PITCH: PROJECT TO INTEGRATE TECHNICAL COMMUNICATION HABITS

A Workshop in PITCH Design & Practice

Tagliatela College of Engineering

University of New Haven

American Society for Engineering Education Annual Conference--Indianapolis Indiana: June 15, 2014

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Topics

- PITCH OVERVIEW
- THE TECHNICAL MEMO IN EASC 1107: INTRODUCTION TO ENGINEERING
- DISPLAYS OF DATA
- COPE PRINCIPLES IN ACTION
- LABORATORY REPORTS IN 3RD YEAR COURSES
- PITCH IN SENIOR DESIGN

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RON HARICHANDRAN

Dean

Tagliatela College of Engineering

University of New Haven

American Society for Engineering Education Annual Conference--Indianapolis Indiana: June 15, 2014

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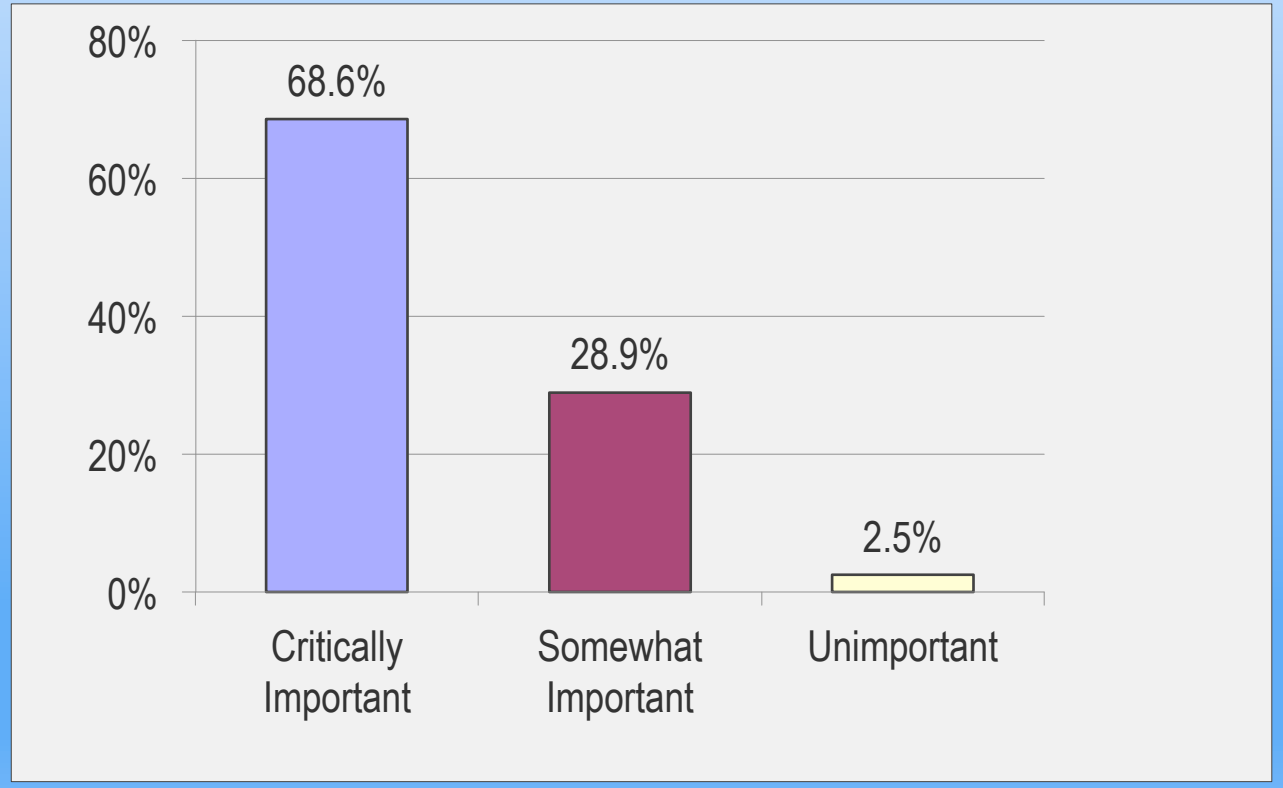
- Question: "Within my organization, to what degree are technical communications skills considered in hiring and promotion decisions?" *N* = 121.



