MAE 2250

Intro


cdn.theatlantic.com

-11°F


-18°F
cdn.theatlantic.com


hep.ucsb.edu

MAE 2250

Intro


SimpoCAM
studiorola.com

Results from Alumni Survey 5 years after graduation

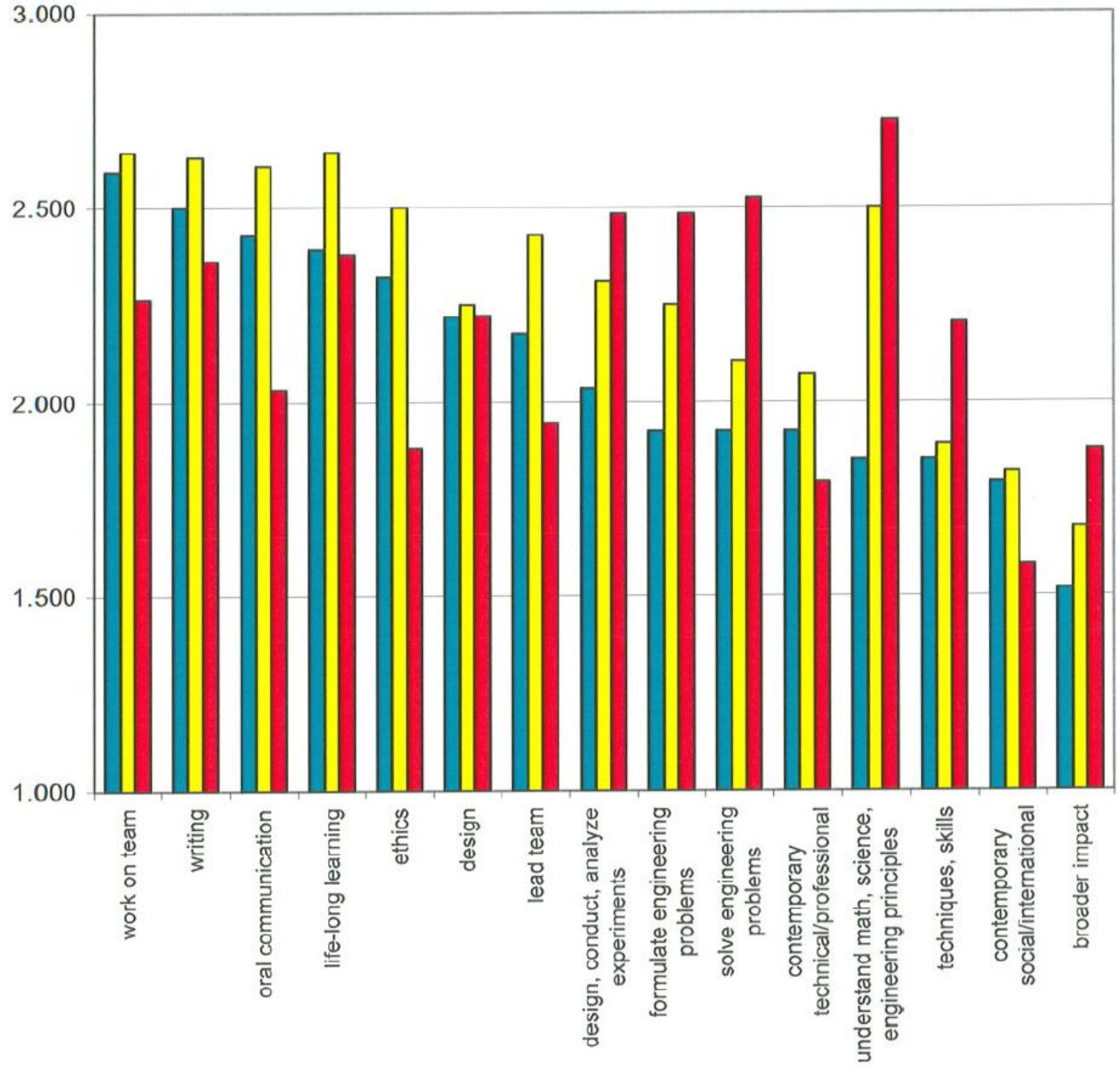
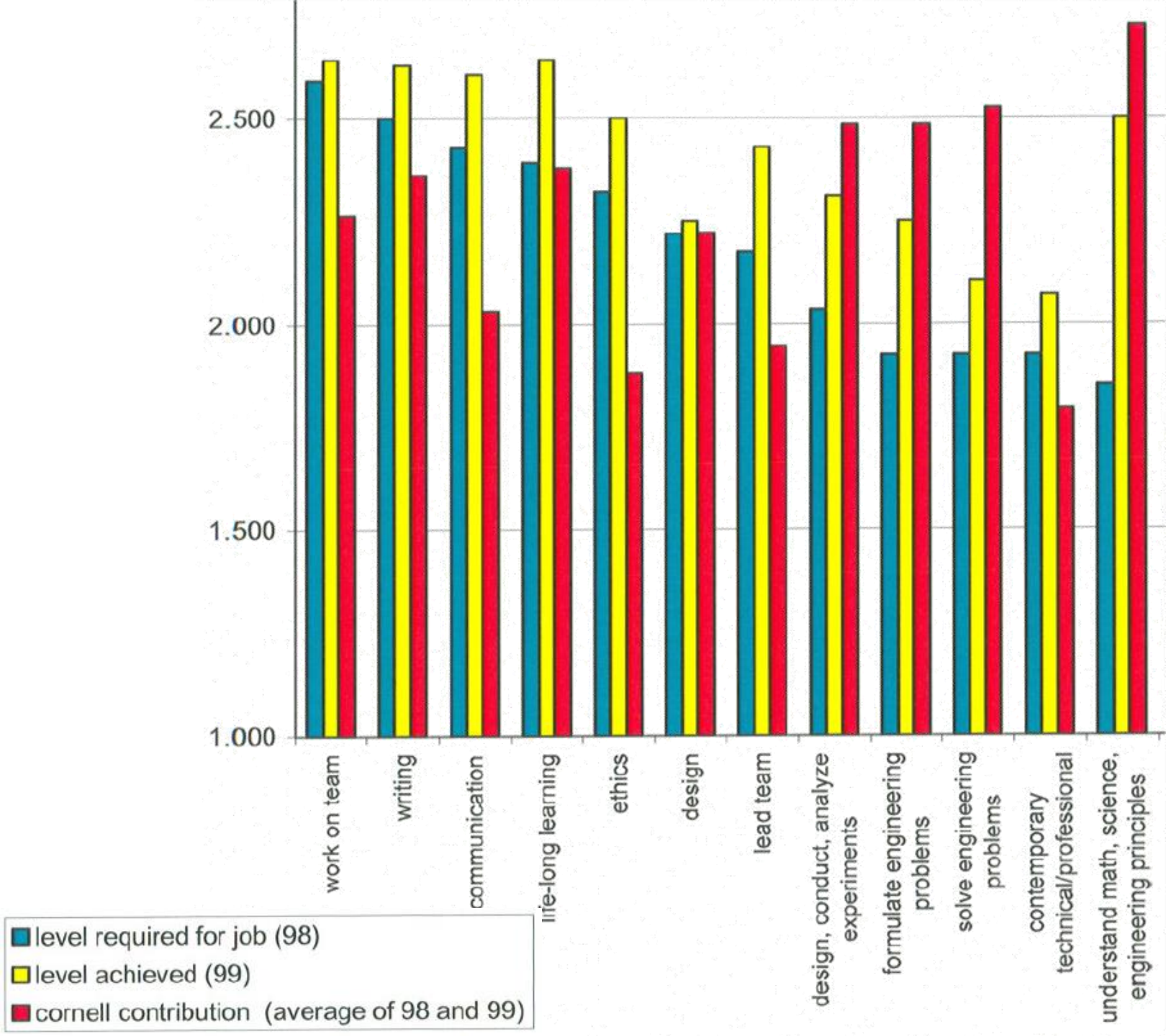
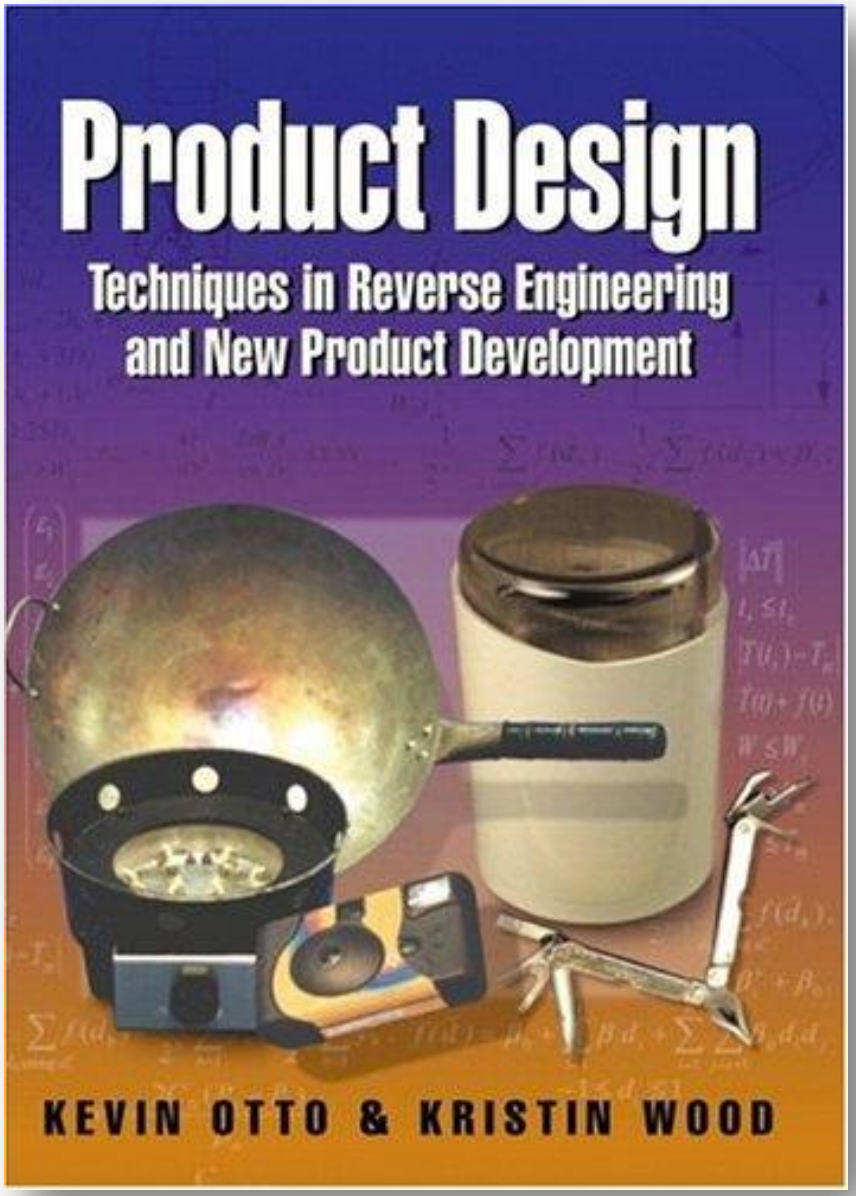
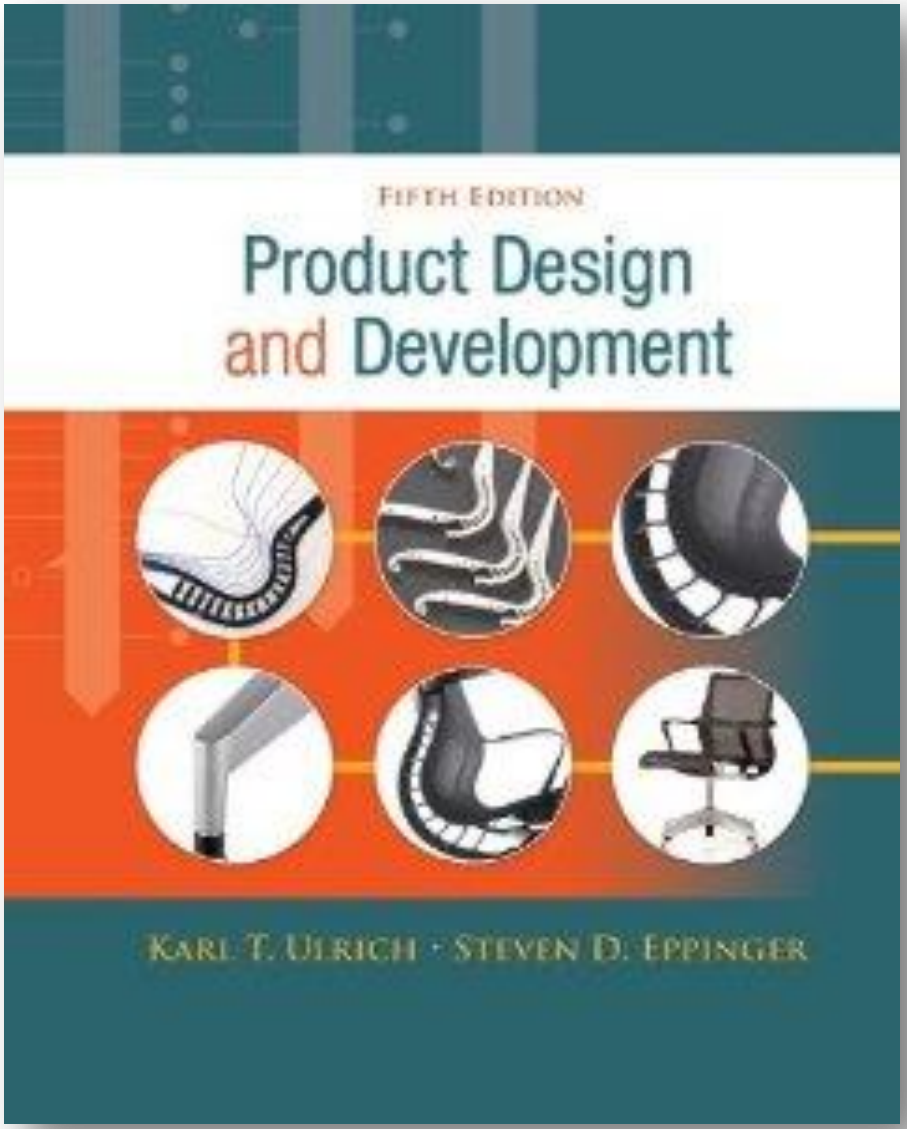


