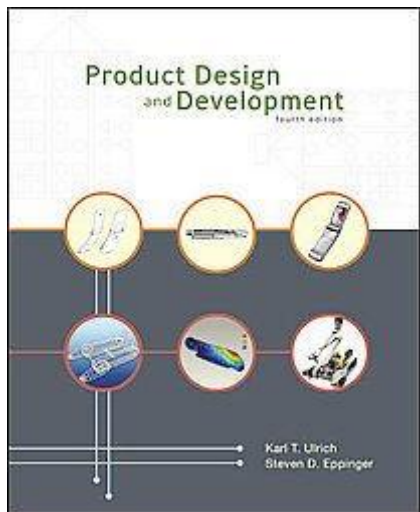


# EMEN 5400 Principles of Product Development Syllabus

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## Textbook



## **Product Design and Development, Fourth Edition**

Karl T. Ulrich and Steven D. Eppinger

McGraw-Hill Irwin

ISBN: 0-07-310142-7

## Grading

### **Grading: 400 total points**

100 points: Weekly contributions to discussion of lecture on eCollege

100 points: Weekly contributions to discussion of readings on eCollege

100 points: Exam #1

100 points: Exam #2

### **Scale:**

- A 94.0 and above
- A- 90.0 to less than 94.0
- B+ 87 to less than 90
- B 83.0 to less than 87.0
- B- 80.0 to less than 83.0
- C less than 80.0

## Weekly Discussions of Lectures

Register on the web at xxxxxx for access to eCollege eCompanion (look for the register link).

This web-based tool will be used as an integral part of the course to enable students to interact and download class visual aids and readings.

Assigned readings for each unit will be posted in eCollege. Students are expected to complete assigned readings prior to attending class and to actively participate in discussions in class and online.

## Weekly Discussions of Lectures

Each week each student will be expected to initiate and react to discussions of that week's lecture.

To be considered for purposes of grading, contributions to the discussion must tie directly to that week's lecture or relate directly to a prior contribution on that week's lecture.

In the course of the discussions, students should feel free to add interesting, "as-an-aside" type comments that add to the dialog but do not relate to that week's lecture. These comments are welcomed, but will not be considered for purposes of grading.

You are encouraged to make the first sentence of each contributions a short 5-6 word title for that contribution. This title will then show up in the discussion thread making it easier for persons to scan the contributions.

Students must make their contribution for each class session no later six days from the date of the classroom lecture.

Late contributions will not be accepted.

## **Contributions will be graded from "0" to "4"**

- "0" for missing or late
- "1" for "minimal effort"
- "2" for "one good contribution"
- "3" for "multiple good contributions"
- "4" for "exceptional"

## **Grading Criteria:**

- Apply that week's course content to actual company situations
- Apply that week's course content to personal work experiences
- Cite authoritative sources - e.g. published articles, known authors, etc.
- Make multiple, substantive, original contributions
- Bring a new, insightful perspective to the discussion
- Provide an informed, well-articulated disagreement with instructor, textbook, or other students

It will be rare, if ever, that a "4" will be awarded for a single contribution.

## **Weekly Discussions of Readings**

Each week each student will be expected to initiate and react to discussions of that week's assigned readings.

To be considered for purposes of grading, contributions to the discussion must tie directly to the assigned readings or relate directly to a prior contribution on that week's readings.

In the course of the discussions, students should feel free to add interesting, "as-an-aside" type comments that add to the dialog but do not relate to that week's readings. These comments are welcomed, but will not be considered for purposes of grading.

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## **First Exam**

The first exam is a take-home exam.

The exam is to represent your personal work. No collaboration with other members of the class is permitted. Discussions with other individuals are permitted and encouraged. All discussions with other individuals must be reported in the appendix to the exam.

All written resources – e.g. textbook, class notes, Internet, etc. – are allowed. Any material used from sources other than the textbook and the lecture should be credited.

The exam is to be turned in using the "Exam 1" drop-box provided on eCollege.

Your challenge in the first exam is to design a new product from mission statement to concept selection. Specifically, your design will address each of the following process steps in new product development:

1. Mission statement
2. Identify customer needs
3. Establish target specifications including target costing
4. Generate product concepts
5. Select product concepts

Each of the process steps is worth 20 points for a total of 100 points.