PITCH: AN OVERVIEW

The Need: Employer & Alumni Survey

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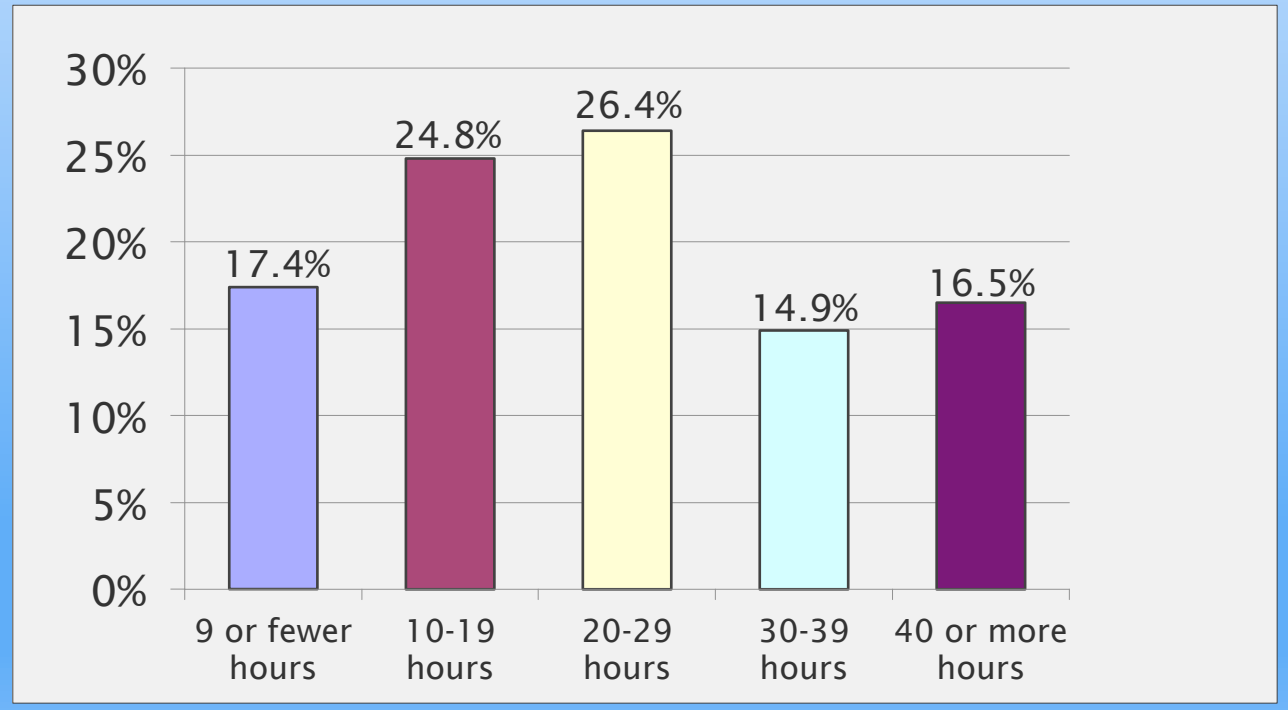
- Question: “In a typical work week, I spend about the following number of hours performing technical communication tasks (writing, reading, speaking or listening).” *N* = 121 .



PITCH: AN OVERVIEW

The Need: Employer & Alumni Survey

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PITCH: AN OVERVIEW

Learning Outcomes

1. Technical Communication Products
   a) Plan, design and produce letters, technical memoranda, short reports, formal e-mails, reports documenting experimental or simulation methods and results, and formal reports (proposals, analyses, progress reports, senior design documents).
   b) Plan, prepare and deliver oral presentations and poster displays.

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2. Technical Communication Habits
    a) Use appropriate format and content;
    b) Exhibit clear, precise and logical expression;
    c) Demonstrate appropriate organization, level of detail, style and tone for a given audience, situation and purpose;
    d) Demonstrate appropriate syntax and correct usage of grammar and spelling;
    e) Highlight or identify critical information;
    f) Present, discuss, and summarize data accurately and persuasively;
    g) Write thoughtful and persuasive conclusions and recommendations;
    h) Work effectively to produce multi-author communications.

PITCH: AN OVERVIEW

Learning Outcomes

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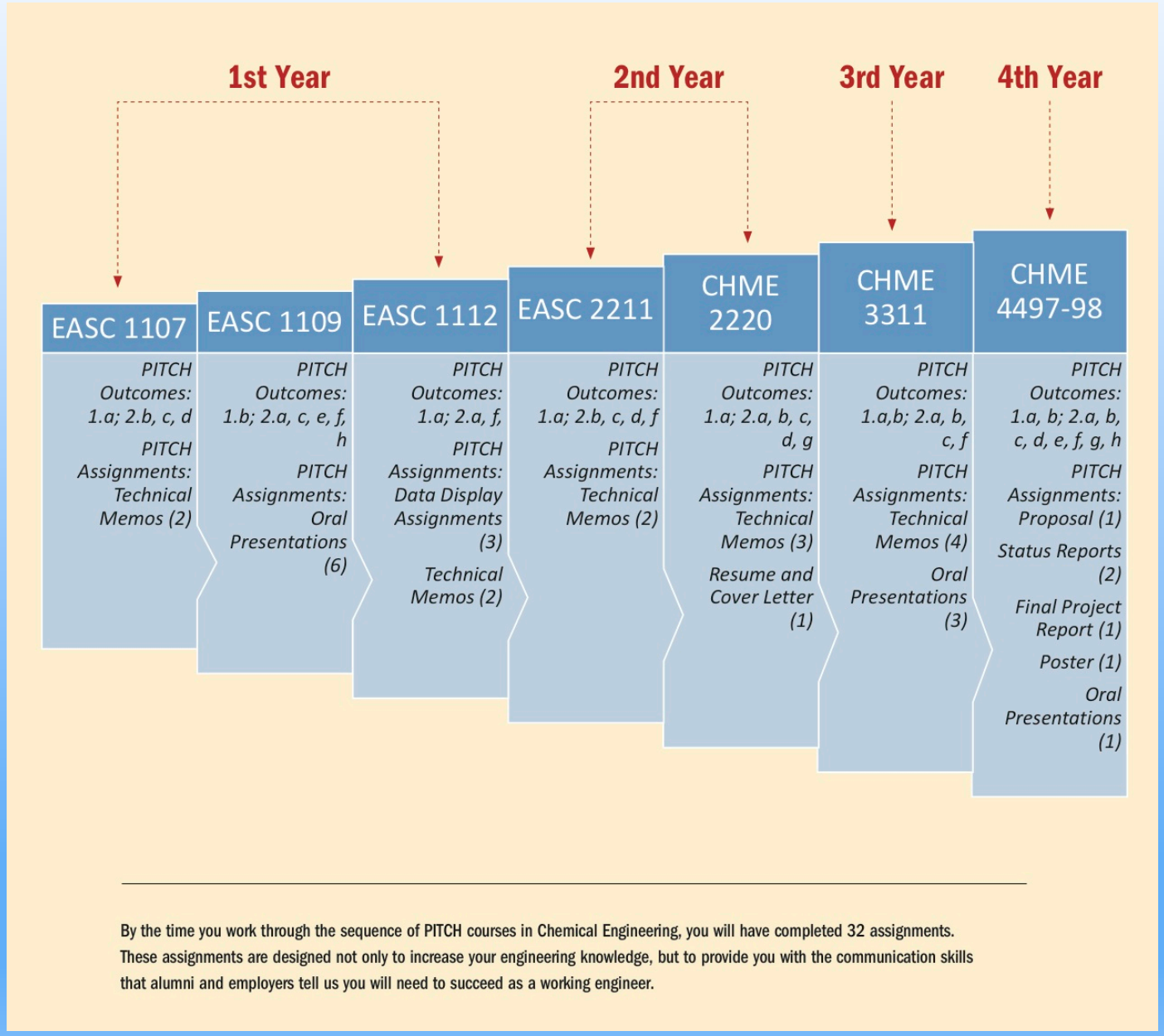