Fig. 1. Level of achievement of program outcomes, ranked by importance to current job. Pooled data from class of 1998 and class of 1999, surveyed 5 years after graduation.

The class of 1998 was asked about the level required for their jobs and about Cornell's contribution; the class of 1999 was asked about the level achieved and about Cornell's contribution. The Cornell contribution numbvers were consistent, and so the results were averaged. The outcomes are identified here with a brief phrase; see Table 1 for the exact wording of the questions, numerical scores, and standard deviations.


2.500
2.000
1.500
1.000
work on team
writing
communication
life-long learning
ethics
design
lead team
design, conduct, analyze experiments
formulate engineering problems
solve engineering problems
contemporary technical/professional
understand math, science, engineering principles
level required for job (98)
level achieved (99)
cornell contribution (average of 98 and 99)


Product Design
Techniques in Reverse Engineering
and New Product Development
KEVIN OTTO & KRISTIN WOOD

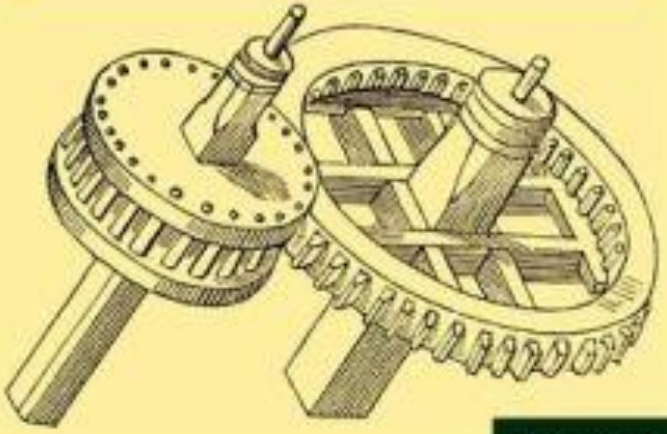

Fifth Edition
Product Design
and Development
Karl T. Ulrich · Steven D. Eppinger

CAMBRIDGE LIBRARY COLLECTION

PRINCIPLES OF MECHANISM

DESIGNED FOR THE USE OF STUDENTS IN THE UNIVERSITIES, AND FOR ENGINEERING STUDENTS GENERALLY

ROBERT WILLIS



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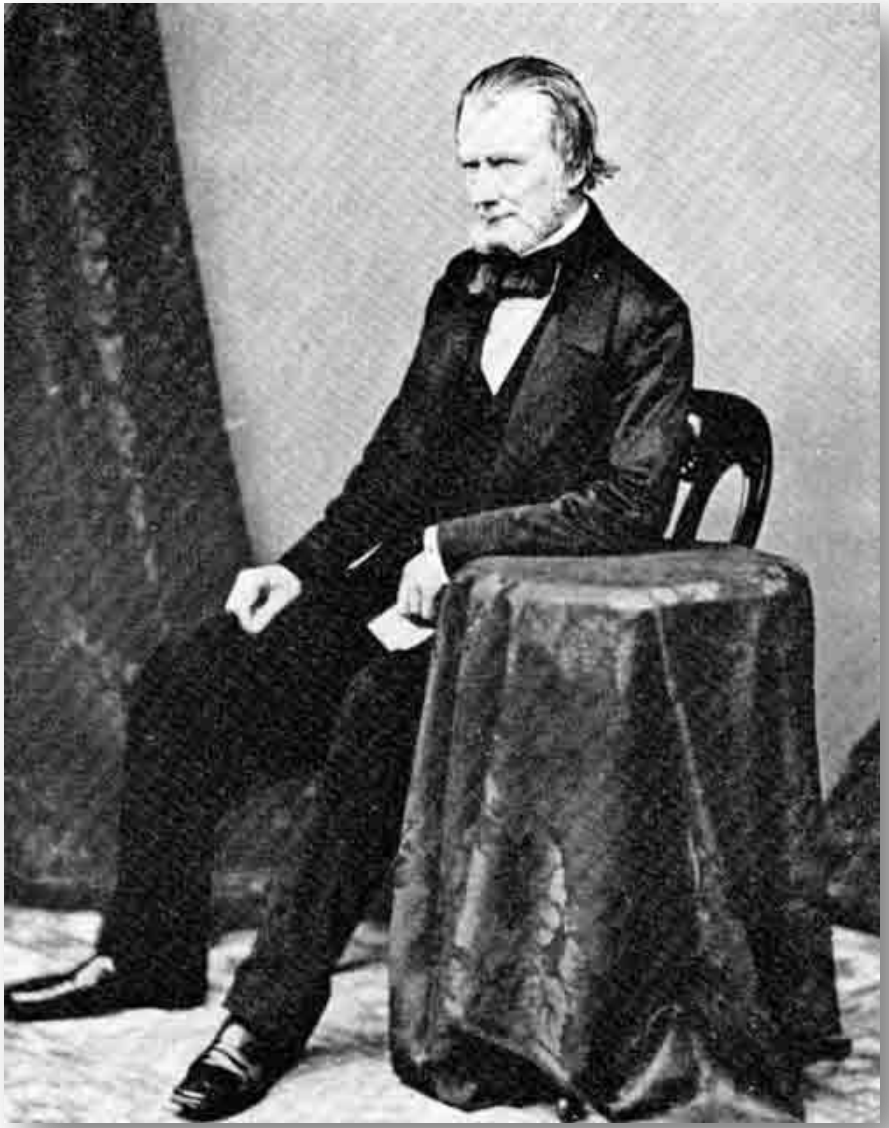


Robert Willis (1800-1875), Jacksonian Professor, Cambridge University

"[A rational approach to synthesis is needed] to obtain, by direct and certain methods, all the forms and arrangements that are applicable to the desired purpose.

At present, questions of this kind can only be solved by that species of intuition that which long familiarity with the subject usually confers upon experienced persons, but which they are totally unable to communicate to others.

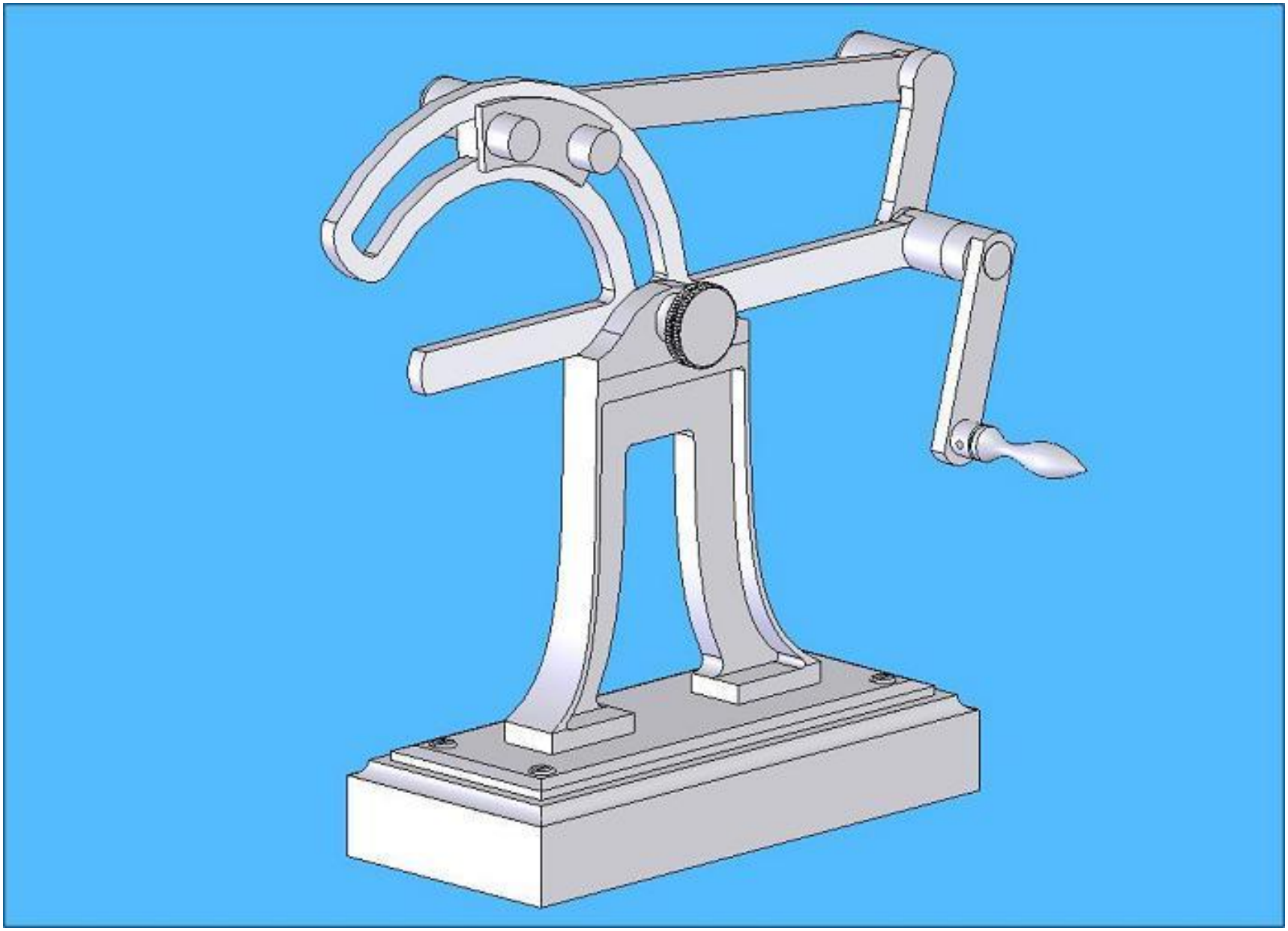
When the mind of a mechanician is occupied with the contrivance of a machine, he must wait until, in the midst of his meditations, some happy combination presents itself to his mind which may answer his purpose."

