

ME110
Introduction to New Product Development

Professor Alice M. Agogino
Spring 2004

GENERAL INFORMATION

Faculty:

Alice M. Agogino, Department of Mechanical Engineering, 5136 Etcheverry Hall, (510) 642-6450, aagogino@euler.berkeley.edu. Prof. Agogino is the Roscoe and Elizabeth Hughes Professor of Mechanical Engineering at UC Berkeley and has served in a number of administrative positions, including Associate Dean of Engineering and Faculty Assistant to the Executive Vice Chancellor & Provost in Educational Development and Technology. Her research interests include design theory and methods, sensor fusion, computer-aided design, design databases, educational technologies, digital libraries, on-line communities, gender & technology, green design, and MEMS design. She runs a digital library of science, technology, engineering and mathematics courseware at www.smete.org.

Teaching Assistants:

Jessy Baker, jbaker@uclink.berkeley.edu
Shankaran Sitarama, sshankar@euler.me.berkeley.edu

Class Meetings:

Lectures: MW, 10 a.m. – 11 a.m., 3106 Etcheverry Hall
Studio: F, 10 a.m. – 11 a.m., 3106 or 2105/7 Etcheverry Hall
Office Hours (Agogino): MWF 11:00 – noon, 5136 Etcheverry Hall

Course Objectives:

This course provides an operational experience in the development of innovative and realistic customer-driven engineered products. Design concepts and techniques are introduced, and the student's design ability is developed in a design or feasibility study chosen to emphasize ingenuity and provide wide coverage of engineering and business topics. Innovative thinking is nurtured. Design optimization and social, economic, and political implications are included. Both individual and group oral presentations are made, and participation in a research seminar or conference is required. Students can expect to depart the semester understanding new product development processes as well as useful tools, techniques and organizational structures that support new product development practice.

Prerequisites:

Junior or Senior standing. Graduate students need permission of instructor as graduate students are encouraged to take ME290P instead. Students from all disciplines of engineering or business are welcome.

Expectations:

Each student is expected to prepare for and attend all of the class sessions (lectures and studios) and to participate fully on a project team. Some of the studio sessions will provide in-class time for your project as well. The workload for the course has been designed so that it is relatively constant throughout the semester, and all requirements are clearly spelled out in this syllabus so that you can readily plan ahead.

Academic Integrity:

I encourage full group and class collaboration on all aspects of this course. It is almost impossible to share too much information in product development. I do expect that all team members will contribute substantially to the project efforts, although some students will choose to devote themselves to the projects beyond what is required for the course. Students will be asked to critique and contribute to the development projects of others in the class in a cooperative, supportive environment, and will be asked to submit critiques of their own group and group members during the course of the semester.

Reading Materials:

The primary reading material for the class is the textbook Product Design and Development (Second Edition) written by Karl Ulrich and Steve Eppinger. This book is a very basic text that provides a step by step view of how new product development processes are to be conducted. Supplemental required course reading materials are available from a combination of Study.Net and the “Blackboard” course website at bb.berkeley.edu.

Grading:

Your course grade will be determined as follows:

10% on the quality of your preparation for and participation in class discussions

30% on the quality of your individual assignment solutions

50% on the quality of your team’s work on project-related assignments and presentations

10% on the quality of your individual final project deliverables (lessons learned and design journal)

During the semester, I will periodically ask for individual assessments of the contributions made by members of your team to the team project. These assessments may be considered in preparing your final team grade.

Website Use:

I will make extensive use of the course website for this course to both communicate information to you and to converse with you about your homework and your projects. Log onto <http://blackboard.berkeley.edu> (or bb.berkeley.edu for short) and push the “create account” button if you do not already have one on Blackboard. Step-by-step instructions for enrolling are at the “Blackboard Instructor’s Guide” link at <http://media.berkeley.edu/web/lms.html>. The class is titled “Introduction to Product Development” and is listed under “Courses” Engineering ME110_sp04. **NOTE: YOU MUST REGISTER FOR EACH CLASS YOU TAKE AS WELL AS REGISTER FOR BLACKBOARD. IF YOU DO NOT, YOU WILL NOT SHOW UP ON THE CLASS LIST.** You should plan to check the website regularly for updates about the class, and are expected to submit your homework through the web. Once you have formed your project groups, we will set up group web pages on this site on which we expect you to store your working documents for your project. The faculty will review the website regularly to provide feedback on your work.

Class Preparation and Participation:

Reading assignments and questions to guide your thinking about these assignments will be given on the class website for each class session. I expect you to come to class prepared to discuss the readings and the suggested questions. In any given class session, a handful of students may be called upon specifically to speak to the readings and questions about them. If you have prepared according to the syllabus on the course website, you will have no problem responding when called upon. Your individual class participation grade will be based upon your in-class remarks during discussions and will be judged by the faculty. If there is inadequate discussion in class I may have to resort to in-class quizzes over the readings.

Individual Assignments:

All individual assignments are to be submitted via the class website prior to the start of class on the day they are due. Individual assignments are to be submitted through the digital (student) drop box and will be reviewed by the instructor/TA. (They are not visible to other students.) Specific instructions will be given for each homework assignment as to what it should be named. Always bring one copy of your homework to class, as we will frequently ask you to share your results in class.

PROJECT BACKGROUND AND GENERAL INFORMATION

New Product Development Project:

The goal of this exercise is to learn principles and methodologies of product development in a realistic context. Most product development professionals work under tremendous time pressure and do not have an opportunity to reflect on the development process. In this course, the stress level will be low enough to allow time to experiment and learn. You will be asked to form project teams of 4 to 5 students. You will have opportunities during the first two weeks of class to scope out the possible projects and get to know potential teammates.

