigator at UC Berkeley Theoretical & Applied Fluid Dynamics Laboratory.

Instructor at Yale University – **Rich Bonnanzio**
Rich is a former engineer for Pratt & Whitney that led design team for F135 Joint Strike Fighter, and also holds multiple patents related to jet design.

Instructor at UC San Diego – **Ryan Miller**
Ryan is a civil engineer for one of San Diego's leading construction management firms. He has supervised projects ranging from hospitals to schools and parking structures and specializes in LEED certification. He brings real world insight and years of experience to the classroom.

Sample Schedule from Past Year

This is only to provide a general idea of the class structure. The exact sequence of lessons will change based on availability of guest speakers and on companies that can host our students.

Day 1. Monday
- Class expectations
- Product improvement exercise
- Challenge #1: Cable car build
- Software installation and test period

Day 2. Tuesday
- Reverse engineering overview
- Student item analysis
- Challenge #2: Ping pong trick shot
- Autodesk Inventor check-in

Day 3. Wednesday
- Intro to Autodesk modeling
- Autodesk modeling skills
- Begin modeling reverse engineering items

Day 4. Thursday
- Continue modeling reverse engineering items
- Learn assembly techniques in Autodesk
- Review project outcomes and presentation expectations for tomorrow

Day 5. Friday
- Finalize reverse engineering product
- Create presentation on proposed improvements
- Present projects (gallery walk style)
- Challenge #3: Paper bridge

Day 6. Monday
- Confirm installation of Autodesk Revit
- Wood framing tutorial
- Creation of shed in Autodesk Revit OR roof construction project

Day 7. Tuesday
- Understanding residential construction and observing "common" items in a house
- Review Habitat for Humanity Housing code
- Begin planning for house project – Client interview, bubble diagrams, and floor plan drafts to be completed

Day 8. Wednesday
- Build scale models of houses via foam core and cardboard.
- Confirm they meet code requirements
- Model houses in Autodesk Revit

Day 9. Thursday
- Present residences and give tours along with floor plan drawings and how specific items of residential code were followed.
- End of course survey, feedback, and end of academic track

Tuition

- **Residential Students**: $4,998
  - Includes: all meals, lodging, excursions, academic program, weekend excursions
  - Excludes: optional airport pickup and drop off service (available for an additional fee)

- **Commuter Students**: $2,798
  - Includes: lunch, academic program, excursions, programming from 9am to 5pm, Monday-Friday
  - Excludes: lodging, breakfast, dinner, weekend excursions

- **Extended Commuter Students**: $3,398
  - Includes: lunch, dinner, excursions, academic program, programming from 9am to 8pm, weekend excursions
  - Excludes: lodging, breakfast