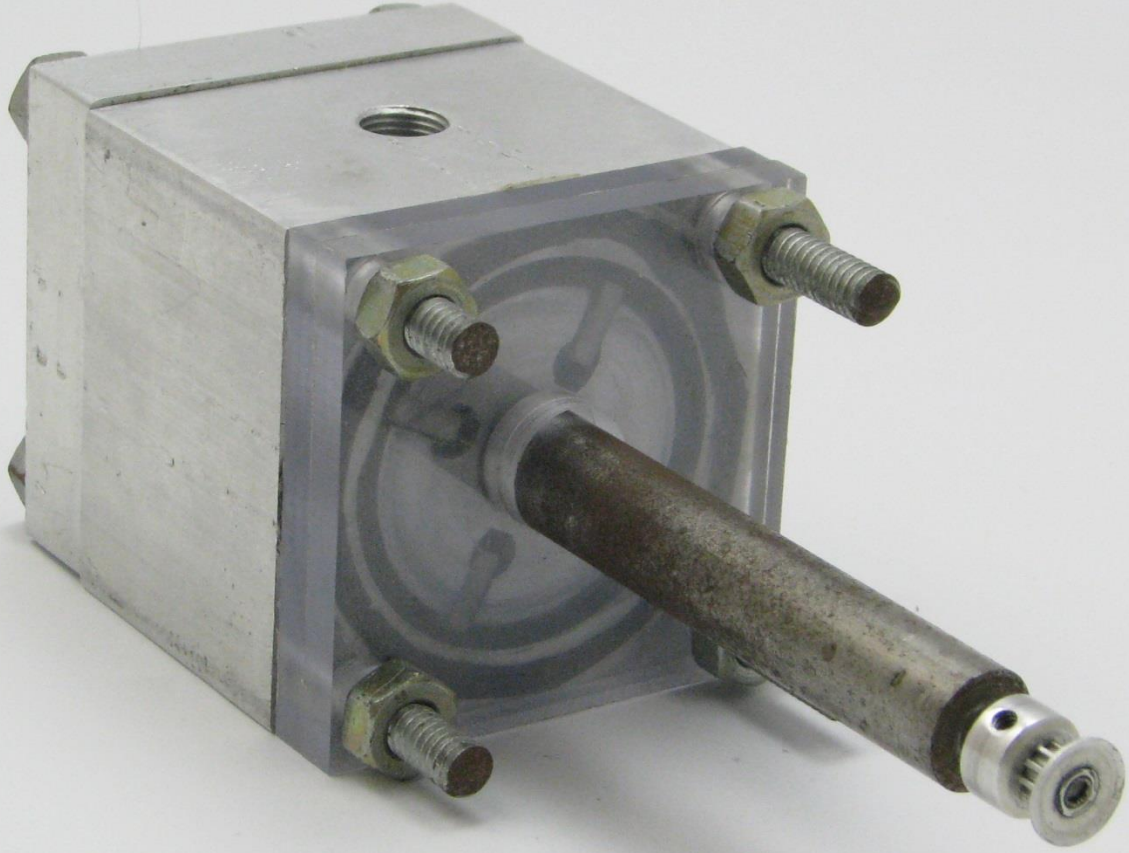
Robert Willis

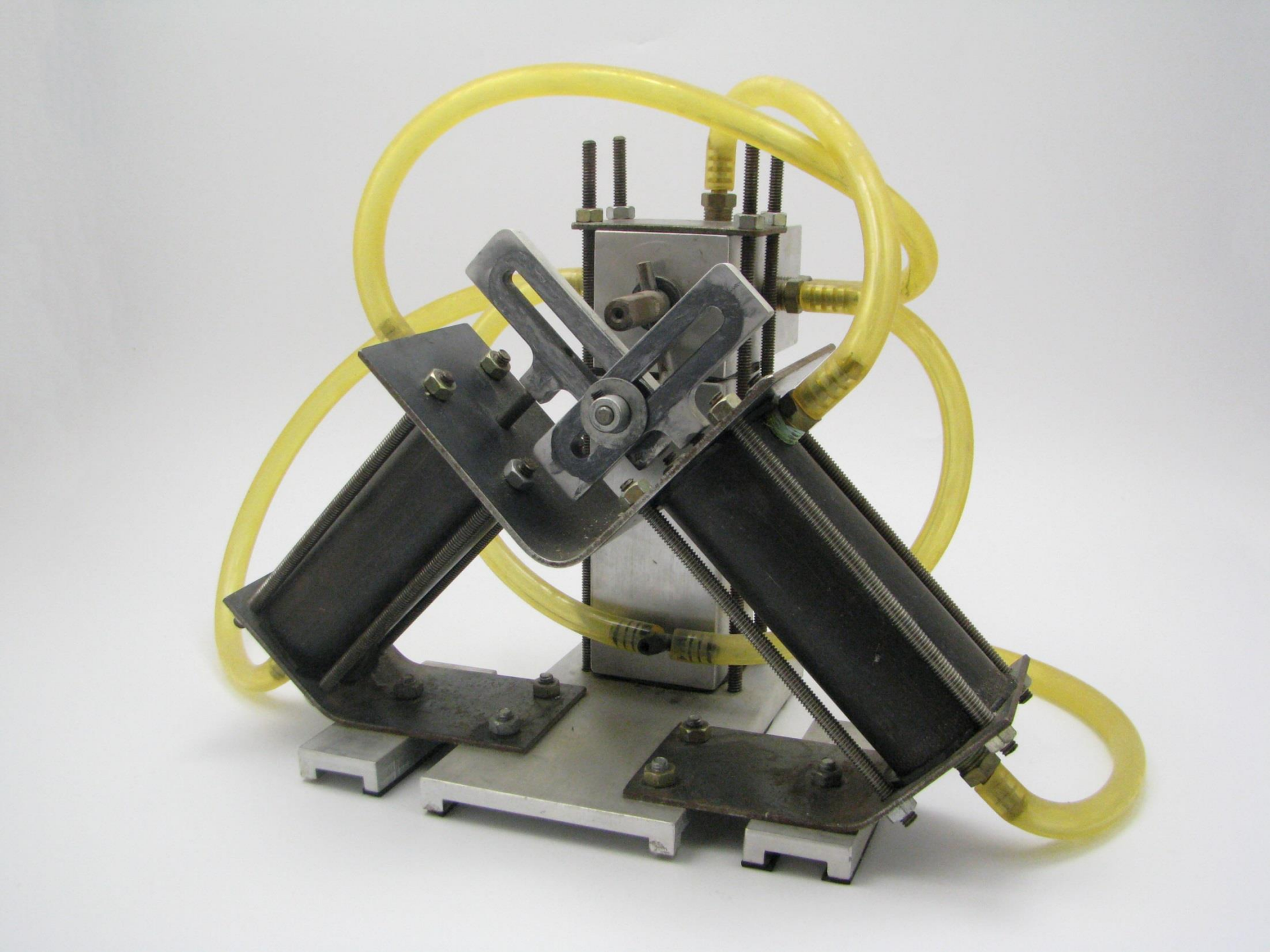
The Principles of Mechanism, 1841

Projects (80% total)	Shop practice (Lamp)	10%
	CAD project	10%
	Design Make Sell	30%
	Air Motor project	30%
Optional Final (20%)	Final exam or class participation (whichever is higher)	20%