PITCH: AN OVERVIEW

Roadmaps for Each Program

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PITCH: AN OVERVIEW

Faculty Participation and Training

1. Engineering faculty delivered technical communications instruction
2. Lead faculty hand-picked for each targeted course
3. Incentives provided to participating faculty
4. 3-day summer training workshops held
5. Consultant provided support throughout year
6. 16 engineering and computer science faculty trained and participated in first two years
7. Project led by the dean

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PITCH: AN OVERVIEW

Website

Resources developed are available at the PITCH website www.newhaven.edu/engineering/PITCH/

- Learning Outcomes
- Roadmaps
- Faculty, alumni and employer survey results
- Advice tables and guidelines

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PITCH: AN OVERVIEW

Assessment Plan

- Student work on PITCH assignments in all classes are being archived for future longitudinal assessment.
- Improvement in technical communication will be assessed by evaluating student skill development from freshman to senior year.

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JEAN NOCITO-GOBEL

Professor of Civil & Environmental Engineering

Tagliatela College of Engineering

University of New Haven

American Society for Engineering Education Annual Conference--Indianapolis Indiana: June 15, 2014

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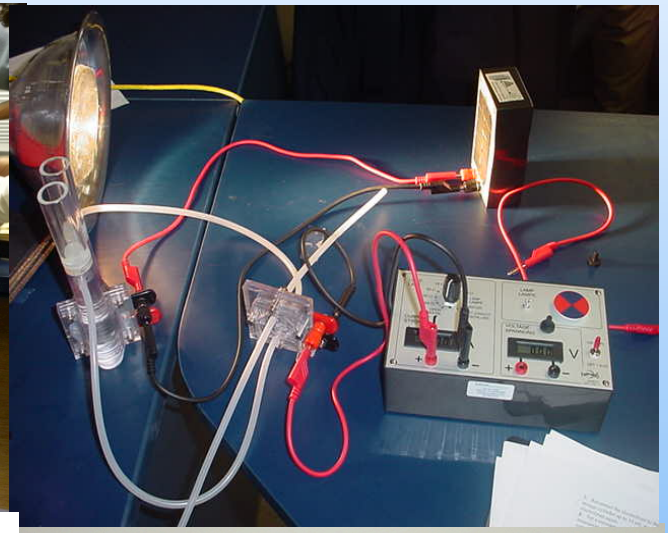

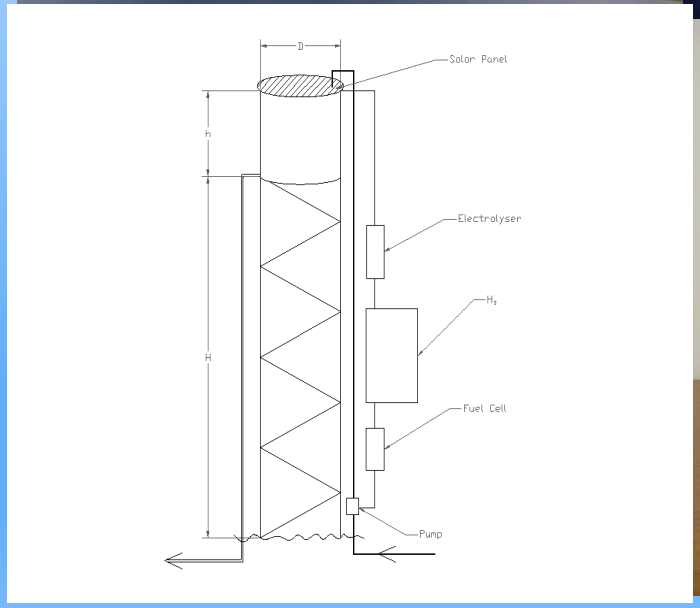

THE TECHNICAL MEMO IN EASC1107: INTRO TO ENGINEERING

- First semester, freshmen course
- Hands-on, project-based
- Engineering concepts introduced through 4 projects
- Communication using technical memos

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Tagliatela College of Engineering

September 9, 2013
To: Mike Rufalo, Laboratory Manager
From: Juliette Coblenz, Laboratory Technician
Subject: Homestead Industrial Project: Results of Test on Weathered White Pine Boards

Notice that the very first sentence answers the basic question and is clearly linked to the subject line and the heading; there is no beating around the bush

Our laboratory tests confirmed that sample of No. 2 white pine submitted by Homestead Industrial maintains a compressive strength far beyond the 675 psi specified by The National Design Specification (NDS) for Wood (1997). All 30 specimens were tested to failure and the results analyzed. The mean compressive strength of those 30 specimens tested was 4475.18 psi, a figure 563% greater than the listed NDS value. Assuming a normal distribution, the probability that the strength of a specimen will be larger than the published value is 99.28%. Below I have included the mean, minimum and maximum compressive strengths and the standard deviation and coefficient of variation of those strengths, as well as the histogram you requested. Please contact me if you have any questions.

