BIOE 200: Career Immersion

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About your course staff

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Purpose of the course

Students will learn strategies for

- Explain differences in design process across different settings
- Understanding and interpreting clinical needs
- Researching literature and searching patents
- Working in small entrepreneurial multidisciplinary teams
- Clinical and scientific literature review
- Intellectual property analysis and feasibility,
- Basic prototyping and market assessment.

Students create, analyze and screen medical technology ideas, and select projects for future development.
We have a number of activities for you

**Notebooks**: Students will keep reflective journals during the experiences and also write needs statements they have observed during their clinical and simulation experiences.

**Paper**: Students will prepare reports after each module highlighting one of the needs and developing out a proposed solution for the problem.

**Simulation**: Students will watch clinician training in a simulation setting and debrief and have discussion with instructors about experiences. You will be placed into 1 of 6 groups for your sim experience and you only need to attend 1.

**Tours**: Students must participate in tours, research shadowing and demos of research and clinical spaces. During these experiences, you will be guided by researchers or clinicians and staff on relevant equipment and procedures related to the space. Spaces include Catheterization Lab, Mills research center, Sleep Lab, Operating Room, Radiation Lab in Mills, MRI, CT Imaging, and Ambulance/Helicopter. Schedules for tours will be posted on the class website and sign-ups will be first come first serve based on available spots for the tour.

**Presentation**: Poster session. Students will present needs and perform gap analysis based on the needs identified during their observations. Students will give presentations on the needs identified during immersion and simulation in a networking session.
Grading for this course will be light and based on application of techniques taught in class, participation, and professionalism.

<table>
<thead>
<tr>
<th>Grading</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Notebooks</td>
<td>35%</td>
</tr>
<tr>
<td>Paper</td>
<td>30%</td>
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<tr>
<td>Presentation</td>
<td>15%</td>
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<tr>
<td>Attendance, professionalism, &amp; participation</td>
<td>20%</td>
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Keep up to date on the schedule on the website and take note of your group # (once assigned)

<table>
<thead>
<tr>
<th>Friday In-Class</th>
<th>Location</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>31-Aug Purpose of Clinical Integration and Ethnography</td>
<td>1306 Everitt</td>
<td>Pre-observation worksheet</td>
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<tr>
<td>7-Sep Clinical Teams and Environments, Conduct</td>
<td>1306 Everitt</td>
<td>Journal</td>
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<tr>
<td>14-Sep Research Teams and Environments, Conduct</td>
<td>1306 Everitt</td>
<td>Journal</td>
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<tr>
<td>21-Sep Industry Teams and Environment, Conduct</td>
<td>2233 Everitt</td>
<td>Journal</td>
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<tr>
<td>28-Sep Needs Statements/Framework for Problem Identification</td>
<td>1306 Everitt</td>
<td>Pre-observation worksheet</td>
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<tr>
<td>5-Oct Sim Group 1, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>12-Oct Sim Group 2, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>19-Oct Sim Group 3, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>26-Oct Sim Group 4, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>2-Nov Sim Group 5, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>9-Nov Sim Group 6, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>16-Nov Sim Group 7, Research shadowing</td>
<td>Sim Lab Everitt</td>
<td>Journal</td>
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<tr>
<td>23-Nov Thanksgiving, no class</td>
<td>Home</td>
<td>Relax</td>
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<tr>
<td>30-Nov Needs Statement Revisit, Design Plan</td>
<td>1306 Everitt</td>
<td>Journal</td>
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<tr>
<td>7-Dec Needs Statement Revisit, Design Plan</td>
<td>1306 Everitt</td>
<td>Journal</td>
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<tr>
<td>12/? Presentations and Networking</td>
<td>Everitt TBD</td>
<td>Poster</td>
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Key steps along the way

• Gain knowledge so that you know the right questions to ask
• Gain empathy with your target users by talking to and observing them
• Create a point of view statement to inform your design
  • User + need + insight
• Generate as many ideas as possible
  • High tech and low tech
• Make, sketch, role play, etc. to explore your idea
Inputs to the Problems

• Observations
  • Videos
  • Shadowing

• Literature Review
  • PubMed

• Interviews
  • Doctors
  • Patients
  • Nurses
  • Engineers

Problem Identification
Hear, Create, Deliver (HCD)

Hear – prepare for and conduct field research, interviews, observations in a community. Observe needs and desires.

Create – translate field research into ideas that may be prototypes, opportunities, other solutions that are technically and organizationally feasible to meet needs.

Deliver – realize solutions with financial sustainability in mind to launch tangible solutions in community.
Stanford Biodesign:
The Value of Direct Observation
Ethnography is the study of humans in their natural habitat.
Using ethnography at the beginning of the design process is key to help customers identify needs.

Customer needs a car, not ‘bells and whistles’

Don’t impose your beliefs on a system
There are many places to do ethnography for medical devices
Some Things to Look for

• Pain and discomfort

• Fear and stress

• Wasted time

• Inconsistencies

• Poor treatment outcomes
Other Things to Look for

• Communication between surgeons
• Preparing instruments
• Redundancies
• Did anything break or get damaged?
• Staff interaction
• Organization, transport, and storage methods
Documentation

• Write down questions for later interviews
• Capture everything in raw, objective notes
  • Describe facial expressions
  • Direct quotes
  • Document all of the things you were looking for...
Hear, Create, Deliver (HCD)

Hear – prepare for and conduct field research, interviews, observations in a community. Observe needs and desires.

Create – translate field research into ideas that may be prototypes, opportunities, other solutions that are technically and organizationally feasible to meet needs.

Deliver – realize solutions with financial sustainability in mind to launch tangible solutions in community.
Let’s run through an example
Physical therapy requires patients to perform exercises and follow doctor recommendations, however, doctors are completely reliant on patient reported information.
The device uses LSM9DSO sensors, FLORA, battery, a multiplexer and a bluetooth sensor
Data collected shows accurate tracking compared to measurements taken while under observation.
Human-centered design demands an understanding of those we’re designing for, and nowhere will that be more true than in the design of wearables, their software, and the interfaces which display their data in the workplace context. We also can leverage these new technologies to serve the rural population in new ways.
Your assignment for this week is to watch a medical procedure and define needs

1) Watch an OR Live video of your choosing
2) Take notes
3) Identify some needs that align with the concepts presented today
4) Submit the link to the video you watched and your needs using the web form
5) [https://illinois.edu/fb/sec/8509305](https://illinois.edu/fb/sec/8509305)