D14







DISCONTINUED

Safety


Griz-Mill

Wikipedia


TR3

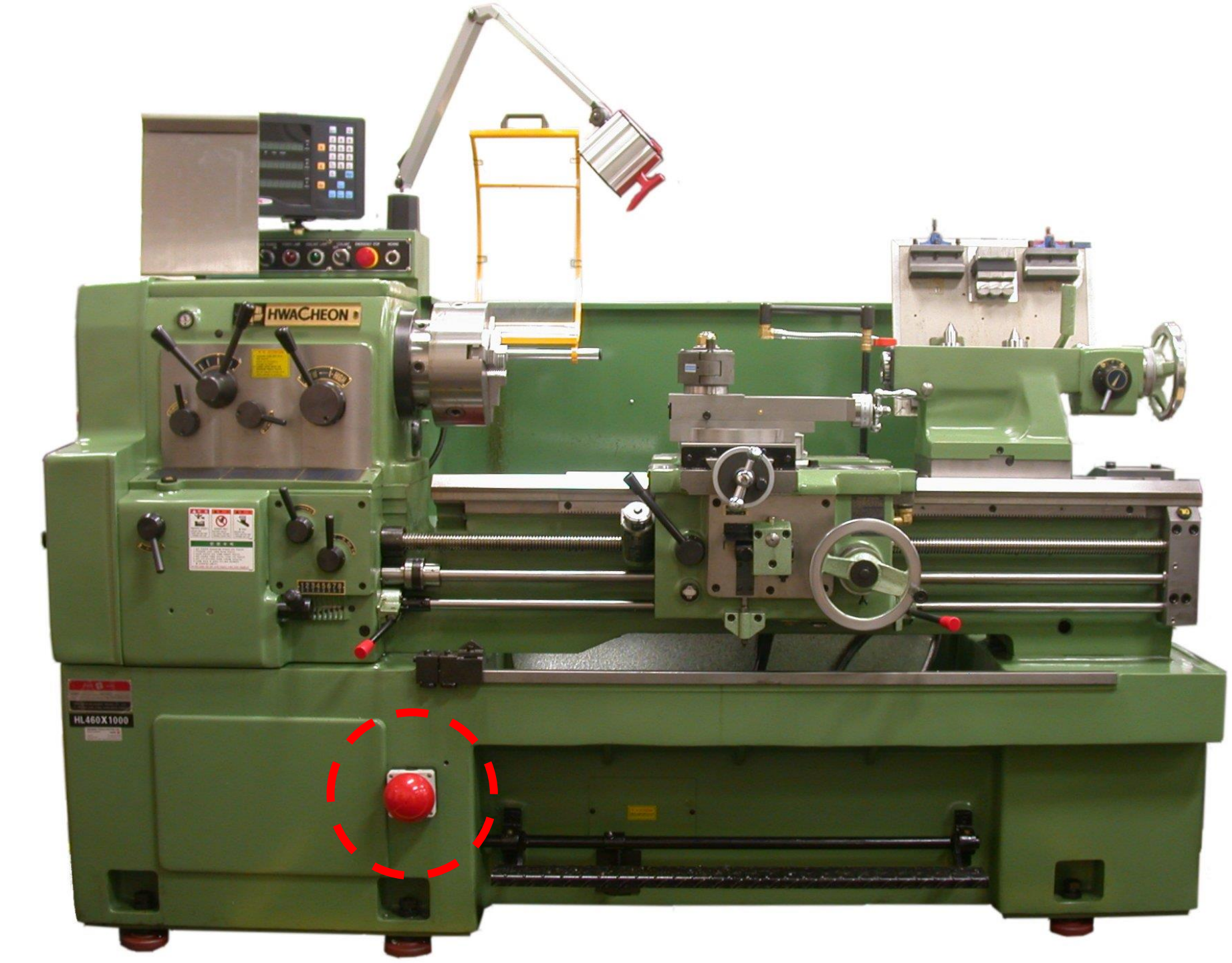
VELVET REVOLUTION

An haute interpretation of shades of green in traditional camouflage. 3.1 Phillip Lim merino-wool sweater ($375) and hooded scarf ($425); 3.1 Phillip Lim, NYC. Ralph Lauren Black Label velvet dress, $1,998; select Ralph Lauren stores. Dolce & Gabbana leather and-mink gloves. Cesare Paciotti goat-hair boots.

Fashion Editor: Marie-Amélie Sauvé.

NO

LOOSE CLOTHING
LOOSE SCARVES
LONG HAIR EXPOSED



Wikipedia

The New York Times

Yale Student Killed as Hair Gets Caught in Lathe

April 13, 2011

MAE 2250: Mechanical Synthesis - Spring 2014

synopsis

M&AE 2250 is a course that focuses on product design . You will experience a comprehensive "Product Realization" process to meet customers' needs, including considerations of performance, cost, manufacturing, marketing, etc. You will interact with others and apply design methodology. These design experiences will simulate real-world engineering practices and include system/project approaches, teamwork, and graphic and oral communication.

Design has no unique path of progression or definitive 'rules' – each design task may follow different methods of approaching the problem. You will learn the values and priorities that help you create and select solutions that meet customer specifications. You will cultivate an ability to work with teammates, and to function in a project having 'fuzzy' objectives. Design education is challenged by a relative lack of rigor, a wide-ranging technical content and personal preferences of individual designers, but offers many opportunities for creativity and innovation.

Overall, MAE 2250 should

- Stimulate original thinking and creativity;
- Integrate engineering knowledge with personal experience in multi-disciplinary applications;
- Foster an understanding of the unstructured nature of design;
- Provide practice in problem definition and solution synthesis;
- Provide training in graphical thinking and communication;
- Introduce fabrication methods necessary for practical implementation of designs;
- Introduce critical economic evaluation of design concepts.

Mondays, Wednesdays and Fridays 11:15AM - 12:05PM in UPSON B17. See full schedule.

Administrative

Syllabus: objectives and methods.
Schedule: topics, tasks and deadlines
Course staffing, office hours, coverage, and contact info
Piazza Q&A discussion board
CMS Course management system (upload assignments)
Course management: TAs Only

Projects & Exercises

Lamp project
CAD Project
Design Make Sell
Air Motor Project

Resources

CAD Systems in M&AE
Emerson shop guides and information
Myers-Briggs personality test
TA midterm evaluations
Using 3D Printing
Using Laser Cutter
Ordering parts
What should be included in the project report?
Other Resources

http://courses2.cit.cornell.edu/mae2250/

Week	Date	Weekday	Lecture	Lab section
0	20-Jan	Mon	*MLK Day*	Lab: Shop/CAD Training HW: Read Emerson guide. Sign shop agreement and upload to CMS
	22-Jan	Wed	Course overview	
	24-Jan	Fri	The product development process	
1	27-Jan	Mon	Identifying customer needs	Lab: Continue Shop/CAD Training. HW: Continue Lamp and/or CAD project in parallel
	29-Jan	Wed	Product Specification	
	31-Jan	Fri	Concept generation	
2	3-Feb	Mon	ODP Intro, Mechanics of materials	Lab: Shop/CAD Training. Get team assignments HW: Continue Lamp and/or CAD project in parallel
	5-Feb	Wed	AM Intro: Thermodynamics, Valving	
	7-Feb	Fri	Finish project intros	
3	10-Feb	Mon	Concept Selection + Group Think	Lab: Finalize Shop/CAD Training. Finalize CAD project. HW: Get project #1 team assigments, meet and brainstorm product plan
	12-Feb	Wed	3D Printing	
	14-Feb	Fri	Digital Manufacturing	
4	17-Feb	Mon	*Break*	Project #1. Preliminary design review (PDR) presentation DUE: CAD report due on CMS.
	19-Feb	Wed	Sketching	
	21-Feb	Fri	Project Planning	
5	24-Feb	Mon	Product Architecture	Project #1. Critical design review (CDR) presentation. Start prototype fabrication. DUE: Lamp due in lab. Place sticker with your NetID. Upload Lamp report to CMS
	26-Feb	Wed	Engineering Communication: Written & Oral	
	28-Feb	Fri		
6	3-Mar	Mon	Team Dynamics - Teamwork	Project #1. Material requisitions and prototype fabrication requests due to TA.Finalize prototype fabrication
	5-Mar	Wed	Team Dynamics - Personality	
	7-Mar	Fri		
7	10-Mar	Mon	Manufacturing	Project #1. Test prototype. 5-min product demonstration in section. Iterate product design. Final material requisitions and prototype fabrication requests due to TA.
	12-Mar	Wed	Design for Manufacturing	
	14-Mar	Fri		
8	17-Mar	Mon	Kinematics	Project #1. Final presentation and demonstration. DUE: Final project #1 report on CMS. HW: Get project #2 team assigments, meet and brainstorm product plan
	19-Mar	Wed	Machine design	
	21-Mar	Fri		
9	24-Mar	Mon	Machine design	Project 2. Preliminary design review (PDR) presentation. HW: Upload team assesment form for your first project
	26-Mar	Wed	Machine design	
	28-Mar	Fri		
10	31-Mar	Mon	*Spring Break*	
	2-Apr	Wed		
	4-Apr	Fri		
11	7-Apr	Mon	Patents	Project #2. Critical design review (CDR) presentation. Start prototype fabrication.
	9-Apr	Wed	Product Liability	
	11-Apr	Fri		
12	14-Apr	Mon	Ethics	Project #2. Material requisitions and prototype fabrication requests due to TA.Finalize prototype fabrication
	16-Apr	Wed	Design Automation	
	18-Apr	Fri		
13	21-Apr	Mon	Human Factors	Project #2. Test prototype. 5-min product demonstration in section. Iterate product design. Final material requisitions and prototype fabrication requests due to TA.
	23-Apr	Wed	Tolerances	
	25-Apr	Fri		
14	28-Apr	Mon	TBD	Project #2. Final presentation and testing
	30-Apr	Wed	TBD	
	2-May	Fri		
15	5-May	Mon		DUE: Final project #2 report on CMS. HW: Upload team assesment form for your second project
	7-May	Wed	Review	

Section	Day/Time	TA1	TA2					
1	Mon 2:00-4:25pm	cap273 Carlos	tws68 Thomas	AM then ODP				
2	Tue 2:00-4:25pm	nmb65 Nicole	rpk74 Rehan	ODP then AM				
3	Wed 2:00-4:25pm	pm442 Patricia	mmp84 Maegan	AM then ODP				
4	Thu 2:00-4:25pm	tmn33 Thu	cas489 Carolyn	ODP then AM				
5	Fri 2:00-4:25pm	aps224 Aaron	jlp275 John	AM then ODP				
6	Mon 7:30-9:55pm	ch489 Camelia	pkn6 Priya	ODP then AM				
7	Wed 7:30-9:55pm	avs55 Amanda	jwe47 Jessica	ODP then AM				

Just Jan 22-Feb 11

		Mon 2:00-4:25pm	Tue 2:00-4:25pm	Wed 2:00-4:25pm	Thu 2:00-4:25pm	Fri 2:00-4:25pm	Mon 7:30-9:55pm	Wed 7:30-9:55pm
Lathe training	Emerson	cap273 Carlos	nmb65 Nicole	pm442 Patricia	tmn33 Thu	aps224 Aaron	ch489 Camelia	avs55 Amanda
Mill training	Emerson	tws68 Thomas	rpk74 Rehan	mmp84 Maegan	cas489 Carolyn	jlp275 John	pkn6 Priya	jwe47 Jessica
CAD training	Taylor	kam358 Katie	tmn33 Thu	cap273 Carlos	gl259 Garrick	gl259 Garrick	avs55 Amanda	ch489 Camelia

Entire semester

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
		Emerson TA	Emerson TA	Emerson TA	Emerson TA	Emerson TA	Taylor Studio	Taylor Studio
9:00-10:00	Emerson	jlp275 John	tws68 Thomas	pkn6 Priya	pkn6 Priya	nmb65 Nicole		
10:00-11:00		mmp84 Maegan	rpk74 Rehan	ch489 Camelia	cap273 Carlos	ch489 Camelia	aps224 Aaron	avs55 Amanda
11-1pm							aps224 Aaron	avs55 Amanda
1:00-2:30	Emerson	gl259 Garrick	jwe47 Jessica	kam358 Katie	tws68 Thomas	cap273 Carlos	cas489 Carolyn	jwe47 Jessica
2:30-3:30		mmp84 Maegan	tmn33 Thu	cas489 Carolyn	pm442 Patricia	tmn33 Thu	nmb65 Nicole	rpk74 Rehan
3:30-5pm		Section 1 TAs	Section 2 TAs	Section 3 TAs	Section 4 TAs	Section 5 TAs	ch489 Camelia	cap273 Carlos
2:00-4:25pm	Taylor	cap273 Carlos	nmb65 Nicole	pm442 Patricia	tmn33 Thu	aps224 Aaron		
		tws68 Thomas	rpk74 Rehan	mmp84 Maegan	cas489 Carolyn	jlp275 John		
5pm-7:00pm	Emerson	jlp275 John		pm442 Patricia				
7:30--9:55pm	Taylor	Section 6 TAs	Office hours	Section 7 TAs	Office Hours			
		ch489 Camelia	pm442 Patricia	avs55 Amanda	tws68 Thomas			
		pkn6 Priya	nmb65 Nicole	jwe47 Jessica	mmp84 Maegan			

Making things

EMERSON


Griz-Mill

Wikipedia

--- MAE 2250 Spring 2012 ---
Lamp Mill and Lathe Reservation
General Slots

Wednesday 1/30/2013

Lathe 2

	Name/Group Sticker
8 to 9:30AM	Monday Night Crist, Jedidiah
9:30 to 11:00AM	
5 to 6:30PM	Monday Gura, Colin


