ENGR 1620: Technology Leaders Section

Course Title: ENGR 1620 Introduction to Engineering (Design Workshop), Fall 2012
Section: 2
Classroom: Rice 120
Class schedule: T-TH 3:30-4:45
Office Location: Olsson 114b
Office Hrs.: MW 1:00-2:00 (Week of Labor Day: Office Hours moved to Tu 9:30-11:00)

Instructional team

Lead Instructor  Teaching Assistant
Reid Bailey        Ben Choo
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434.924.6352

Text: Becoming a Technical Professional, Johnson and Bailey, Kendall-Hunt.

The Upside: What You Should Get From This Class

1) Technology Leaders Theme

While a common set of goals and objectives are shared for all sections of ENGR 1620, each section takes on its own theme. Our theme – technology leaders – focuses on designing systems to solve a that involve the integration of several components that must work together to meet people’s needs. More specifically, systems of sensing equipment that collect information that needs to be distributed to many users each with different needs. These kinds of systems are the focus of the Technology Leaders section.

In this section, you will be joining a hypothetical high-tech company with technical expertise in sensors (which we will help you gain through hands-on labs) and their application to real problems (you will have the opportunity to work with real clients). Your job: design a working prototype of one of our company’s possible new products. In past years, products included children’s museum exhibits that can capture shadows, play sounds and light lights when people walk by, and guide kids in learning what is recyclable, training aids for hurdlers and hammer throwers, a system to track when newspapers are taken from a distribution box, a security system for our lab.

This year, the projects will focus on designing toys for first through third graders that integrate the use of sensors in helping the kids learn about environmental sustainability.

2) Course Goals and Learning Objectives

The primary goal of ENGR 1620 is to introduce students to both the fun and challenge of real world engineering practice through multidisciplinary design experiences and realistic, open-ended problem solving. In the TLP section, we are going to do this through the integration and application of sensors. More explicitly, at the end of this course students should be able to:
• Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, including the ability to perform the following elements of an overall design process
  i. Define a problem
  ii. Generate solutions
  iii. Evaluate solutions
  iv. Implement and test solutions
  v. Identify when iteration is necessary

• Work effectively on an engineering team
• Communicate technical ideas through both written documents and oral presentations

3) How Will You Learn These Things?
We use two primary mechanisms for students meeting the objectives in this class: labs where students can learn specific technical skills and a client-based design project where students learn about design. The projects are particularly exciting this year as they involve “service learning,” which means that they are working with people in our community.

A heavy emphasis is placed on active, hands-on learning in an authentic environment.

No fake projects, no busy work, no memorization.

[Yes to real projects with real clients that can have real impacts. Yes to deep learning.]

4) How Will You Demonstrate Your Knowledge?
The final grading for ENGR 1620 combines the design workshop experience (this syllabus) and the computer lab assignments that you do outside of this workshop. The grades will be split as follows:

  Computer Laboratory Assignments: 25%
  Design Workshop Assignments: 75%
## Grade Breakdown

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Team Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Homework</strong></td>
<td>1%</td>
<td>CHAIR TEAM</td>
</tr>
<tr>
<td>• Chair of Scrap Assignment</td>
<td></td>
<td>%1%</td>
</tr>
<tr>
<td>• Miscellaneous homeworks not currently listed on syllabus</td>
<td>% for homework will be adjusted as necessary</td>
<td></td>
</tr>
<tr>
<td><strong>Labs</strong></td>
<td>21.4%</td>
<td>LAB TEAM &amp; INDV</td>
</tr>
<tr>
<td>• Pre-Labs</td>
<td>7.1%</td>
<td>LAB TEAM &amp; INDV</td>
</tr>
<tr>
<td>• Labs</td>
<td>14.3%</td>
<td>LAB TEAM &amp; INDV</td>
</tr>
<tr>
<td><strong>Project Major Deliverables</strong></td>
<td>78.6%</td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td>• Information Gathering Strategy Memo</td>
<td></td>
<td>%3.6%</td>
</tr>
<tr>
<td>• Individual Info Gathering Write-Ups</td>
<td></td>
<td>%3.6%</td>
</tr>
<tr>
<td>➤ 30 second ads and Info Gather Synthesis</td>
<td></td>
<td>%10.6%</td>
</tr>
<tr>
<td>• Initial Requirements Posted on Wiki</td>
<td></td>
<td>%3.6%</td>
</tr>
<tr>
<td>• Idea Generation Affinity Packet</td>
<td></td>
<td>%3.6%</td>
</tr>
<tr>
<td>➤ November Design Review</td>
<td></td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td>➤ Final Written Report</td>
<td></td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td>➤ Final Play Test</td>
<td></td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td>• Team Contract</td>
<td></td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td>• Team Wiki</td>
<td></td>
<td>PROJECT TEAM</td>
</tr>
<tr>
<td><strong>Easy Points!</strong></td>
<td>4%</td>
<td>INDIVIDUAL</td>
</tr>
<tr>
<td>• CATME evaluations</td>
<td></td>
<td>%2%</td>
</tr>
<tr>
<td>(points just for completing the evaluations… not related to how your team scores your performance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• End of Course Evaluation Completed</td>
<td></td>
<td>INDIVIDUAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%2%</td>
</tr>
</tbody>
</table>