Table 1. Homestead Wood Products Test Values

Mean compressive strength	4475.18 psi
Minimum compres strength	2189.01 psi
Maximum compres strength	6611.83 psi
Mean compressive strength	4475.18 psi
Standard deviation	1373.35 psi
Coefficient of variation	.3068

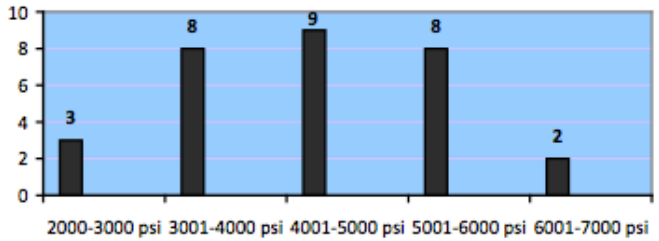

Figure 1. Distribution of Test Results: Homestead No. 2 White Pine--Compressive Strength of 30 Samples Tested to Failure.

CHOICE OF TECHNICAL MEMO

- Commonly used in industry
- Type of writing that requires:
  - Focus on conciseness
  - Need for summation
- Frequency of writing

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FRESHMEN BACKGROUND VS. PITCH SKILLS

Expressive → Direct style of writing

Lab Reports → Explaining data

General → Specific audience

Introduction → Summary paragraph

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FORMAT/STRUCTURE FOR TECHNICAL MEMO

- Format of heading
- Context of the memo

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September 4, 2013

To: Laboratory Staff
From: Mike Rufalo, Laboratory Manager
Subject: Homestead Industrial Project: White Pine Testing

Here is the assignment sheet for the sample memo that follows. Note the specific instructions.

Homestead Industrial, Inc. has asked us to verify the strength of weathered white pine boards previously used for siding on homes. They would like to reuse the material and are concerned about the strength. Since wood is such a highly variable material, thirty samples will have to be tested to failure in compression. The resulting maximum strengths should then be analyzed statistically and compared to an existing standard. This comparison is important in addressing Homestead's concern.

Please perform the testing and analysis detailed in the assignment below and write a company memo to me. I am familiar with the standard lab practices but will not be aware of your specific results. I will rework your memo into a more formal letter to Homestead Industrial. Please keep the memo short and to the point!

Your Assignment – a memo report to the project manager

Perform the compressive testing as detailed in our standard laboratory practices (on the web site) and provide the following **results.**

- Provide the minimum and maximum (range), mean, standard deviation and coefficient of variation of the failure strengths. I would like these values presented in a table.
- Include a histogram plot of the failure strengths.

Your memo should answer the following **questions**.

1. The National Design Specification (NDS) for Wood (1997) lists the allowable design strength for No. 2 white pine as 675 psi. Using the test data, what is the probability that the strength of a sample will be larger than the published value *p* (sample data > 675 psi)? Assume a normal distribution as detailed in our lab manual.
2. On a percentage basis, how much larger (or smaller) is the mean failure strength than the published value of 675 psi? For example, you could state, "The mean strength from the test data is [(mean – 675 psi) / 675 psi] percent higher than the published value for No. 2 white pine as listed in the National Design Specification for Wood (1997)."

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September 9, 2013
To: Mike Rufalo, Laboratory Manager
From: Juliette Coblenz, Laboratory Technician
Subject: Homestead Industrial Project: Results of Test on Weathered White Pine Boards

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Our laboratory tests confirmed that sample of No. 2 white pine submitted by Homestead Industrial maintains a compressive strength far beyond the 675 psi specified by The National Design Specification (NDS) for Wood (1997). All 30 specimens were tested to failure and the results analyzed. The mean compressive strength of those 30 specimens tested was 4475.18 psi, a figure 563% greater than the listed NDS value. Assuming a normal distribution, the probability that the strength of a specimen will be larger than the published value is 99.28%. Below I have included the mean, minimum and maximum compressive strengths and the standard deviation and coefficient of variation of those strengths, as well as the histogram you requested. Please contact me if you have any questions.

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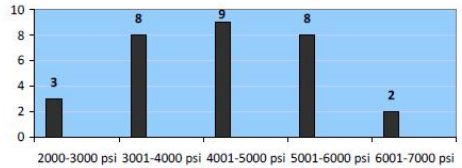

Figure 1. Distribution of Test Results: Homestead No. 2 White Pine--Compressive Strength of 30 Samples Tested to Failure.