EPILOG


Legend 36EXT
www.epilog

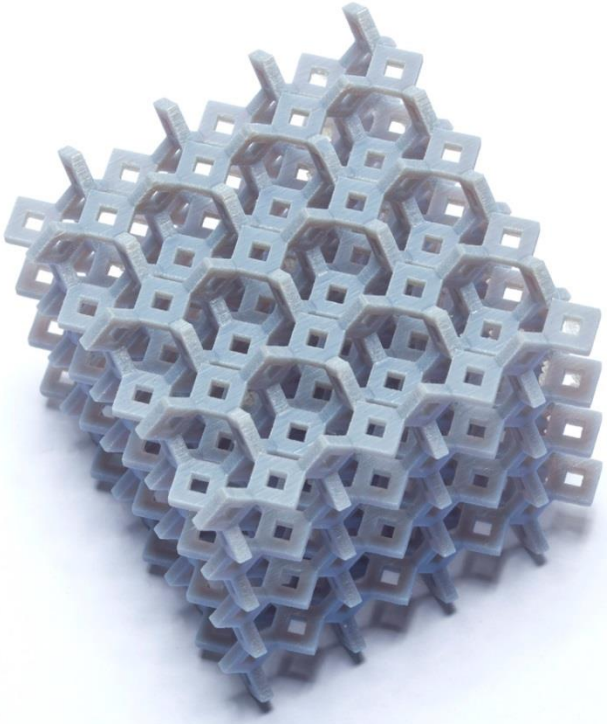
Laser cutting instructions for MAE 2250

MAE2250 offers teams the option to use the department's Laser Cutting services on an Epilog 24"x36" system.

Laser cutting services are free. However, each 0.25" thick 12"x12" Acrylic plate beyond the first free plate will cost $5.

To request a laser cut, follow the following steps:

1. **Prepare** your parts' outline as a SolidWorks drawing (see sample drawing and original part)
    - Position the outline on the 12"x12" sheet in such a way to avoid areas where you have cut out before (you should keep track of your previous cuts). A good way to do this is to maintain a single drawing with all cuts, and then temporarily delete previous outlines just before cutting.
    - For precision cuts, factor in the laser beam melting width (a.k.a kerf) of approx. 300 microns.
    - Make sure your parts will be easy to identify when tossed in a box full of parts from other groups, or when compared to earlier versions of your own parts. It is a good idea to include in your design some kind of unique identifier.
    - Avoid cutting lots of small disconnected parts - this will risk some parts getting lost. If you have many small parts, consider cutting them as a single connected unit, in such a way that they can be easily broken off later.
    - Be sure to round (fillet) external corners (this saves material and makes your part look nicer), and round (fillet) all internal corners (avoids stress concentrations and makes the part stronger). Use a large fillet - as large as possible without compromising functionality. Acrylic is very brittle so this step is important.
    - Reduce unnecessary weight by perforating large areas.
    - Avoid cutting very thin details. Cutting accuracy is about 100 microns
    - Think organic. For example, if you are cutting a cantilevered beam, make it thicker near the root where stresses are high, and thinner near the edges where stresses are low. Don't just cut a uniform rectangular cantilever. Manufacturing complexity is free - complex shapes are not more expensive to cut than simple shapes.
    - Acrylic is brittle. If you need to cut a thin part that needs to be stiff and strong, consider cutting a small groove in its center so that you can later insert a strengthening screw or dowel pin.
    - If you need to connect your sheet to other components, consider cutting holes so that you can later insert thermoplastic inserts.
    - You can make 3D structure by joining 2D sheets. To do this you will need to cut T-joints.
    - If you are uncertain about some small portion of a large design, cut just that portion for testing, before cutting the entire part. This will save material and time, and will allow you to iterate more. For example, if you have a large part that includes a small interlocking snap-fit buckle connector, cut just the connector first to make sure you got the dimensions right, before cutting the whole thing. You might even cut three connectors with slightly different sizes to optimize in parallel.
2. **Compress** your file(s) into a single ZIP file named Section#team#_month_day.zip. e.g. "2A_10_13.zip" (see section numbers)
3. **Upload** your file to the the shared MAE 2250 LaserCutting Dropbox Directory (If you have not received an invitation, request it). Note that files will be deleted after use. Please keep a copy.
4. **Collect** your parts from a basket near the laser cutter a day or two later. You may need to peel the charred protective layer off the acrylic sheet.
5. **Remember** to count your material cost against your project allowance (even if it didn't turn out as you had hoped or you didn't end up using the laser-cut part in your final project). However, you only need to count the cost of the parts actually used when costing your product.



3D Printing instructions for MAE 2250

MAE2250 offers teams the option to use the department's 3D Printing services on an OBJET system.

3D Printing services will cost the team **$1 + $5 per net cubic inch**. For example, printing a part with a net volume of 1.7 cubic inches will cost $8.5 = 1+5*1.7

Note: 3D-Printed parts are NOT food safe. Do not use them in conjunction with food or drink. Wash hands after handling parts.

To request a 3D print, follow the following steps:

1. **Prepare** your part(s) in SolidWorks and "Save As" in STL format.
    - When saving, there will be an "Option" button when you can set STL parameters. Make sure that you save in millimeters (not Inches, even if you are designing in Inches). Be sure also to save at a high resolution. Save in STL Binary (not ASCII). If you want to save an entire assembly containing multiple parts, check the box "Save assembly as a single STL".
    - Make sure your parts will be easy to identify when tossed in a box full of parts from other groups, or when compared to earlier versions of your own prints. It is a good idea to include in your design some kind of embossing with a serial number, mark, or other unique identifier.
    - Avoid printing lots of small disconnected parts - this will increase your cost and risk some parts getting lost. If you have many small parts, consider printing them as a single connected unit, in such a way that they can be easily broken off later.
    - Be sure to round (fillet) external edges (this saves material and makes your part look nicer), and round (fillet) all internal corners (avoids stress concentrations and makes the part stronger). Use a large fillet - as large as possible without compromising functionality.
    - Reduce unnecessary print material (and cost) by hollowing out large volumes, and perforating large sheets.
    - Avoid printing very thin details. Print accuracy is about 100 microns, but smallest printable feature is about one millimeter.
    - Think organic. For example, if you are printing a cantilevered beam, make it thicker near the root where stresses are high, and thinner near the edges where stresses are low. Don't just print a uniform rectangular cantilever. Manufacturing complexity is free - complex shapes are not more expensive to print than simple shapes.
    - 3D Printing material has about half the strength of ABS plastic. If you need to print a thin part that needs to be stiff and strong, consider leaving a small hole in its center so that you can later insert a strengthening screw.
    - If you need to connect your printed part to other components, consider printing holes where you can later insert thermoplastic inserts.
    - If you are uncertain about some portion of your design, print just that portion for testing, before printing the entire part. This will save cost and time, and will allow you to iterate faster. For example, if you have a large mechanism with an interlocking snap-fit buckle connector, print just to connector first to make sure you got the dimensions right, before printing the whole thing. You might even print three connectors with slightly different sizes.
    - You CAN print moving mechanism as a single part. If you do so, be sure to leave a gap of at least 250 microns between surfaces. You will need to clean out the gel between the parts, so make sure the gap is accessible. The surfaces will create friction of plastic-on-plastic when moving.
2. **Compress** your file(s) into a single ZIP file named Section#team#_month_day.zip. e.g. "2A_10_13.zip" (see section numbers)
3. **Upload** your file to the the shared MAE 2250 3D-prints Dropbox Directory (If you have not received an invitation, request it). Note that files will be deleted after use. Please keep a copy.
4. **Collect** your parts from a basket next to the printer (check a day or two later).
5. **Clean** your parts from support material in the Emerson cleaning station (get trained on the washing station).
6. **Remember** to count your printing cost against your project allowance (even if it didn't turn out as you had hoped or you didn't end up using the printed part in your final project). However, you only need to count the cost of the parts actually used when costing your product.

Choose a Category

Abrading & Polishing
Building & Grounds
Electrical & Lighting
Fabricating
Fastening & Joining
Filtering
Flow & Level Control
Furniture & Storage
Hand Tools
Hardware
Heating & Cooling
Lubricating
Material Handling
Measuring & Inspecting
Office Supplies & Signs
Pipe, Tubing, Hose & Fittings
Plumbing & Janitorial
Power Transmission
Pressure & Temperature Control
Pulling & Lifting
Raw Materials
Safety Supplies
Sawing & Cutting
Sealing
Shipping
Suspending

All Categories

Fastening & Joining

Fasteners


Screws & Bolts


Threaded Rods & Studs


Eyebolts


U-Bolts


Nuts


Washers


Shims


Helical & Threaded Inserts


Spacers & Standoffs


Pins


Anchors


Nails


Nailers


Rivets


Rivet Tools


Staples


Staplers


Key Stock


Retaining Rings


Cable Ties


Lanyards


Magnets

Adhesives & Tape


Adhesives


Tape


Hook & Loop

Soldering & Welding


Solder


Soldering Irons


Electrodes & Wire


Welders


Torches


Gas Regulators


Welding Gloves


Welding Helmets &


Protective Screens


Melting Pots

MAE2250_orderform.xls [Protected View] [Compatibility Mode]

	A	B	C	D	E
1	**MAE 2250 Order form**				
2	Only order parts not available from Emerson:	http://courses2.cit.cornell.edu/mae2250/Emerson/StockMaterial.pdf			
3					
4	**Description**	**McMaster Code**	**Qantity to buy**	**Unit of measurement**	**Cost**
5		http://www.mcmaster.com/		Total cost < project allowance	
6					
7	(Example) Plastic Press-Fit Thumb Screw Head Knurled, Gray, Fits #6 Screw, 3/8" A, 3/16" B	94052A223	1	Pack of 25	$13.69
8	(Example) Amber Polyurethane Bar 1" Square, 12" Length, 40A Durometer	8792K231	1	ft	$10.00
9	(Example) Flexible Magnetic Strip With Adhesive Back 1/32" Thick, 1/2" Width	**5759K26**	1	ft	$0.30
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28					
29				Total cost:	$23.99

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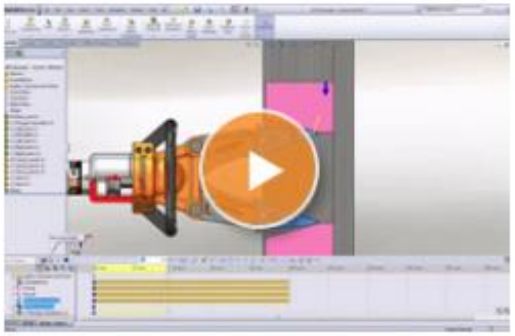
+1-781-810-5011

SOLIDWORKS TUTORIALS

SolidWorks 3D solutions give you the power to innovate and invent. Access a wide range of free, informative resources—full video tutorials, PDF guides, project files, and demo clips—designed to help you become a top SolidWorks user.



SolidWorks for the Engineering Design Process 6:28

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Five comprehensive learning modules with in-depth video tutorials guide you through SolidWorks software and the engineering design process.