In addition, your report should contain an appendix that lists discussions with other individuals, e.g. name and nature of discussions. The appendix is not graded.

Guidelines for a reasonable product are:

1. The product should be hardware and not software or a service; however, the hardware product may have a software component.
2. There should be a demonstrable market for the product. One good way to verify a market need is to identify existing products that attempt to meet the need. Your product need not be a variant of an existing product, but the market need addressed by your product should be clearly evident. The product does not need to have a tremendous economic potential, but should at least be an attractive opportunity for an established firm with related products and/or skills.
3. The product should have a high likelihood of containing fewer than 10 parts. Although you cannot anticipate the design details, it is easy to anticipate that an electric drill will have more than 10 parts and that a garlic press can have fewer than 10.
4. You should be confident of being able to prototype the product without significant costs. For example, a razor like Gillette's Mach3 may have about 10 parts, but would require tens of thousands of dollars to create a geometrically accurate prototype.
5. The product should require no basic technological breakthroughs. (Yes, a more compact airbag would be a nice, but can you do it without inventing a new chemical?)
6. You should have access to a small number of potential users of the product.
7. Save any proprietary ideas for another occasion.
8. Most everyday products are really not very well designed. If you pick almost any everyday product, you will be able to develop a product that is superior to everything currently on the market.
9. Do thorough research to identify competitive products and solutions.
10. Some examples from previous classes at other universities using our textbook:
  - o clipboard for disabled persons

- canteen for in-line skaters
- beverage holder for sail boats
- book bag for college students
- stripping basket for fly fishing
- portable sharpener for ice skates
- rowing foot stretcher for crew shells
- laser level for carpenters
- beer bottle capper for home brewers
- reading/area light for campers
- grocery bag carrier for urban shoppers
- clamp for theatrical lighting
- brake for in-line skates
- tripod for birders

You may want to visit <http://web.mit.edu/15.783j/www/gallery.html> to view pictures and descriptions of MIT product projects.

Please adhere to the following guidelines in addressing the five process steps:

1. Technical requirements:
  - a. Microsoft Word or Adobe pdf format
  - b. 12 point, Times New Roman typeface
  - c. 1.5 line spacing
  - d. Not to exceed 20 pages in length, excluding the appendix.
2. Include 20 customer needs.
3. Be sure to address target costing in your target specifications.
4. Develop 8 initial product concepts. One of these may be an existing product that you intend to use as a reference.
5. Using concept screening as described in the textbook, reduce your product concepts to 4.
6. Using concept scoring, reduce your 4 product concepts to the 2 most promising concepts.

Additional guidance

1. There is no fixed minimum length for the paper – quality will be more important than quantity in grading. However, with five parts to the exam, it is hard to imagine a paper less than 10 pages in length.
2. Grading will be based on the instructor’s judgment of how well the process described in the textbook and the lectures is applied to the chosen product. The three grading factors will be: (1) how well the process is applied, (2) the choice of an apt product, and (3) how well your work is written up. The priority among these from highest to lowest is: (1) the application of the process, (2) the write up, and (3) the chosen product.
3. Since this is the first time this textbook is being used and this exam is being given, no good student example can be given. There are worthwhile examples in the textbook and the lectures.
4. If you do not talk to anyone, no appendix is required. However, it is difficult to imagine how customer needs can be ascertained, validated, and prioritized without some interaction with others.
5. It is recognized that you may not be in a position to communicate with prototypical customers. Of course, this is affected by your choice of a product. You may have to rely on family, friends, and colleagues for input. If so, please be sure to note this and to comment on how this might affect the trustworthiness of the input that you received.
6. While there are good arguments for having everyone tackle the same product, I’m assuming that having the freedom to pick your product will make the exam more interesting and motivating.
7. The choice of an appropriate product is important. Several persons have asked whether it would be possible to get early feedback on their choice of a product. Some guidance has already been given, e.g. less than 10 components. If I have a concern, it would be that you would choose too complex a product. All other things being equal, I would encourage you to find a product that has a small number of components, say from three to six. Three to six components will allow you to gain experience with the proposed development processes. We all need to learn to walk before we can run. If you are seriously concerned about your choice of a product, please review it with me. The caveat in this instance is that the choice of an apt product does not guarantee success in carry out the development process or in reporting your work.
8. The term “hardware” refers to a manufactured product. Examples given previously were: clipboard, canteen, beverage holder, and book bag. A component of this product may be software. As the focus of this course is on “hardware,” a pure software product is not an appropriate choice. Development of software products has its own special concerns, including processes.
9. There is no time limit for the exam. I strongly recommend that you work each week on the exam. This is facilitated by the fact that the five parts of the exam correspond to five chapters in the textbook and the associated lectures

