Lecture 1: Course Overview & Brainstorming

Professor Erik Cheever
Administrivia

- Lab Sections (not everybody can be in section A).
- Keys (Hicks 212, outside door). See Cassy Burnett, Hicks 203.
- Textbook: *Introduction to MATLAB for Engineers*, 3rd edition, William J. Palm
- Names...
- Please, no laptops in class unless we are doing work.
- Cell phones should be off.

- **Department picnic September 10th starting at 4:30!**
Resources...

In no particular order:

- Your course professor
- Wizards
- Me (Erik Cheever)
  Hicks 305, x8076, echeeve1@swarthmore.edu
- Your advisor
- Dean’s office

- Academic Resources Coordinator:
  - Ann Ruether
    Hicks 307, aruethethe1@swarthmore.edu, x8081
Academic Resources

- Ann Ruether coordinates Academic Resources for the Engineering Department
  - Hicks 307
  - aruethe1@swarthmore.edu
  - x8081

- Problem Sessions for Engineering, Physics and Math
- Computer (MATLAB and SolidWorks) Wednesday evenings 7:30-9:30, Hicks 212.

- Wizards website
  - [http://www.swarthmore.edu/wizards.xml](http://www.swarthmore.edu/wizards.xml)

- Tutoring
Course Goals

• Learn about engineering – discover which areas interest you.
• Design / build.
• Learn to work effectively on teams.
• Learn some matrix math and MATLAB. (the language of technical computing)
• Learn some SolidWorks. (real solutions)
Things to keep in mind...

- Lab this Thursday (Lab 1 in Hicks 212). You will get an email to inform you of your lab section.
- 9/9: Lab 1 due
- 9/10: Mouse Escape – 4:15 p.m. on second floor of Hicks, followed by department BBQ
- 9/14: Mouse Escape Report due (Lab 0)
- Shop class (not required – only if you are interested). Details to come.
  Sign up in Engineering Department Office.
What is available from the Engineering Department at Swarthmore?

- Nominally you can concentrate in one of four areas
  1. Civil/Environmental
  2. Computer
  3. Electrical
  4. Mechanical
  5. Others... (bio, aero, chemical...)
Core Courses

- E6 – Mechanics (1\textsuperscript{st} year, spring)
- E11 – Electric Circuits (2\textsuperscript{nd} year, fall)
- E12 – Linear Systems (2\textsuperscript{nd} year, spring)
- E14 – Experimentation for Engineering Design (2\textsuperscript{nd} year, spring)
- Computer Engineering (must take at least one):
  - E15 – Digital Systems (2\textsuperscript{nd} or 3\textsuperscript{rd} year, fall)
  - E19 – Numerical Methods (2\textsuperscript{nd}, 3\textsuperscript{rd} or 4\textsuperscript{th} year, spring)
- E41 – Thermodynamics and Fluid Mechanics (3\textsuperscript{rd} or 4\textsuperscript{th} year, fall)
- E90 – Senior Design (core)
Get involved

- ASCE – American Society of Civil Engineers
- ASME – American Society of Mechanical Engineers
- IEEE – Institute of Electrical and Electronics Engineers
- NSBE – National Society of Black Engineers
- SWE – Society of Women Engineers
- SSE – Swarthmore Society of Engineers
Design Process

1. Define Need
   - Smaller Cell Phone

2. Define Problems to be solved
   - Dimensions
   - Battery life
   - Antenna
   - User interface

3. Research and Design
   - Battery types
     - NiMH
     - LiIon
     - LiPolymer
   - Build Prototype
   - Synthesis
   - Test Battery Life.
     - Does battery catch fire?
   - Evaluation
     - What didn’t work well?
   - Optimization
     - Different Technology?
Other design considerations

- Economic
- Environmental
- Sustainability
- Manufacturability
- Ethical
- Safety/Health
- Social/Political
- Aesthetic
Design in E5

We’ll do all levels of design. For the first project we’ll use an R&D technique called brainstorming.

Brainstorming

- Quickly select one recorder, and one moderator.
- Recorder keeps track of all of the ideas suggested.
- Moderator keeps things moving and according to rules.

- Start by having the recorder get everybody’s name and contact information.
Brainstorming

- Try not to pass judgment on ideas; all ideas are potentially good so do not judge them until after the session.
- Write down all of the ideas. At this point there are no bad ideas. More is better.
- Build and expand on ideas of others.
- Encourage everybody to participate; each person has a valid viewpoint and unique perspective on situation and solution.
- Each idea presented belongs to the group, not to the person stating it. You are not in competition with each other.
The Great Escape (1st E5 design project)

- A cat is trying to catch a mouse (you) using a mousetrap. Your job is to use the mousetrap to move the body of the mouse as far as possible.

http://lowres.cartoonstock.com/animals-trap-mousetrap-mouse_trap-mouse-cats-dre1770_low.jpg

http://40.media.tumblr.com/tumblr_m14bmd15Ym1rngycgo1_400.jpg
Rules

- Distance will be measured horizontally in the main hallway on the second floor of Hicks Hall (i.e., a smooth floor).
- A single member of the team will hold the apparatus with one hand and then release the device from rest.
- Design must contain only what is supplied to you. You may use other tools during the construction process.
- Body of mouse must stay intact.
- No fire is allowed.
- Today: brainstorm ideas.
- Creativity counts (take risks); but observers must be safe.
- Weekend: Meet to choose final idea from brain-storming session and do construction (2-4 hours).
- Demonstrate devices September 10\textsuperscript{th} (4:15, before picnic) in main Hallway of Hicks (2\textsuperscript{nd} floor). Be there if you can; I realize some of you will have other commitments.
# Ball Drop Teams

## Teams

<table>
<thead>
<tr>
<th>Team DW, Hicks 303</th>
<th>Team MBA, Hicks 312, inner room</th>
<th>Team PB, Hicks 312, outer room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. John Arth</td>
<td>1. Emily Bley</td>
<td>1. William Gilchrist</td>
</tr>
<tr>
<td>5. Timothy Nguyen</td>
<td>5. Jane Roberts</td>
<td>5. Taylor Wilson</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Team Emel, Hicks lobby (2nd floor)</th>
<th>Team Tringa, Hicks kitchen (2nd floor – through lobby)</th>
<th>Team Suffer, Hicks 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Nolan Hofstee</td>
<td>2. Ivan Lomeli</td>
<td>2. Rachel Hilburn</td>
</tr>
<tr>
<td>5. Gabriella Smalls</td>
<td>5. Francisco Veron-Ferreira</td>
<td>5. Dariel Padilla</td>
</tr>
</tbody>
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