

330:135g Design for Manufacturing

Dr. Nageswara Rao Posinasetti

Learning to Design?

- The only way to learn about design is to do design.

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Learning to Design?

- In engineering design there are three types of knowledge a designer uses:
 - knowledge to generate ideas,
 - knowledge to evaluate ideas, and
 - knowledge of how to structure the design process.

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Learning to Design?

- Idea generation comes from experience and natural ability.
- Idea evaluation comes partially from experience and partially from formal training.
- Most engineering courses are aimed at developing analytic evaluation skills.
- Generative and evaluative knowledge are forms of domain specific knowledge.
- Knowledge about the design process is largely independent of domain knowledge.

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Learning to Design?

- A design process can be learned that will help result in quality products provided there is sufficient ability and experience to generate ideas and enough experience and training to evaluate them.
- A design process should be learned in an academic setting and, at the same time, in an environment that simulates industrial realities.

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Catalog description

- Design Process, Designers and Design Teams, Project Definition and Planning, Development of Engineering Specifications, Concept Generation, Concept Evaluation, The Product Design Phase, Product Generation, Evaluation for Performance and the Effects of Variation, Evaluation for Cost, Manufacture, Assembly, and other Measures, Launching and Supporting the Product
Prerequisite: 330:148.

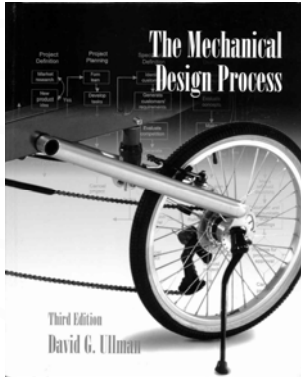
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Course Textbook

- David G. Ullman, **The Mechanical Design Process**, Third Edition, ISBN: 0-07-237338-5, 2003, 432 pages



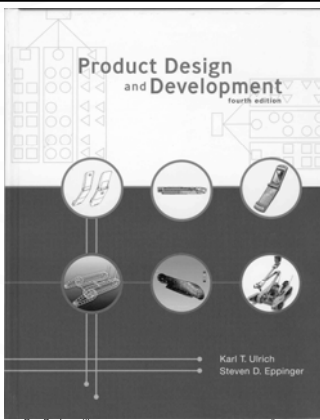
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Reference book

- Karl Ulrich, and Steven Eppinger, **Product Design And Development**, Fourth Edition, ISBN: 978-0-07-310142-2, 2008, 368 pages



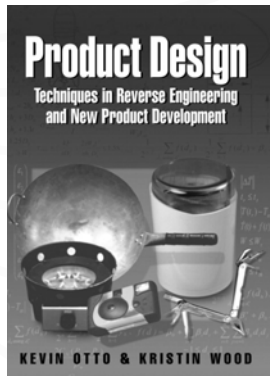
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Reference book

- Kevin Otto, and Kristin Wood, **Product Design**, Prentice Hall, 2001, 1104 pp, ISBN: 0-13-021271-7



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Course Goals

- To provide the student with the practical experience in designing products
- To provide students with the ability to use the various industrial components in their design
- Allow students to make use of the various courses learned in the design

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Course Objectives

- To learn about the process of design in order to generate better quality designs in less time.
- To learn about the organization of design within a company.
- To learn how to be more creative in solving design problems.
- To learn how to design as part of a group activity.

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Course web page

- www.uni.edu/~rao/Course6.htm

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University of Northern Iowa

Spring 2008 Course
330:159g, Design for Manufacturing

Schedule	M 6.00 to 8.50 pm
Class Room	ITC Rm24
Professor	Dr. P. N. Rao

Spring 2003 Projects

Clip on square	Tank car model
Recreation vehicle	

Course syllabus
Home work
Grades

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Evaluation

Attendance, observed performance, attitude, etc.	10%

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Observed Performance

- At the end of the term the instructor will assign each student a grade based on observed performance.
- It includes such factors as problem solving ability, initiative, attitude, attendance, and punctuality.

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Design Project

- As part of the course, students will be doing a complete design project as a group.
- We will go through the entire motions similar to an actual industrial design project.
- Use the Company Procedure Bulletin for details.

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Design Ideas (???)

- Educational toys
- Home appliances
- Energy saving devices in and around the home
- Productivity improvement devices for machine tools

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%
Design project final presentation	10%

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%
Design project final presentation	10%
Design project final report	10%

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Group Evaluation

- To make grading of the group fair, the group grades will be corrected for each student with a weighting factor.
- Each member of the group will evaluate every member of the group (including themselves) for the percent of his/her contribution to the project.
- The evaluations will be averaged by Professor to find each student's contribution and the weighting factor made proportional to it.

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Group Evaluation

- If there are, for example, three students in a group and each makes the same (33%) contribution then all will get the same grade.
- However, if one makes a 40% contribution, one a 25% contribution and the third a 35% contribution then the grades will be corrected by the difference from 33%.
- Thus, if the group grade was 85% then the first student would get 92% ($85+(40-33)$), the second would get 77% ($85+(25-33)$) and the third 87%.

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%
Design project final presentation	10%
Design project final report	10%
Design notebooks	20%

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Design Notebook

- All work concerning the design project is done in a design notebook.
- For this purpose identify a design notebook (spiral bound, with ruled and graph sheets for the purpose of neat sketching)

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Design Notebook

- Every page in the notebook must be numbered at the beginning of the term.
- No pages can be removed and each page must be dated and initialed when used.
- The homework you turn in during the specified dates must be a photo copy of that in the design notebook.

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Evaluation

Attendance, observed performance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%
Design project final presentation	10%
Design project final report	10%
Design notebooks	20%
Assignments	5%

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Assignments

- The project report content is identified into a total of 33 different aspects given in page 2 and 3.
- After these have been developed and entered into the design notebook, photocopies of the same need to be submitted.
- No late submission and no excuses.
- If there is a justifiable reason for late submission, please explain it to me well in advance so that I may consider it.

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Evaluation

Attendance, attitude, etc.	10%
Desk set project	10%
Initial research presentation	10%
Concept presentation	10%
Design project final presentation	10%
Design project final report	10%
Assignments	5%
Design notebooks	20%
Final Examination	15%

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Final Examination

- This will be a short answer exam covering the terminology and concepts studied throughout this course.

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Research Paper (Graduate students only)

- They are expected to do a detailed study of a topic relevant to the course content, subject to the approval of the instructor.
- The topic and a brief written description are to be submitted to the instructor by February, 10th.
- The type written, 8 to 12 page APA format paper is to be submitted by April 30th

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Important Dates

- Jan 28th: Identification of projects and groups
- Feb. 11th: Presentation of initial research of the product and submission of report
- Feb. 18th: Submission of project planning
- Feb. 25th: Submission of concept
- March 24th: Presentation of the initial concept of the product and submission
- April 7th: Submission of product design
- April 21th: Submission of product evaluation
- April 28th: Final presentation
- April 28th: Submission of product development file

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Grading

Percentage range	Grade	Percentage range	Grade
95 – 100	A	90 – 94	A-
87 – 89	B+	84 – 86	B
80 – 83	B-	77 – 79	C+
74 – 76	C	70 – 73	C-
67 – 69	D+	64 – 66	D
60 – 63	D-	< 60	F

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Questions and Comments