## Second Exam

The requirements for the second exam are identical to the first exam with the following exceptions:

1. The second exam paper should begin with a single concept.
2. This single concept does not necessarily have to be the "highest scoring" concept from the first exam paper. However, it is assumed that for most students, the beginning concept will be one of the most highly rated concepts from the first exam paper.
3. If you want to select a concept for the second exam paper that differs from the concepts explored in the first exam paper, send me an email providing a rationale for the change and a sketch and description of the new concept.
4. The second exam paper should not include the material from the first exam paper.
5. The second exam paper covers the following topics:
  - Concept Testing - Chapter 8
  - Product Architecture - Chapter 9
  - Industrial Design - Chapter 10
  - Design for Manufacturing - Chapter 11
  - Prototyping - Chapter 12
  - Patents and Intellectual Property - Chapter 14
  - Product Development Economics - Chapter 15
6. Note that Chapter 13, Robust Design, is not included in the second exam.
7. Six of the above seven topics need to be specifically addressed in the exam paper. Each student has the option of excluding one of two topics - either Prototyping (Chapter 12) or Patents and Intellectual Property (Chapter 14).
8. The second exam paper should be submitted using the "Exam 2" Dropbox provided on eCollege.

## Lecture Videos

Lectures are recorded and made available via the Internet (for streaming and downloading).

### **Requirements**

To successfully stream or download a course, your computer, browser, and Internet connection should meet these minimum requirements:

- PC with Windows and Internet Explorer: Currently Tegrity only supports PCs and Internet Explorer. Apple computers, other operating systems and browsers are not supported at this time. Additional compatibility may be available in the future.
- A computer with Pentium III (or equivalent) processor or better and 128 MB or more of RAM, adequate free hard drive space (each class is about 10 MB), 16-bit or better sound card and speakers (or headphones), 65,000-color or better video display card.
- Internet access with a minimum connect speed of 56Kbps; ISDN/DSL/Cable is recommended.
- Display Properties: You should view the class recording in 800x600 resolution, or higher, and use 16, 24, or 32 bit display.
- Download Tegrity Java component – Microsoft Internet Explorer: Class recordings will prompt you to "trust Tegrity" in order to install the Tegrity Java component. You can view the class even if you do not check the "trust" box. We strongly recommend to allow this installation of the Tegrity Java component for reducing download time for future viewing.
- Virtual Machine: If you are using Microsoft Internet Explorer and experience problems while viewing or closing the recording, we recommend upgrading your Virtual Machine. It can be downloaded from <http://www.java.com/en/download/manual/jsp>.
- Security: Be sure to turn off pop-up blockers, personal firewalls, and personal security in order to run Tegrity.

### Access to Course Lectures

- The portal is <http://engineeringonline.colorado.edu/>.
- When accessing <http://engineeringonline.colorado.edu/>, you will need to use your CU IdentiKey (CU login name and password) to log in – not your e-mail address as has been the case for <http://cua.colorado.edu/>.
- In order to have an IdentiKey, you have to already be registered.
- You can activate your IdentiKey by going CU Connect, <http://cuconnect.colorado.edu/>, or calling 5-help.
- All new students will need to activate their Identkey before they can access the new portal.
- If you have any questions regarding your login or password, contact <mailto:cuahelp@colorado.edu>.
- Main campus students may have access to course lectures online and on CD-ROM for a fee.

### Copyright Information

All material, whether rented or purchased, is granted to user under a limited license for sole use of the recipient. All material is copyrighted by the University of Colorado, and any reproduction, broadcast, or resale is strictly prohibited. Rented materials must be returned on the date it is due, and without prior authorization, it will be deemed to be purchased and subject to additional costs.

## **If Problems Persist**

Please contact Andy Bartlett for more assistance.

Andy Bartlett  
<mailto:Andrew.Bartlett@Colorado.EDU>  
303-492-2247

## **Instructor Information**

Instructor: Dr. Wayne Kirschling

Office: Engineering Center, Office Tower Room 418

Office Phone: 303-492-1211

Office Address: Engineering Management Program

University of Colorado at Boulder

Campus Box 0433

Boulder, CO 80309-0433

FAX: 630-982-0156. Please do not fax anything to the CAETE office.