CHAIR TEAM: Formed by students  
LAB TEAM: Formed by students, cannot team with anyone from your Project Team  
PROJECT TEAM: team composition selected by instructional team

## 5) Teams and Grades

A majority of your grade in the ENGR 1620 Design Workshop are team assignments: they are given to you as a team and must be completed as a team. These assignments will also be graded as a team - all members of a given team will receive the same grade for the assignment (with rare exception). There will be team self-assessments three times during the term (we use a tool called CATME for this) and a team performance review memo– the goal of these is for students to learn how to be a better team member.

The final set of CATME results and the team performance review will be factored into an individual's grade in the class. Consistently poor contributions to the team can lead to a lower grade while consistently strong contributions can lead to a higher grade.
Policies and Procedure

- The computer lab component of ENGR 1620 is required! Go to the first one this week/next week to learn more.
- We will make use of some “Technology Leaders Design Studio” space in the Reactor building on O-Hill. Students can only use this space when the instructor or TA is present.

Email Policies

- Any email without “ENGR 1620” in the subject line will likely not be read.

In-Class Policies

- **Class attendance and participation are required.** Students must attend the section for which they are registered. Without obtaining the prior permission of the instructor:
  - Missing 2 class periods = **one full letter grade (e.g., A- to a B-) reduction** in final grade.
  - Missing more than 2 class periods = student **fails the course**.
- Without prior approval, **cell phone use (including texting)** during class is not allowed. Minimum consequence: student is asked to leave class that day. Maximum consequence: student is not allowed back in class for the entire semester.
- **Laptop usage** during class is encouraged if (and only if) it is being used to benefit the learning experience (e.g., looking up information online so that you can contribute to a class discussion, taking notes). Any other use of a laptop (including email, random web surfing, etc.) is not allowed. Minimum consequence: student is asked to leave class that day. Maximum consequence: student is not allowed back in class for the entire semester.

Assignments

- Any files submitted on Collab should follow the **file naming convention**: email address (e.g., rrb5b) followed by a dash and then the assignment name. If a project team assignment, add another dash and your team name before the file extension.
- For team assignments, only one person should submit the assignment.
- Homework and design project assignments will be due at the beginning of class on the date designated on the Design Workshop assignment sheets (unless otherwise noted).
- Group members who do not contribute to a group assignment **will fail the course**.
- Honor Code issues for team assignments:
  - **For labs**, you can only work and discuss the lab within your team. **Absolutely no collaboration between teams is allowed.** For parts marked as to be completed by individuals, you cannot work with anyone else (including members of your team).
  - **For the main project, you are free to discuss your project with others.** Appropriate citation of contributions from others is essential. The actual completion of your project, of course, should only be done by your team.
  - We hold the Honor Code in high esteem: please please please cite the work of others, including figures, images, and photos. **Ignorance is no excuse for plagiarism.**
- **Late assignments receive ZERO credit.**
- Any student missing more than one graded assignment **will fail the class.**
**Tentative Schedule**

**Up through early October:** learn about toy design, first and second grade learning environment, and technological capabilities of sensors so that you can pick a great new/modified exhibit to design for the museum (i.e., your project focus)

