

NOTE: TEAMS: Complete problems 2 through 9 as a team, and turn in one paper for each team. Use non-engineering format for these problems. Write the names of all team members on assignment. This homework will be part of your design journal due class 19, so keep an electronic copy of this homework for your records.

1. Prepare for the midterm exam by working practice problems found on the Schedules and Downloads page under class 10. **You do not need to turn anything in for this question.** Also, remember to look on the Schedules and Downloads page to confirm the time and place of your exam!
2. Review the Ten faces of Innovation in the class 9 notes under “implementing the IDEO design process.” Determine one or two personas that best describe you. As a team write down the faces that each team member brings to the group and identify a potential way that each group member might strengthen the team effort.
3. The first step of the IDEO Design Process is to **Understand the Problem**. Write a few sentences that describes the problem your group is trying to solve. This definition of the problem should be agreed upon by the entire group. Briefly describe the client, market, technology and constraints that define your problem.
4. Step 2 of the IDEO design process is to **Observe People in Real Life Situations**.
 - a. Discuss why the problem bugged you or someone else and how different people respond when experiencing the problem.
 - b. List people (specific or general) that you should talk to about the product idea.
 - c. List specific areas of research that you should investigate to guide your design.
5. Step 3 of the IDEO process is to **Visualize New-to-the-World Solutions**.
 - a. Include a cell phone picture (or other electronic illustration) of the mind map you developed in class.
 - b. List all of your ideas for solving the problem (we need a lot of ideas). This should be a numbered list. If the brainstorming process was cut short in class, continue brainstorming until you start to run out of ideas.
6. Begin to narrow your focus to the most promising ideas. Have team members vote on their top four ideas (it can be more or less than four – you decide). For example,
 - John – Liked ideas 1, 8, 12, 31
 - Sally – Liked ideas 8, 12, 31, and 38
 - Jane – Liked ideas 1, 12, 23, and 31
 - Hector – Liked ideas 12, 31, 32, and 38
7. Based on the most popular ideas from problem 6, develop three design concepts that are a combination of the most-liked ideas from the brainstorming session. For each concept, write a couple of sentences or draw a sketch to illustrate your idea. Include scans or photos of any sketches with your homework.

As you begin to develop your design concepts, it is appropriate to consider the resources at your disposal to implement the project (Arduino, the sensors in the Project-Based Learning Office, foam board, riveting and sheet metal structures and brackets, the milling machines in BH 129/130, resources outside of class . . .). Remember that it's OK and go back and brainstorm some more as the design concepts begin to gel (add any new ideas to your list from 5b).

8. Use one of the evaluation techniques (Pugh, Modified Pugh, or Decision Matrix) discussed in class to evaluate the three design concepts you developed for problem 7 above. To do this, develop a set of criteria describing the

needs and wants of the customer (for a whiteboard marker, these criteria could be visibility, longevity, emissions, and erase-ability). Determine a numerical score for each of the three concepts.

9. Build a simple prototype of your product – this can be a sketch of your idea or a simple 3D prototype that depicts the form and function. It can be made of paper folded and taped together, foam core, or anything else that is quick and easy. Remember, “prototype early to succeed faster.” Take a picture of this prototype to include in your electronic journal, and bring the prototype to show off in class.
10. **(Due Class 12)** Make an enclosure such as a box out of foam board – it’s OK to be creative with the shape. The box should have six sides so it is completely enclosed. This will build some of the skills that you may need when creating your prototype later in the quarter. Use the presentation entitled “foam core” on the Class 9 schedule for directions. Please make sure you have something under your foam board so you don’t damage desktops and other surfaces around campus (or cut outside on a concrete surface), and follow the safety guidelines in the notes.

[You can do this project in teams of two or individually.](#) Please bring your foam board creation to class 12 to show your instructor, and include a SolidWorks drawing of what you create with your homework. We will likely run out of foam board in Ruston, so if you go home over the weekend, you might want to pick up a piece. A business that makes signs would probably sell you a piece, or you could get it at DollarTree, Walmart, Office Depot, the University Bookstore, Hobby Lobby, etc.