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- Lesson One — Parts
- Lesson Two — Assemblies
- Lesson Three — Drawings
- Lesson Four — Simulation
- Lesson Five — Sustainability

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- Formula SAE Tutorials on YouTube
- "SolidWorks is Engineering" Video Series
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SolidWorks

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1 6:36 **SolidWorks Tutorial: Sustainability Education**
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2 2:13 **SolidWorks Tutorial Learn SolidWorks Intro**
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3 4:06 **SolidWorks Tutorial Learn SolidWorks Lesson 1 Parts**
by SolidWorks 166,975 views
http://blogs.solidworks.com/teacher/solidworks-tutorials/
How do you create a part in SolidWorks? Follow the corresponding steps in the S...

4 4:17 **SolidWorks Tutorial Learn SolidWorks Lesson2 Assembly**
by SolidWorks 85,236 views
http://blogs.solidworks.com/teacher/solidworks-tutorials/ Review SolidWorks Tutorial Lesson 2 Assembly. Create Tutor2 part that uses and extrude base, extr...

5 3:52 **SolidWorks Tutorial Learn SolidWorks Lesson 3 Drawings**
by SolidWorks 49,757 views
http://blogs.solidworks.com/teacher/solidworks-tutorials/ Create a SolidWorks drawing. Use SolidWorks Tutorial, Lesson 3 Drawings. Begin with the SolidWorks

http://www.youtube.com/playlist?list=PL0D787F194B340A78


Mead
COMPOSITION
100 sheets • 200 pages
9¾ x 7½ in/24.7 x 19.0 cm
wide ruled • 09910

Notebooks

- Keep track of ideas, calculations
- Document process
- Timestamp inventions
- Share with others

Challenges

- Loss/ Back up
- Security
- Remote/simultaneous sharing
- Version control
- Time/date stamp
- Multimedia files

REPORT #1

BY HOD LIPSON

January 2013

SUMMARY

We present an unsupervised learning algorithm (GenESeSS) to infer the causal structure of quantized stochastic processes, defined as stochastic dynamical systems evolving over discrete time, and producing quantized observations. Assuming ergodicity and stationarity, GenESeSS infers probabilistic finite state automata models from a sufficiently long observed trace. Our approach is abductive; attempting to infer a simple hypothesis, consistent with observations and modelling framework that essentially fixes the hypothesis class. The probabilistic automata we infer have no initial and terminal states, have no structural restrictions and are shown to be probably approximately correct-learnable. Additionally, we establish rigorous performance guarantees and data requirements, and show that GenESeSS correctly infers long-range dependencies. Modelling and prediction examples on simulated and real data establish relevance to automated inference of causal stochastic structures underlying complex physical phenomena.

INTRODUCTION AND MOTIVATION

Automated model inference is a topic of wide interest, and reported techniques range fromquery-based concept learning in artificial intelligence [1,2], to classical system identification [3], to more recent symbolic regression based reverse-engineering of nonlinear dynamics [4,5].

In this paper, we wish to infer the dynamical structure of quantized stochastic processes (QSPs): stochastic dynamical systems evolving over discrete time, and producing quantized time series (figure 1). Such systems naturally arise via quantization of successive increments of discrete time continuous-valued stochastic processes.

MAE 2250 Project report instructions

Each team will need to prepare one project report. The report will be updated incrementally and uploaded to CMS at the end of every week, starting at the first week of the project and continuing to the final week, ultimately uploaded as the "final project report" on the last week of the project. Only one person from the team needs to upload the report to CMS. Failure to update and upload weekly versions will incur 5% grade penalty on this project.

OBJECTIVES:

- Experience the documentation of the full design process from concept to realization
- Experience collaborative technical writing processes and tools

PROCESS

- The report can be prepared in any collaborative document editing software, including online services (such as Google Docs) or by sharing a static document (e.g. MS Word).
- The report is developed incrementally over the duration of the project. Initially, it will contain just sections 1 and 2. In subsequent weeks, additional sections are expected and earlier sections can be revised and updated.
- Under each section, explicitly list the team members who authored that section.
- Pictures, photos, diagrams, drawings, charts and tables should be included in the document directly. Videos and other multimedia (e.g. CAD models) should be posted online somewhere (e.g. in your dropbox) and pointed to using a URL inserted in the document.
- At the end of every week, the updated report must be saved as PDF and uploaded to CMS.

REPORT CONTENT

The content of the report is fairly open ended. The basic guideline is to include a description of everything you are doing as part of your design process, and everything that someone that would be joining the design team would need to know.

For example, you need to include minutes of your meetings, options considered (even if ultimately rejected), rationale of choices made, results of tests and information about things you tried that ended up not being included in the final design.

At any point in the project, someone who has never heard of your project should be able to read your design report and immediately be caught up and able to contribute. Write it as though MechE students from a different university needed to read it (as opposed to your TAs who already know the project).

If you feel that the content is not well defined - consider it an advantage. You can show off your creativity and innovation. Unlike an analysis problem, there is no simple right or wrong answer. You will need to take initiative.

Here are some rough guidelines:

- **Section 1: Team overview** (include this section in the first week, update thereafter)
  - List team members
  - Who did what, who is responsible for what
  - Updates by week: What was added/revised in this document each week by section. If nothing added/changed, say "No change".

Front Matter: (update every week)

- Cover page with section #, team #, TA name, Team member names, Revision date of this report, representative picture of product
- Table of content

Section 1: Team overview (include this section in the first week, update thereafter)

- List team members contact info
- Who did what, who is responsible for what
- Updates by week: What was added/revised in this document each week by section. If nothing added/changed, say "No change".

Section 2: Product planning (include this section in the first week)

- List products you considered. For each provide description, key features and value statement. competing products on the market. List at least two products for each team member (i.e., eight in total for a team of four). List the person's name next to each product.
- Describe the product your team chose, and why

Section 3: Conceptual design (start this section in the first week, update thereafter)

- Customers and interviews: Identify customer types; list of interviews conducted and raw interview responses, who did the interviews
- Distilled Customer needs: Combine, extend and expand customer needs. Reformulate and prioritize.
- Specifications: Translation of needs to technical terms. Metrics, ideal values and acceptable ranges (without presuming a solution - as shown in class)
- Concept generation: Exploration of the design space: brainstorming session results, morphological chart, benchmarking of existing designs.
- Concept selection: Brief analysis, specification matching and selection.
- Project plan: Detailed development schedule. Strategy to minimize development time. Identify bottlenecks and challenges

Section 4: Detailed design and analysis (start this section in the second week)

- Details. Geometries, materials, tolerances, production, tooling
- Full analyses: E.g., stresses, forces, weight, cost, safety, stability, usability, disposability, manufacturability, other customer needs. Quantitatively analyze at least three performance aspects and compare to specs.
- CAD model (photorealistic rendered images, animation)
- Production drawings + assembly documentation
- Intellectual property landscape analysis (All types of IP, close IP, potentially infringed IP, Public domain IP, IP that could be filed, workaround analysis)

Section 5: Testing and refinement of prototype (include this section in the third week, update thereafter)

- Fabrication: Quality, finish, precision. Include images of parts and assemblies
- Performance: Test quantitative aspects against analysis. Include image and video of product being tested.
- Evaluate Usability: Comfort, safety, reliability

Section 6: User documentation and marketing materials (include this section in the fourth week, update thereafter)

- User manual, quick start guide, safety instructions, maintenance instructions, troubleshooting, disclaimers and warnings
- Marketing material, glamor photos, demo movies, specifications and features, comparison to selected competitors, pricing
- Website with information, pricing, testimonials, team. No false advertising - you should be able to back up every fact or claim using data this report
- Truth in advertising. All factual claims must be supportable.

MAE 2250: Mechanical Synthesis (Spring 2014)

Course Description (hide)

No description is currently set.
(edit)

Announcements (hide)

No announcements have been posted.

Post a new announcement: (show)

Assignments (hide)

		Due	Wt.	Max	High	Mean	Med.	Dev.	Status	
Shop Contract	(edit | groups | schedule)	January 29, 2014	1	100	No Statistics Available				Open	Remove
CAD Report	(edit | groups | schedule)	February 23, 2014	1	100	No Statistics Available				Open	Remove
Preliminary report A (Project #1)	(edit | groups | schedule)	February 23, 2014	1	100	No Statistics Available				Open	Remove
Preliminary report B (Project #1)	(edit | groups | schedule)	March 2, 2014	1	100	No Statistics Available				Open	Remove
Lamp Report	(edit | groups | schedule)	March 2, 2014	1	100	No Statistics Available				Open	Remove
Preliminary report C (Project #1)	(edit | groups | schedule)	March 9, 2014	1	100	No Statistics Available				Open	Remove
Preliminary report D (Project #1)	(edit | groups | schedule)	March 16, 2014	1	100	No Statistics Available				Open	Remove
Preliminary report E (Project #1)	(edit | groups | schedule)	March 16, 2014	1	100	No Statistics Available				Open	Remove
Final Report (Project 1)	(edit | groups | schedule)	March 23, 2014	1	100	No Statistics Available				Open	Remove
Team Assessment #1	(edit | groups | schedule)	March 24, 2014	1	100	No Statistics Available				Open	Remove
Preliminary Report A (Project #2)	(edit | groups | schedule)	March 30, 2014	1	100	No Statistics Available				Open	Remove
Preliminary Report B (Project #2)	(edit | groups | schedule)	April 13, 2014	1	100	No Statistics Available				Open	Remove
Preliminary Report C (Project #2)	(edit | groups | schedule)	April 20, 2014	1	100	No Statistics Available				Open	Remove
Preliminary Report D (Project #2)	(edit | groups | schedule)	April 27, 2014	1	100	No Statistics Available				Open	Remove
Preliminary Report E (Project #2)	(edit | groups | schedule)	May 4, 2014	1	100	No Statistics Available				Open	Remove
Final Report (Project 2)	(edit | groups | schedule)	May 11, 2014	1	100	No Statistics Available				Open	Remove
Team Assessment #2	(edit | groups | schedule)	May 13, 2014	1	100	No Statistics Available				Open	Remove
Total Weighted Score				0.0	0.0	0.0	0.0	0.0		

Surveys

No surveys have yet been posted

http://cms.csuglab.cornell.edu/web/guest/

TITLE MAE 2250: Materials Bridge Project — GUSSET IT!

Project No. 1 Book No. 1 15

From Page No. 14

- 2/25/11 - Meeting in Duffield (11:15 AM - 12:20 PM)
  - Discussed drawings for presentation
  - Reviewed PDR skeleton created by Shaun → ran through slides to check for wordiness
  - Knew over what each person is to say during the presentation.
  - Cleaned up PowerPoint
  - See PowerPoint at End (page indicated in Table of Contents)

2/25/11 - Lab Section, Taylor Design Studio (2:00-4:30 PM)

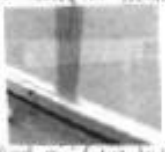
- Deflection - think of how much this is relevant to Moore
- Stability of keeping ball in net
- Look into cost of notecards
- Labeled colors on charts/put in key on charts

More Design Considerations to Consider (what we took away from PDR that we need to check)

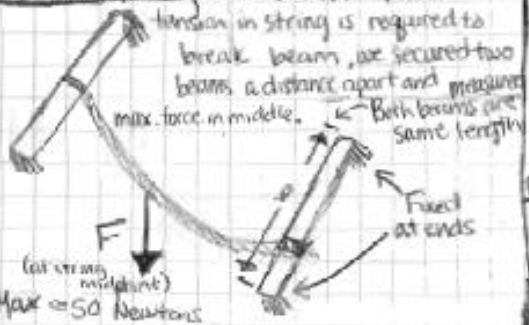
- Materials Update: Birch wood is what coffee stirrers made out of (but data not in B&J Beer | Johnston Mechanics of Materials Book)
- Online Research (Lemay)
  - Double Gusset Joint the best!