Not all memos will be this brief, but in this case a simple request only required one paragraph of text, plus a table and attached graph. Two things to note:

- *"Assuming a normal distribution" is a precise and necessary qualifying statement here.*
- *The order of mean, minimum and maximum compressive strengths is the same in both the text and the table. That sort of consistency really helps the reader.*
- *This summary graph is simple and direct, as well as easy to read, although there might have been titles for each axis. Notice that the title is properly placed* ***beneath*** *the graph and contains enough detail to make the content clear at first glance. You could also imagine a detailed table listing the results for each specimen, but that was not requested here. In most settings, you should also expect to see attached a sheet of your calculations, as appears in the next example.*

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Advice Table for Technical Memos

Advice	Explanation	Example
Respond to your reader's needs. Most work assignments should respond to a reader's specific request for information	Consider the factors that govern your reader's interest in your memo and address those factors in the way you organize your memo: • Has the reader asked for specific information, often in a list of questions? • Is the reader aware of the subject and its importance? • Why does the reader need this information? • What level of detail or evidence will the reader require to accept the content of the memo?	Rephrase the primary question as a statement to open your memo. That way you make sure you place the most important information *first*. • Here are the data you requested regarding the thermal diffusion experiments. The results should be useful to the Composite Materials Group and should answer their questions regarding our procedures. The attached graphs illustrate our specific results.
*Use the **Subject** line to your advantage.*	Focus the reader's attention by using a subject line that highlights the critical ideas in your memo. Make the subject precise. A generic subject line can mask the importance of the information.	*Prefer* a subject line such as: **Subject**: Serious Violations of Safety Regulations—Building A3 *Avoid* generic or overly broad subject lines such as: **Subject**: Safety Inspections
Get to the point.	Except for "bad news" situations, begin your memo with the major point you wish to make. Don't make the reader search for the answers to the important question (s).[1]	*Prefer* a direct, specific opening: We believe the equations used in our procedure are valid for use in the design you propose (*followed by a list of reasons why and any limitations or qualifiers to your statement.)*
Give structure to the information.	Make sure that headings, paragraphs, and lists reflect distinct groups of information arranged in an order that makes sense to your reader. The reader needs to follow the strict line of reasoning and evidence that leads to your primary points. Avoid mixing ideas or going off on points that are not centrally related to your conclusions.	*Prefer* a structure that illustrates the structure of ideas: The equations we used would not suit your design for two reasons:

ADVICE TABLE

- Format of table: advice, explanation and examples
- Identifies common mistakes

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ASSIGNMENT REVISION

- Written in memo format
- Audience specified

Customer Awareness Project

An important part of any design project is communication of that design to the client. For the Customer Awareness Project, students will work in teams to design material and report findings. Your company is exploring new markets and is trying to break into the market of toys for offices and desks. You have been asked to develop a product to compete with the Rubik cube.

Design Requirements

- Each puzzle design must have a specific theme with a target audience, age group and time to completion.
- Each cube is made from 27 individual ¾ inch wood blocks.
- Pieces should interlock so that the puzzle cube is self-supported when assembled.
- Should be easy for shipping.

Action Items:

- As a team, design a brief survey to determine who your target audience will be for the puzzle cube. Collect data from at least 12 individuals; e.g. 3 people per team member. The survey could include questions related to a theme for the puzzle cube, level of difficulty and price someone would be willing to pay. The suggested length of the survey is 1 page.
- Upon analyzing the survey results, each member of the team will sketch, design and build a puzzle cube according to the design requirements above. Students will then produce a computer model of their sketch using a 3-D solid modeling program, i.e. Inventor.
- Team members will evaluate their individual puzzle design by testing it out on 10 prospective customers using a survey provided by your instructor.
- Based on a KT Decision Analysis, choose the optimal design for the team using the results from your surveys.

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Tagliatela College of Engineering

June 11, 2014
TO: EASC1107 Students
FROM: Steve Gobel, Marketing Analyst
SUBJECT: Request for Technical Memo – Testing Puzzle Cube Designs for Customer Awareness

During a marketing meeting, your company has decided to explore new markets for generating revenue and have targeted the toy industry. Preliminary research has shown that puzzles like the Rubik's Cube® seem to appeal to all ages. You have been asked to lead a team to first identify a market and then develop a puzzle cube that can compete in that market. There is limited time since your company would like to introduce this product to the market in time for the holiday season. You are not expected to do a Cost-Benefit Analysis at this time; however, specifying a selling price is expected. In three weeks, you need to pitch your team's idea to the Director of New Product Development, Mr. DeHart, so that he can make a recommendation to the company's investors.

Design criteria for the puzzle cube and action items appear below. To expedite the design process, each member of your team will design a puzzle cube based on the listed criteria. Your team will collect data for each puzzle before choosing which design to pitch to Mr. DeHart.

Design Criteria

- Each puzzle design must have a specific theme with a target audience, age group and time to completion.
- Each cube is made from 27 individual ¾ inch wood blocks.
- Pieces should interlock so that the puzzle cube is self-supported when assembled.
- The puzzle must be easy to ship.

Action Items:

- As a team, gather data on a potential market by interviewing at least 15 individuals. Draft a survey that includes questions related to a theme for the puzzle cube, level of difficulty and price someone would be willing to pay. Go out there and see how many people you can speak to about puzzle cubes!
- Analyze the data you gather to determine a theme, age group and level of difficulty for your team to focus on to design the puzzle cube.