Project Background:

Your challenge in the project portion of this course is to design a new product, test it on a consumer group, and produce a prototype version of it. The goal of this exercise is to learn principles and methodologies of product development in a realistic context. Guidelines for successful projects are as follows:

- There should be a demonstrable market for your product. The product does not have to have a tremendous economic potential, but should, at a minimum, be an attractive opportunity for a small firm.
- If you choose a physical hardware product (rather than a software user interface design), the product should not be composed of too many parts; fewer than 10 parts would be reasonable. Although you cannot anticipate the design details, it is easy to anticipate that an electric drill will have more than 10 parts and a garlic press fewer than 10.
- You should be confident of being able to build a reasonable prototype of the product. If you choose to make a hardware product, you must have access to prototyping capabilities such as machining processes and the skill sets to run them. If you have not already gone through the mechanical engineering student shop training, I strongly recommend that you do during the early part of the semester. Gordon Long is the Senior Lab Mechanician in charge of the student machine shop. You will need to visit him in 1166 Etcheverry Hall or call him at 642-3314 to make an appointment. The qualification training is for education and safety purposes. It consists of three 1 hour sessions and one final 1-2 hour session on an actual hands-on application. In some cases a combination of a non-functioning “appearance” type model and a rough mechanical or electrical “working” prototype may be acceptable. For products with a software or user interface component, you should have proficiency in Web page design or other authoring or graphics tools.
- The product should require no fundamental technological breakthroughs that need to be developed in order to show a “proof of concept”. I am more concerned that you have a specific market need in mind for your project than that you attempt to develop new technologies.
- You should have access to more than five potential “lead users” of the product (more than 20 would be nice.) You will need to talk with them or observe them when you launch your product and visit them with your product prototypes.
- Save any highly proprietary ideas for another context, as we will be open in discussing the projects in class and do not wish to be constrained by proprietary information.
- The most successful projects tend to have at least one team member with strong personal interest in the target market.
- Most products are really not very well designed. (See, for example, the badly designed products documented at www.baddesigns.com.) Thus, if you pick almost any product that satisfies these general guidelines, you will likely be able to develop a product that is superior to everything currently on the market.

Projects adhering to these guidelines will have the greatest probability of success.

Project Assignments:

Project assignments are intended to pace the development process for your product. There is virtually no slack in this schedule and so assignments must be completed on or before the scheduled due date in order to maintain the project schedule. All project assignments will be clearly spelled out in the Blackboard course website.

All project deliverables (except the project proposal and the sketchbook/journal) are to be completed as a team. Please deliver all assignments according to the following format:

- Please submit your materials to the course website: <http://blackboard.berkeley.edu>. Project deliverables should be posted to your group pages (off of the “Communication” page) on the class website where they will be visible to all members of your group as well as all faculty members and coaches (but not to members of other groups).
- You should plan to maintain a history of your project deliverables on your group website so that the faculty/TA can review your progress over time, not just your most recent output.
- Be concise. I like assignments that are 2-5 pages in length when possible.
- With each project deliverable, please provide a short (less than one page) description of the process your group adopted in completing the assignment and reflections on its effectiveness. You should also comment on any lessons learned related to team dynamics or project management.
- Please develop a naming scheme for the things you post to your group website that makes obvious what those things are. In particular, you should name the links to the files that are intended for faculty/TA review by using as the first word of the name the letters DEL (short for deliverable). Follow DEL with an indication of what the document is. For example, when you submit your mission statement for faculty review, name the link DELmissionstmt.

Journal:

Each individual in the class is **required** to maintain a design journal throughout the semester to be turned in at the final project presentation. The journal will be returned at the end of the semester. This journal should include your individual thinking (both imagery and words) pertaining to your project. Think of it as a diary of sorts so be sure **to date** each page. You may sketch pictures, paste in pictures, write words, or choose any other approach that works for you to capture your ideas, thoughts, and reflections about your product and your project. The journal should be used both to **capture ideas** about the product itself as you move through the process, but also to **document thoughts and insights** on the process of product development, group dynamics, project process, etc. Inventors do this as it helps to document when they came up with an original idea (useful in the patenting process); engineers do this to work out complex technical details; and designers do this to generate lots of ideas (as ideas feed off of one another); project managers use journals as a management tool to generate “lessons learned” and “best practices” to help run future product development projects more effectively. Only the instructor/TA will see these journals; no one else will see them unless you choose to share. Your design journal will count towards your grade on your individual project deliverable.

Working with Your Team

For some of you, this will be your first experience in working on a collaborative, cross-functional team. Part of the learning in this course is to assess patterns of cooperation and team dynamics and to reflect on both the behavioral and organizational challenges your team faces. While teams vary from semester to semester, I find that good organizational practices always benefit the entire team. Here are a few suggestions:

- Set regular meeting times. One hour of the class will be devoted to team activities so as to minimize the time you need to meet outside of class. Even so, you should schedule another hour during the week for regular meetings with your design group.
- Use the provided team e-mail “listserv” to communicate with your team. It will also archive and thread your e-mails so that you can review past conversations. Store shared documents on the group page on the website.
- Work together not separately. Get to know each other’s strengths, e.g., who knows PowerPoint, who’s is good at drawing, graphics or CAD, who’s good at running meetings, who’s good at eliciting feedback from customers, etc. There are many decisions you must make as a team.
- Attempt as much open communication as possible. Discuss the means by which you wish to resolve problems as a group, and what escalation process you will use if problems persist. Decide, for example, when you want to involve the faculty or TA in helping you resolve problems.
- Use your mission statement to create a shared vision among the team members that will allow you to stay focused and on target.
- Have fun!