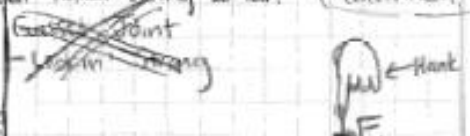
← Two Stirrers Flat/Sandwich against a third stirrer to create strong joint. We created a sample joint and tested it by seeing if the stirrers slip when pulled on. Glue holds and joint is strong! Online research confirmed!

Also easy to manufacture



- Tests During Lab
  - Made Gusset Joint → drying for possible tests, but looks strong so far.
  - Test Bar w/ String → to see how much tension in string is required to break beams, are secured two beams a distance apart and measure max. force in middle.





Buckling Test

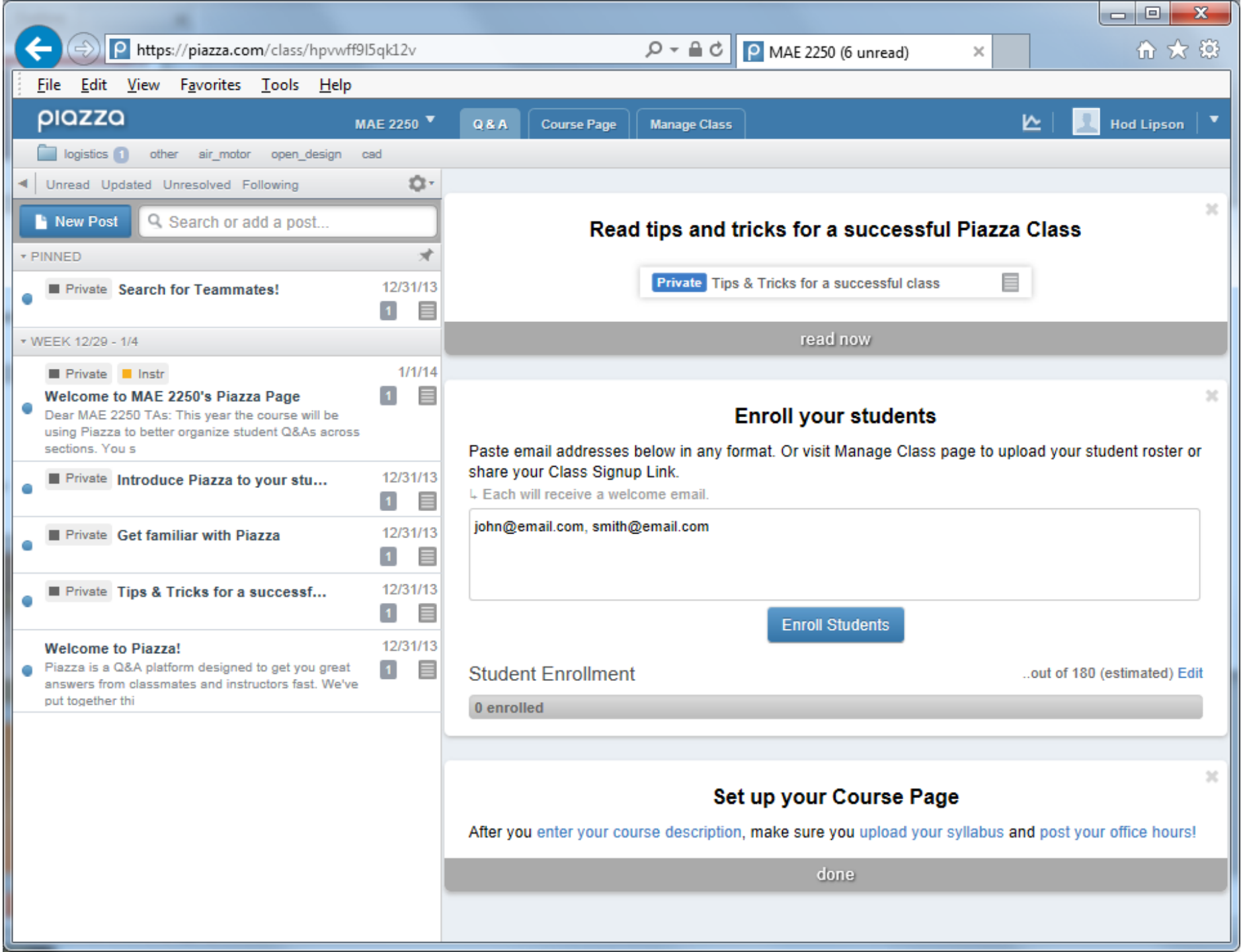
Max ≈ 1.3 lbs

We tested buckling by placing stick vertically on a scale and pushing straight down it. Force recorded

Witnessed & Understood by me: Rebecca Ventimiglia — Date: 2/25/11

Witnessed by — Date: 2/25/11

Recorded By: Rebecca Ventimiglia


https://piazza.com/class/hpvwff9l5qk12v
MAE 2250 (6 unread)
File Edit View Favorites Tools Help
piazza
MAE 2250
Q & A
Course Page
Manage Class
Hod Lipson
logistics 1
other
air_motor
open_design
cad
Unread Updated Unresolved Following
New Post
Search or add a post...
PINNED
Private Search for Teammates! 12/31/13
WEEK 12/29 - 1/4
Private Instr 1/1/14
Welcome to MAE 2250's Piazza Page
Dear MAE 2250 TAs: This year the course will be using Piazza to better organize student Q&As across sections. You s
Private Introduce Piazza to your stu... 12/31/13
Private Get familiar with Piazza 12/31/13
Private Tips & Tricks for a successf... 12/31/13
Welcome to Piazza! 12/31/13
Piazza is a Q&A platform designed to get you great answers from classmates and instructors fast. We've put together thi
Read tips and tricks for a successful Piazza Class
Private Tips & Tricks for a successful class
read now
Enroll your students
Paste email addresses below in any format. Or visit Manage Class page to upload your student roster or share your Class Signup Link.
↳ Each will receive a welcome email.
john@email.com, smith@email.com
Enroll Students
Student Enrollment
..out of 180 (estimated) Edit
0 enrolled
Set up your Course Page
After you enter your course description, make sure you upload your syllabus and post your office hours!
done

MAE 2250 – Team Assessment

Please evaluate the effectiveness and team participation of your partners in this project. Then upload form to CMS. This form is confidential.

Project: _____

Your name: _____ Your Net ID (caps) _____

Your Signature: _____

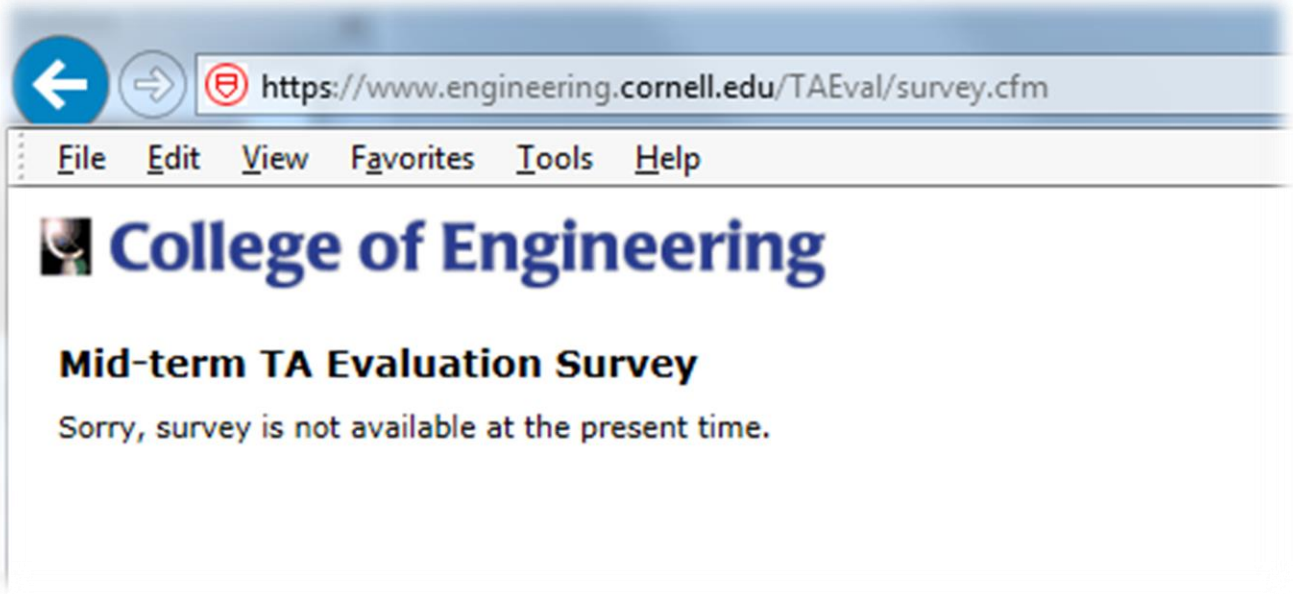
Lab section: Mon Tue Wed Thu Fri Mon-Eve Wed-eve

Partners names (include yourself)	remarks	grade 0 to 100

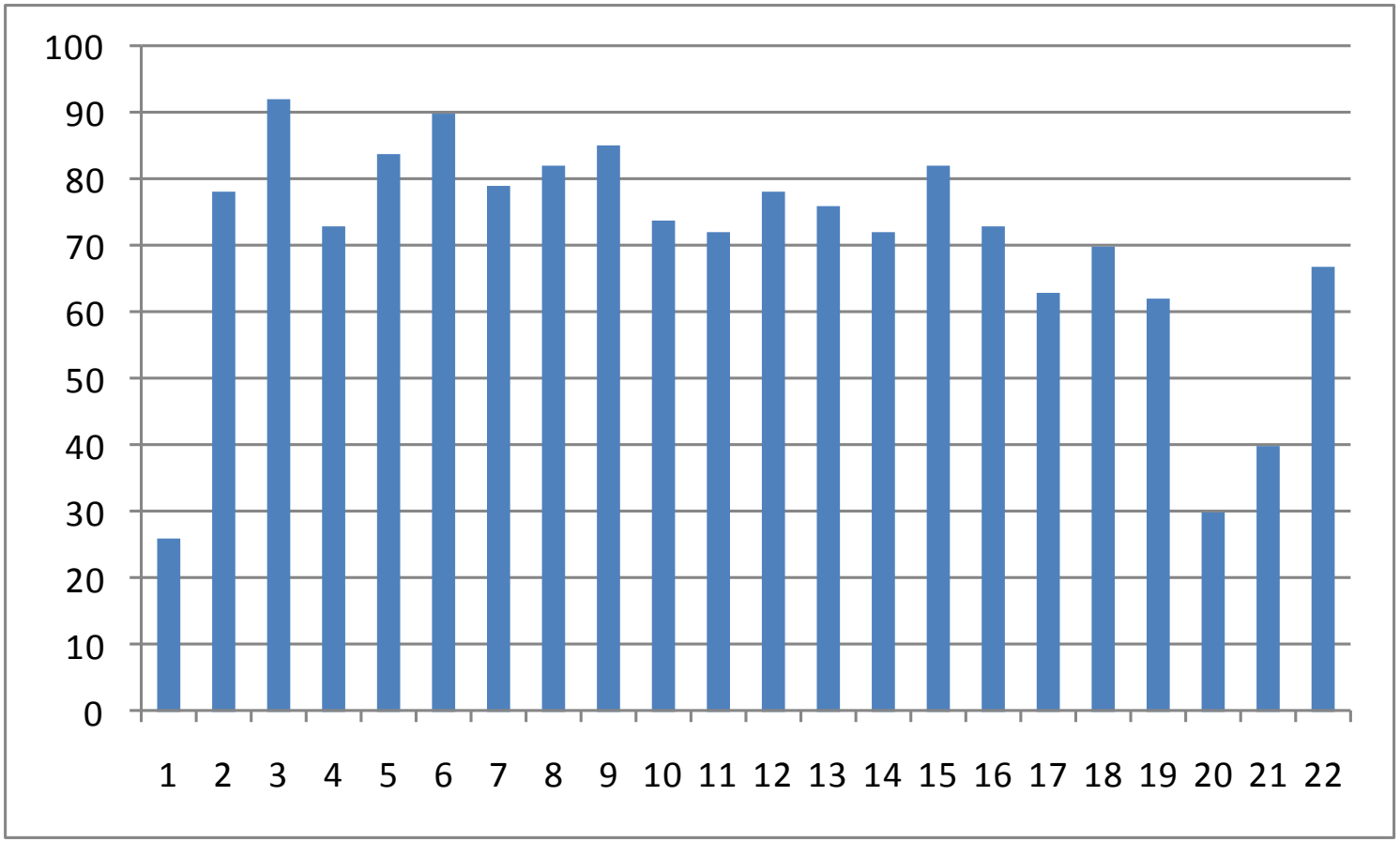
Grade scale. Use the following scale as a rough guide [1]