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Student(s):	SAMPLE	
Course	EASC1107	
Description	Project 4 - Customer Awareness Project	

Overall Grade		
	Percent	Grade
Technical Memo	40%	0
Isometric handsketch of all puzzle s	4%	
Orthographic drawing for each part properly dimensioned.	20%	
Drawing of assembled and exploded view of cube (with part list) for individual & recommended cube designs	4%	
Data collected from Pre- and Post client survey (Provide a tally of results).	10%	
Statistical Analysis	10%	
KTDA (used to select "TEAM cube")	4%	
Photograph of cubes	2%	
Pitching Your Cube	6%	
TOTAL GRADE	$\sum(\% * Grade)$	0

Points Possible - indicates the total maximum points that can be earned in that category.

Points Earned - indicates total number of points actually earned in the given category.

Dimension	Pts Possible	Performance Level			Pts. Earned	Comments
		16 - 20 pts	12 - 15 pts	0 - 11 pts		
Overall Quality of Memo	20	Is the structure of the memo designed to meet the readers needs or the writers needs. Paragraphs are organized. Precise & consistent terminology. Proper use of units and notation;e.g. unit abbreviations.				
		5 pts	3-4 pts	0 pts		
Heading	5	Heading is complete according to guidelines. Includes date, TO, FROM, and precise subject line.	Heading is complete but subject line is general and non-specific.	Heading is missing at least one of the elements.		
		12 - 15 pts	8 - 11 pts	0 - 7 pts		
Summary Paragraph	15	Concisely addresses readers questions. Rephrases the primary question as a statement to open the memo, followed by secondary questions/results and important conclusions.				

DEVELOPMENT OF RUBRICS

- Specific to assignment
- Student and Instructor versions
- Still under development

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STUDENT ADVICE/GRADING TABLE

EASC1107 Introduction to Engineering
Customer Awareness Project
Technical Memo Grading Rubric

Dimension	Expectations
Overall Quality of Memo (20%)	• Organized paragraphs. • Precise & consistent terminology. • Proper use of units and notation; e.g. mL not milliliters
Heading (5%)	• Complete heading according to guidelines. • Includes date, recipient, sender (author), and subject line. • Precise and meaningful subject line.
Summary Paragraph (15%)	• Concisely addresses readers' questions. • Rephrases the primary question as a statement to open the memo, followed by secondary questions/results and important conclusions.
Relevant Background (20%)	• Discusses engagement of customers via initial survey for determining design criteria. • Summarizes survey results. • Discusses design criteria and constraints. • Describes individual puzzle cube design. • Explains 3-D solid modeling drawings of individual puzzle cube design.
Analysis of Puzzle Cube Designs (20%)	• Explains testing of prototype puzzle cube. • Summarizes and discusses survey data collected from testing prototype puzzle cube. • Discusses statistical analysis of survey results. • Explains the use of KT Decision Analysis for choosing puzzle cube design.
Recommendations (10%)	• Recommendations based on data presented. • Defines appropriate information to market puzzle cube. • Comments on whether modifications are needed in puzzle cube design for marketability.

Overall Grade		
	Percent	Grade
Technical Memo	40%	
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Orthographic drawing for each part properly dimensioned.	20%	
Drawing of assembled and exploded view of cube with part list	4%	
Data collected of pre- and post-customer surveys	10%	
Statistical analysis of data	10%	
KTDA (used to select recommended cube)	4%	
Photographs of cubes	2%	
Pitching your cube	6%	
TOTAL GRADE	100%	

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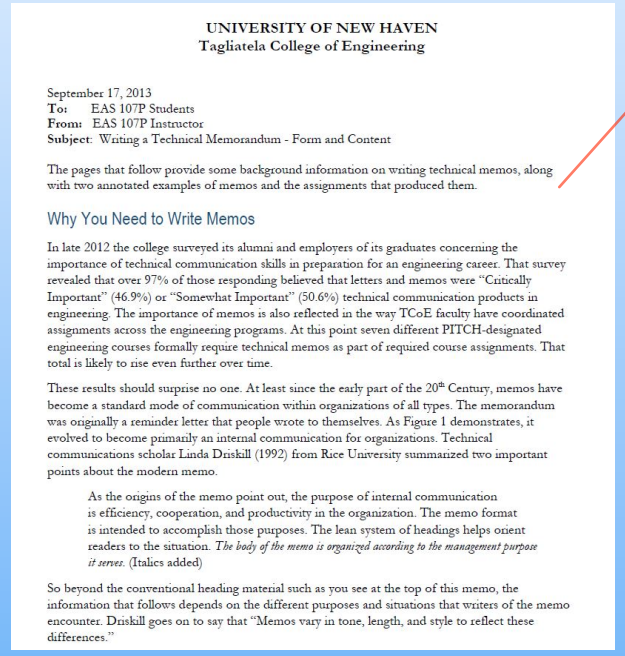
STUDENT RESOURCES

Guideline for Technical Memo



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Tagliatela College of Engineering

September 17, 2013
To: EAS 107P Students
From: EAS 107P Instructor
Subject: Writing a Technical Memorandum - Form and Content

The pages that follow provide some background information on writing technical memos, along with two annotated examples of memos and the assignments that produced them.