E-mail: <mailto:Wayne.Kirschling@colorado.edu>

**E-mail is the preferred means for contacting me.**

Office Hours: As arranged.

## **Engineering Management and University Information**

### **Engineering Management**

**Appropriate Classroom Laptop Use:** Although having a laptop in class opens up new learning possibilities for students, sometimes students utilize it in ways that are inappropriate. It is easy for your laptop to become a distraction to you and to those around you. Therefore, please refrain from instant messaging, e-mailing, surfing the Internet, playing games, writing

papers, doing homework, etc. during class time. Acceptable uses include taking notes, following along with the instructor on PowerPoint, and other directed class activities, as well as working on assigned in-class activities, projects, and discussions that require laptop use.

**A Note on e-Mail Addresses:** When you register on ECollege, you can set your e-mail address to be sent from the course website to any address you choose. I know it can be a hassle to check multiple e-mail locations on a daily / regular basis, but may I suggest that you use your CU e-mail address for this purpose (e.g. [firstname.lastname@colorado.edu](mailto:firstname.lastname@colorado.edu)). If you do not know your assigned CU address, contact ITS (dial 5-HELP from any on-campus phone) and they will provide it to you. The reason I mention this is because in the past, I have sent e-mails to students with attachments of interest as the course proceeds. In some cases, where students have used their work e-mail address, the e-mail goes through but the attachment is blocked. In some rare cases, fire-walled work systems, when blocking an attachment, block the associated e-mail as well, and provide no indication to the student that anything was sent out by me and subsequently blocked. It is *your* responsibility to be cognizant of any information sent via the course website by me, so it might be useful to use either a CU or at least personal e-mail address that will not present this sort of possibility.

The Engineering Management Program (EMP) has a large distance learning population and, as such, many copyrighted materials are offered electronically to students. EMP has the responsibility to comply with the copyright law regulating distance education for a non-profit, state institution, i.e., the Technology, Education and Copyright Harmonization (TEACH) Act of 2002. It's the student's responsibility to comply with U.S. copyright law with respect to the use and sharing of the electronic materials provided within the program.

### **University Provisions and Requirements**

If you qualify for accommodations because of a disability, please submit a letter to the instructor from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. For further information, see <http://www.Colorado.EDU/disabilityservices>, contact 303-492-8671 , or visit Willard 322.

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of

religious obligations, have conflicts with scheduled exams, assignments or class attendance. Students for whom religious observances conflict with class schedules should contact the instructor no later than two weeks before the potential conflict to request special accommodations. See full details at [http://www.colorado.edu/policies/fac\\_relig.html](http://www.colorado.edu/policies/fac_relig.html).

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. See policies at <http://www.colorado.edu/policies/classbehavior.html> and at [http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student\\_code](http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code).

Academic Honesty & Plagiarism: The development of the Internet has provided students with historically unparalleled opportunities for conducting research swiftly and comprehensively. The availability of these materials does not, however, release the student from citing sources where appropriate; or applying standard rules associated with avoiding plagiarism. Specifically, the instructor will be expecting to review papers written by students drawing ideas and information from various sources (cited appropriately), presented generally in the student's words after careful analysis, synthesis, and evaluation. An assembly of huge blocks of other individuals' existing material, even when cited, does not constitute an appropriate representation of this expectation. Uncited, plagiarized material shall be treated as academically dishonest. If the student is confused as to what constitutes plagiarism, he/she should review the CU Honor Code on this topic, and / or refer to either or both of the following excellent sources:

<http://www.georgetown.edu/honor/plagiarism.html>

<http://www.northwestern.edu/uacc/plagiar.html>

Information on the CU Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>

Students agree that by taking this course all required papers may, at the discretion of the instructor, be subject to submission for a Textual Similarity

Review to Turnitin.com for the detection of plagiarism. All submitted papers will be added as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers in the future.

The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty. Sexual harassment is unwelcome sexual attention. It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combination of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall. Any student, staff or faculty member who believes s/he has been sexually harassed should contact the Office of Sexual Harassment (OSH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550 . Information about the OSH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at:  
<http://www.colorado.edu/sexualharassment/>