90-100	**Excellent** Consistently went above and beyond—tutored teammates, carried more than his/her fair share of the load
80-90	**Very good** Consistently did what he/she was supposed to do, very well prepared and cooperative
70-80	**Satisfactory** Usually did what he/she was supposed to do, acceptably prepared and cooperative
60-70	**Ordinary** Often did what he/she was supposed to do, minimally prepared and cooperative
50-60	**Marginal** Sometimes failed to show up or complete assignments, rarely prepared
40-50	**Deficient** Often failed to show up or complete assignments, rarely prepared
30-40	**Unsatisfactory** Consistently failed to show up or complete assignments, unprepared
20-30	**Superficial** Practically no participation
10-20	**No show** No participation at all

[1] From Richard Felder, http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Student-Centered.html


https://www.engineering.cornell.edu/TAEval/survey.cfm
File Edit View Favorites Tools Help
College of Engineering
Mid-term TA Evaluation Survey
Sorry, survey is not available at the present time.

Projects (80% total)	Shop practice (Lamp)	10%
	CAD project	10%
	Design Make Sell	30%
	Air Motor project	30%
Optional Final (20%)	Final exam or class participation (whichever is higher)	20%


100
90
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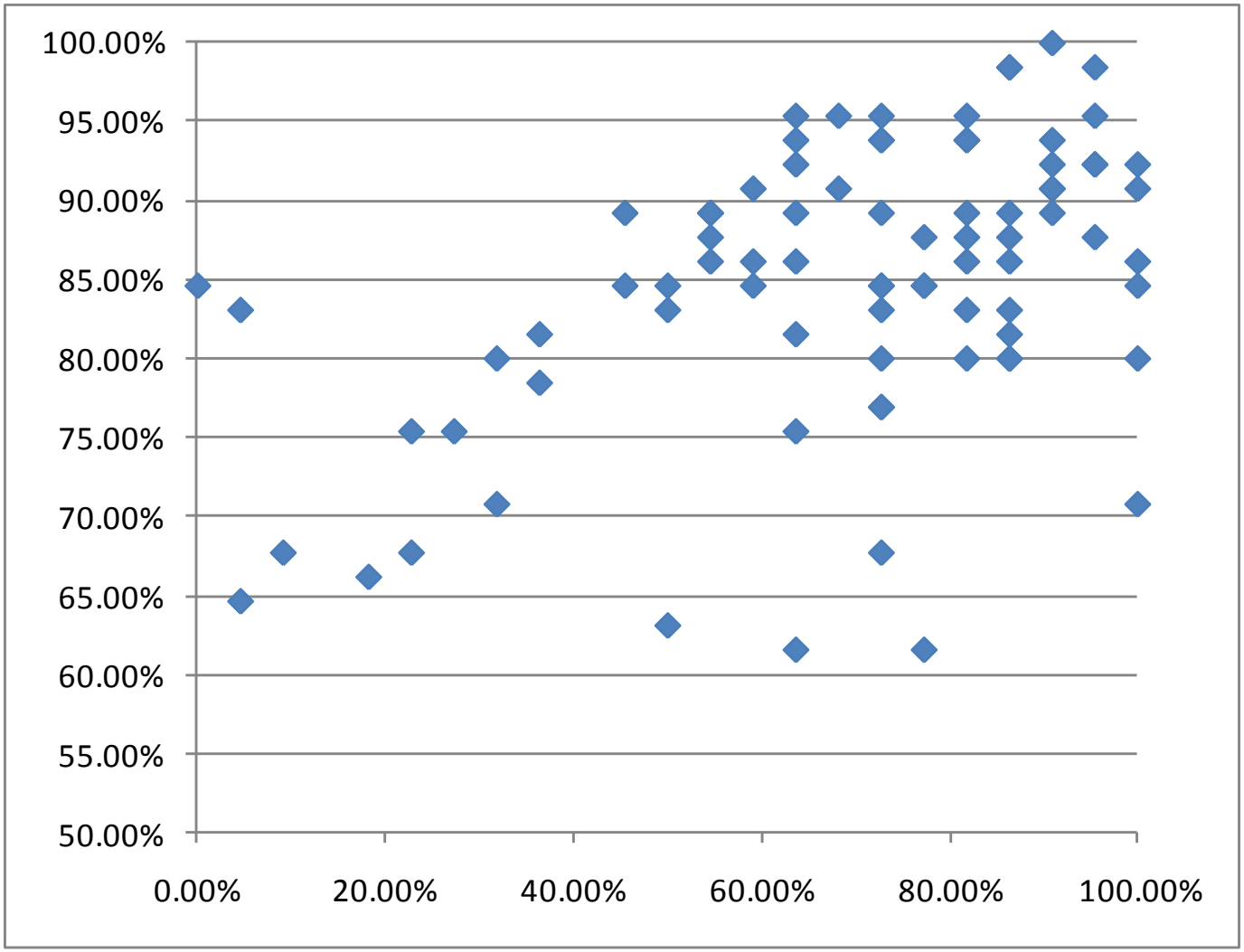
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22


100.00%
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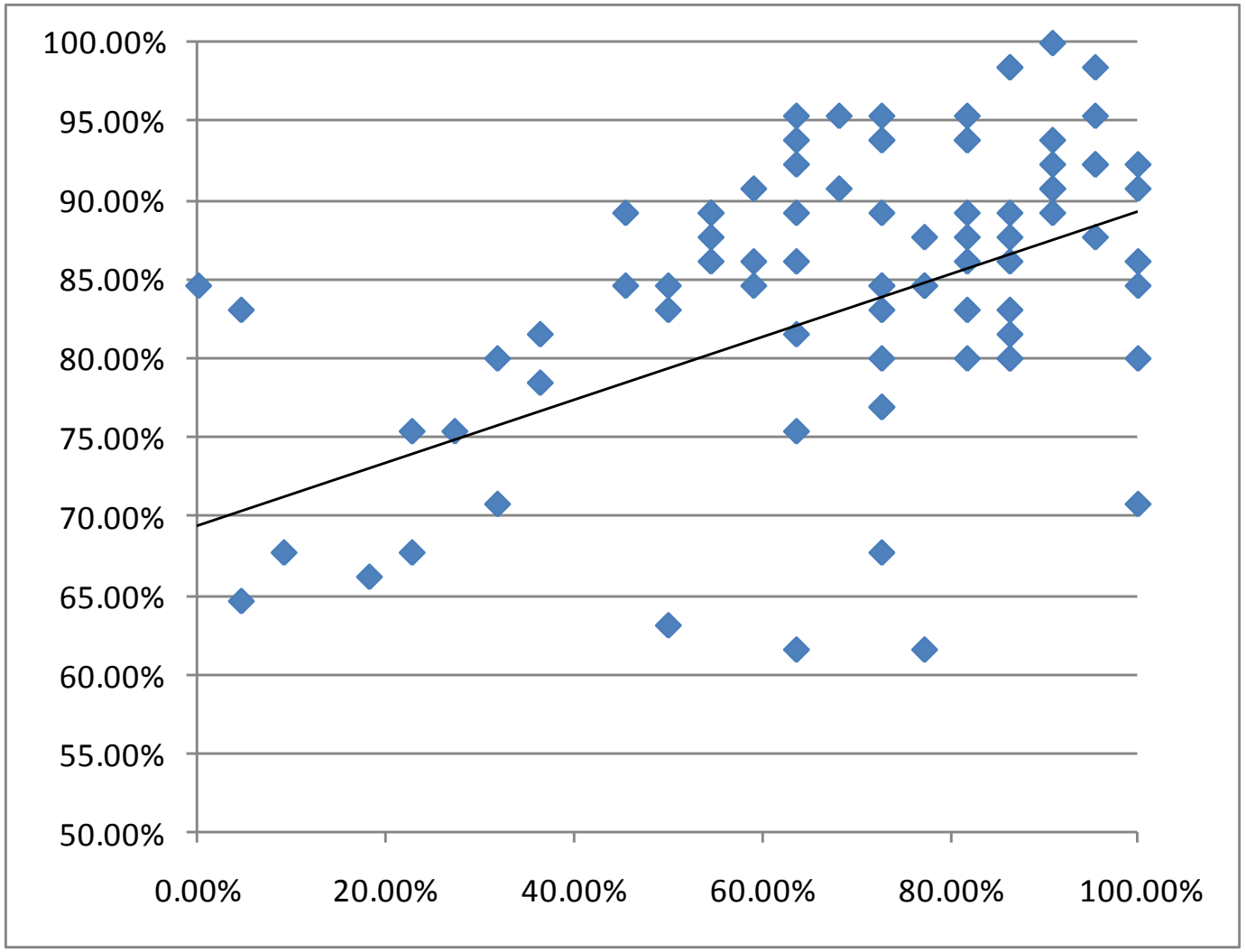
80.00%
100.00%

Participation Correlated with Higher Grade



Sample Exam Questions

- What is the difference between
  - a design patent
  - a utility patent
- Which one of these is an improperly specified customer need?
  - Screw driver should not break when dropped from a ladder
  - Screw driver should be able to hold screws

Clicker

Register at: http://atc.cit.cornell.edu/course/polling/clickers.cfm


AT&T
4:10 PM
Courses
Chemistry-101-001
Question 1
Select an answer
C
Received
A
B
C
D
E

Test Question

- **A: I like to design**
- **B: I will like to design**
- **C: I have always liked to design**
- **D: All of the above**
- **E: Whatever**