Why You Need to Write Memos

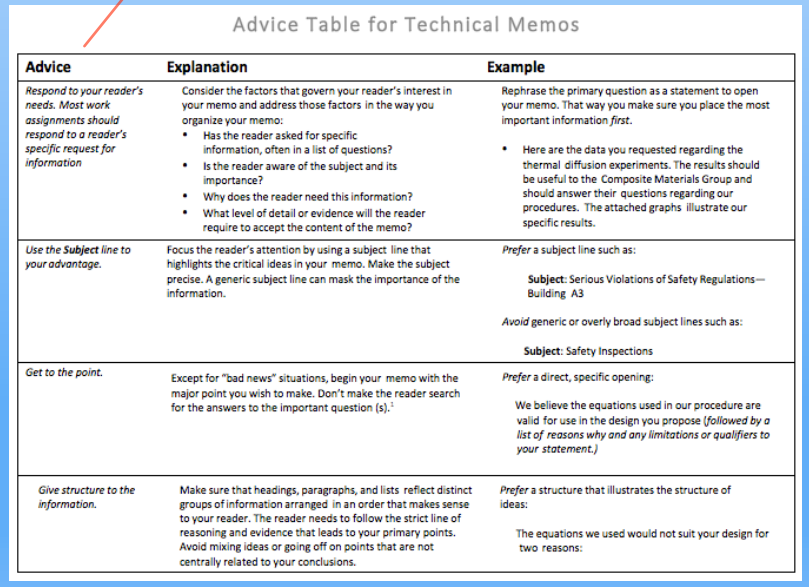
In late 2012 the college surveyed its alumni and employers of its graduates concerning the importance of technical communication skills in preparation for an engineering career. That survey revealed that over 97% of those responding believed that letters and memos were "Critically Important" (46.9%) or "Somewhat Important" (50.6%) technical communication products in engineering. The importance of memos is also reflected in the way TCoE faculty have coordinated assignments across the engineering programs. At this point seven different PITCH-designated engineering courses formally require technical memos as part of required course assignments. That total is likely to rise even further over time.

These results should surprise no one. At least since the early part of the 20th Century, memos have become a standard mode of communication within organizations of all types. The memorandum was originally a reminder letter that people wrote to themselves. As Figure 1 demonstrates, it evolved to become primarily an internal communication for organizations. Technical communications scholar Linda Driskill (1992) from Rice University summarized two important points about the modern memo.

> As the origins of the memo point out, the purpose of internal communication is efficiency, cooperation, and productivity in the organization. The memo format is intended to accomplish those purposes. The lean system of headings helps orient readers to the situation. *The body of the memo is organized according to the management purpose it serves.* (Italics added)

So beyond the conventional heading material such as you see at the top of this memo, the information that follows depends on the different purposes and situations that writers of the memo encounter. Driskill goes on to say that "Memos vary in tone, length, and style to reflect these differences."

Advice Table



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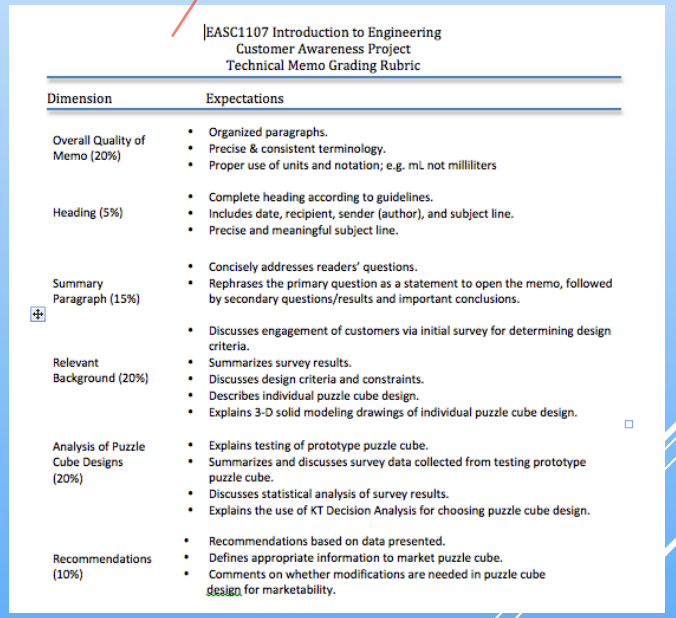
Student Advice/ Grading Table



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Customer Awareness Project
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MICHAEL COLLURA

Professor of Chemical Engineering

NADIYE ERDIL

Asst. Professor of Industrial Engineering

Tagliatela College of Engineering

University of New Haven

American Society for Engineering Education Annual Conference--Indianapolis Indiana: June 15, 2014

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PITCH – Core Competencies

a. Use appropriate format and content;
c. Demonstrate appropriate organization, level of detail, style and tone for a given audience, situation and purpose;
e. Highlight or identify critical information;
f. Present, discuss, and summarize data accurately and persuasively;
g. Write thoughtful and persuasive conclusions and recommendations;

