

PENN STATE UNIVERSITY
Department of Mechanical & Nuclear Engineering

ME240: PRODUCT DISSECTION
Spring 2008

Course Description

This course examines the way in which products and machines work: their physical operation, the manner in which they are constructed, and the design and societal considerations that determine the difference between success and failure in the marketplace. The primary objectives of this course are to develop a basic aptitude for engineering and engineering design and to develop mental visualization skills by examination of design and manufacture of consumer and industrial products. Heavy emphasis is placed on hands-on laboratory experience and the development of team and communication skills. Students, working in teams, dissect several common products to discover their internal functions and to critique their design, manufacturing methods, materials selection, and potential for recycling. Lecture and discussion topics include the design process, material selection, introduction to manufacturing processes, basic mechanical and electrical components and measurements, green design, and human factors. Dissection projects include a bicycle, a hand drill, a mixer, staplers, telephones, single-use cameras, and an internal combustion engine.

Class Times: TR 2:30-4:25pm (314 Hammond)

Web Site: <http://www.mne.psu.edu/simpson/courses/me240>

Instructor:

Dr. Tim Simpson	Seung Ki Moon	John Krenzle
Professor	Teaching Assistant	Lab Assistant
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Text: There is no text required; however, a lab notebook or journal is necessary. Handouts will be distributed in class as appropriate.

Grading:

<u>Bicycles (Jan. 14 – Feb. 14)</u>		
Journal answers for bicycle lab sessions		100 pts (total)
Sessions 0 & 6	5 pts each	
Session 1	15 pts each	
Sessions 2-5	10 pts each	
Bicycle Evolution Web Page	30 pts	
Bicycle Evolution Video	5 pts	
<u>Appliances (Feb. 18 – March 27)</u>		
Journal answers for lab sessions		100 pts (total)
Drill	10 pts	
Mixer	10 pts	
Staplers	20 pts	
Single-Use Cameras	10 pts	
Telephones	20 pts	
How Things Work Web Page	30 pts	

Engines (March 31 – May 1)

Journal answers for lab sessions		100 pts (total)
Engine Session 0	10 pts	
Engine Session 1	20 pts	
Engine Session 2	20 pts	
Engine Session 3	10 pts	
Engine Test Run	10 pts	
Engine Web Page	30 pts	

Attendance: Attendance is required at all laboratory sessions since you are an integral part of a team; any absences must be approved by the instructor

Course Objectives:

The objectives in this course are to learn about engineering and product design by:

- Dissecting existing consumer and industrial products to determine how they function, how they are made and how they might be improved
- Explaining that function by applying appropriate physical principles
- Communicating that function effectively—by oral, written, electronic, and graphical means
- Developing visual reasoning skills and basic mechanical aptitude

Bicycle Dissection Schedule:

Date	Activity	Reading	Grade
Jan. 15	Video: Bicycle Evolution	—	5 pts
Jan. 17	Session 0: Getting the patient ready Session 1: Brakes and gears	BM 1, 2, 4 BM 13, 17	5 pts 15 pts
Jan. 22	Session 2: Shifters and chains	BM 9, 8	10 pts
Jan. 24	Session 3: Derailleur, Freewheel, and Hub Hand in journals (Sessions 0 & 1 will be graded)	BM 11, 7, 5 —	10 pts —
Jan. 28	Session 4: Crankshaft	BM 6	10 pts
Jan. 31	Session 4 (cont.)	—	—
Feb. 5	Session 5: Reassemble and Adjust Hand in journals (Sessions 2 & 3 will be graded)	Entire BM Guide —	10 pts —
Feb. 7	Session 5 (cont.)	—	—
Feb. 12	Session 6: Wrap-up and Testing	—	5 pts
Feb. 14	Finish Bike Testing & Wiki Reports Due Hand in journals (Sessions 4-6 will be graded)	— —	30 pts —

Appliances Dissection Schedule:

Dates	Activity	Slides	Grade
Feb. 19 & 21	Lecture: Drills, Bearings, and Motors	PPT	—
	Build Your Own Motor	—	—
	Drill Dissection	—	10 pts
	Mixer Dissection	—	10 pts
Feb. 26 & 28	Lecture: Stapler Wars	PPT	—
	Stapler Dissection	—	20 pts
	Hand in journals (Drill & Mixer labs will be graded)	—	—
March 4 & 6	Lecture: How Cameras Work	PPT	—
	Camera Dissection	—	10 pts
	Hand in journals (Stapler labs will be graded)	—	—
March 11 & 13	NO CLASS - SPRING BREAK	—	—
March 18 & 20	Lecture: How Telephones Work	PPT	—
	Telephone Dissection	—	20 pts
	Hand in journals (Camera labs will be graded)	—	—
March 25 & 27	How Things Work In-Class Activity	PPT	30 pts
	Hand in journals	—	—

Engine Dissection Schedule:

Dates	Activity	Reading	Grade
April 1 & 3	Video: Theories of Operation	—	—
	Session 0: Getting the patient ready	Chps. 1, 13, & 14	10 pts
April 8 & 10	Lecture: Engine Operation 1	—	—
	Session 1: Carburetor and Ignition	Chps. 3, 4, & 2	20 pts
April 15 & 17	Lecture: Engine Operation 2	—	—
	Session 2: Engine Block and Drivetrain	Chps. 6, 8, 9, & 10	20 pts
	Hand in journals (Sessions 0 & 1 will be graded)	—	—
April 22 & 24	Lecture: Engine Operation 3	—	—
	Session 3: Reassemble Engine	Chp. 12	10 pts
	Hand in journals (Session 2 will be graded)	—	—
April 29 & May 1	Video: Engine Failures	—	—
	Engine Reassembly (cont.)	—	—
	Engine Test Run	—	10 pts
	Hand in journals (Session 3 will be graded)	—	—
	Engine Web Page Due	—	30 pts