**Rest of October:** Develop requirements for your project focus, explore alternative solutions.

**November:** Evaluate alternative solutions and narrow your design space, utilizing prototyping heavily

**December:** Fully focused on finishing the implementation and testing of a working prototype of your entire system.

**Directions to TLP MAST Lab (O-Hill):** [http://goo.gl/maps/SsHc](http://goo.gl/maps/SsHc)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Location</th>
<th>Project Milestones</th>
<th>Rough/Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tue 8/28</td>
<td>Why are you here? Chair of Scrap Kick-off</td>
<td>Classroom</td>
<td></td>
<td>Complete CATME Survey by 11:59 pm on 8/28</td>
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<tr>
<td></td>
<td>Thu 8/30</td>
<td>Project Focus: Technology Tools for Sustainability</td>
<td>Classroom</td>
<td></td>
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<tr>
<td>2</td>
<td>Tue 9/4</td>
<td>Design Reflection &amp; then Chair of Scrap Presentations</td>
<td>Classroom</td>
<td>Chair of Scrap Due Reading: Chapter 1 in book</td>
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<tr>
<td></td>
<td>Thu 9/6</td>
<td>Team Building and Project Kick-off</td>
<td>Classroom</td>
<td>Teams Formed (at latest)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tue 9/11</td>
<td>Project Update - IDOE - Info Gathering Techniques - Types of Questions</td>
<td>Classroom</td>
<td>Go to Clark Elementary this week or next, time TBD</td>
<td></td>
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<tr>
<td></td>
<td>Thu 9/13</td>
<td>Project Area: Sustainability</td>
<td>Classroom</td>
<td>Info Gathering Strategy Memo Due 9/13</td>
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</tr>
<tr>
<td>4</td>
<td>Tue 9/18</td>
<td>Lab #1</td>
<td>O-Hill</td>
<td>Go to Clark Elementary this week or next, time TBD</td>
<td></td>
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<tr>
<td></td>
<td>Thu 9/20</td>
<td>Lab #1</td>
<td>O-Hill</td>
<td></td>
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<tr>
<td>5</td>
<td>Tue 9/25</td>
<td>Lab #1</td>
<td>O-Hill</td>
<td>Team Wiki, with initial content posted by 9/25 at class time; Initial Content includes each team members info gathering write-up</td>
<td>Pre-lab due</td>
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<td></td>
<td>Thu 9/27</td>
<td>Project as Spiral, Determining Objectives, Ideas Generation for Project Focus In Class</td>
<td>Classroom</td>
<td>Come to class with 2 sets of individual project ideas: one to turn in and one to discuss</td>
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<tr>
<td>6</td>
<td>Tue 10/2</td>
<td>Lab #1</td>
<td>O-Hill</td>
<td>Info Gathering Synthesized or Wiki</td>
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<td></td>
<td>Thu 10/4</td>
<td>Converging Project Focus Ideas Based on Objectives, Making your ads</td>
<td>Classroom</td>
<td>Lab report due one day after lab completed</td>
<td></td>
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<tr>
<td>7</td>
<td>Tue 10/9</td>
<td>NO CLASS - READING DAY</td>
<td>Classroom</td>
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<td></td>
<td>Thu 10/11</td>
<td>Decision analysis</td>
<td>Classroom</td>
<td>Upload Toy Focus Presentation on 10/12 at 5:00 pm</td>
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<tr>
<td>8</td>
<td>Tue 10/16</td>
<td>No class to make up for Sunday workshop - Read about learning and team contracts</td>
<td>Classroom</td>
<td>Complete CATME peer evaluation</td>
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<td></td>
<td>Thu 10/18</td>
<td>Design Inception, CyberEnote, Functional Requirements</td>
<td>Classroom</td>
<td>Team Contract</td>
<td></td>
</tr>
</tbody>
</table>

**SUNDAY October 21st: WOODWORKING WORKSHOP!!! 11:00am-5:00 PM**

**9**
- Tue 10/23: Creativity, Ideation, and Prototyping
- Thu 10/25: Lab #2: "Triggering Stuff?"

**10**
- Tue 10/30: Functional User Reviews, Iconic Users
- Thu 11/1: Design Requirement Review + How Prototyping

**11**
- Tue 11/6: Team Meetings with Instructors/Experts (Project Workshops when not meeting)
- Thu 11/8: Team Meetings with Instructors/Experts (Project Workshops when meeting)

**12**
- Tue 11/13: Project Check-in, Oral Presentations
- Thu 11/15: Design Reviews (10’ presentations demos followed by 15’ Q/A)

**13**
- Tue 11/20: Design Reviews (10’ presentations demos followed by 15’ Q/A)
- Thu 11/22: NO CLASS - THANKSGIVING

**14**
- Tue 11/27: Trade-off Reflections; Kant Chart, Test Plans
- Thu 11/29: Project Workday

**15**
- Tue 12/4: Project Workday
- Thu 12/6: Project Workday

Reading days 12/9, 12/11, 12/16 (Sun, Thur, Sun)

**Wed 12/12**: Final Exam Time Slot; 9 AM - Noon

**TRD**
- Final Playtest likely on 12/12 or 12/13, Final Report Due Date dependent on playtest date
- Complete Final CATME peer evaluation