DISPLAYS OF DATA

Targeted PITCH Competencies

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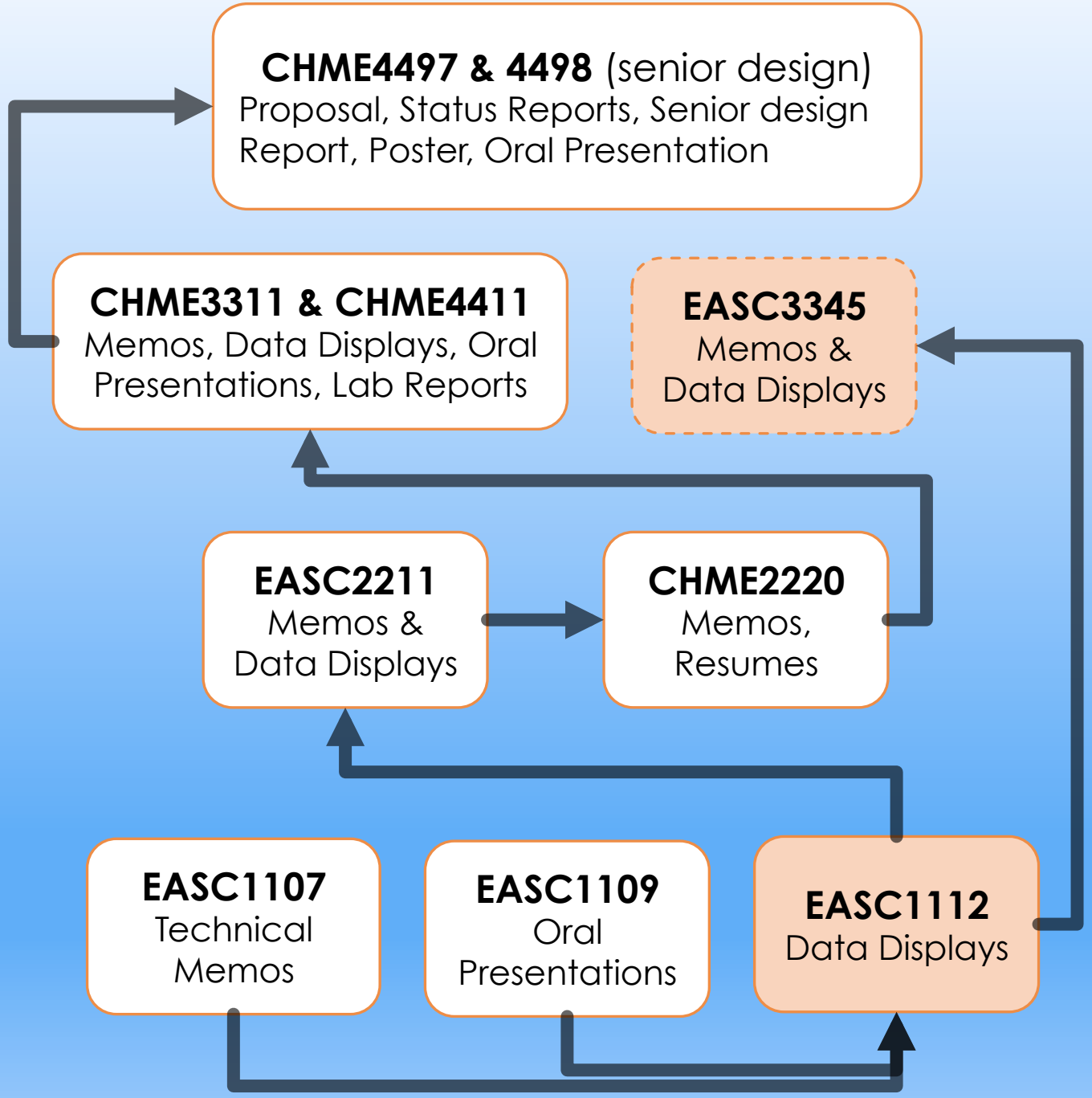

DISPLAYS OF DATA

Targeted PITCH Courses

EASC1112: Methods of Engineering Analysis

EASC3345: Applied Engineering Statistics

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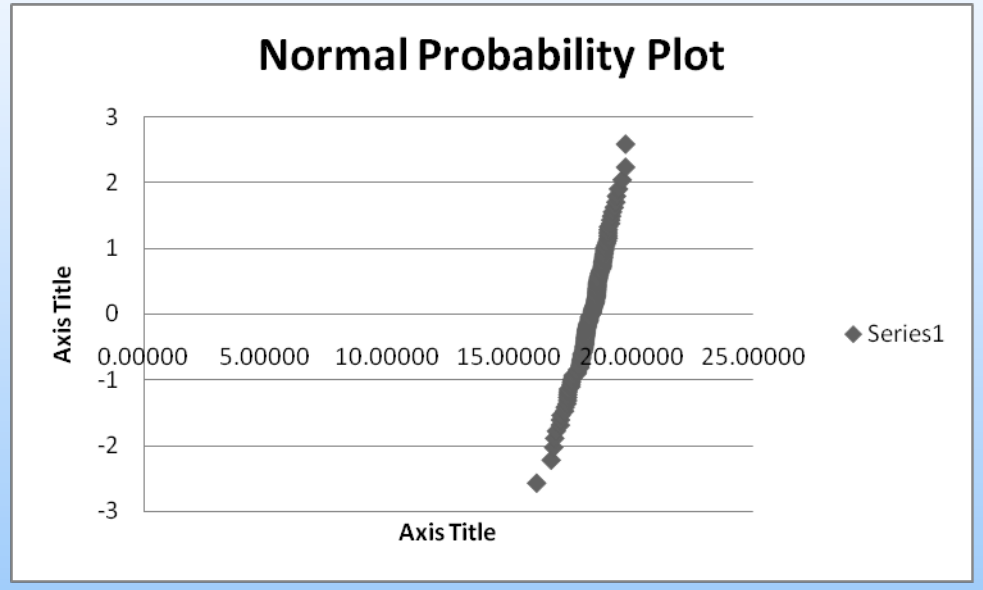

DISPLAYS OF DATA

The Need

Column1		Column2		Column3		Column4	
Mean	4.81	Mean	4.62	Mean	5.16	Mean	3.98
Standard Error	0.078102497	Standard Error	0.111355287	Standard Error	0.089690827	Standard Error	0.067986927
Median	4.9	Median	4.7	Median	5.15	Median	3.9
Mode	4.9	Mode	4.8	Mode	5.2	Mode	3.9
Standard Deviation	0.246981781	Standard Deviation	0.352136337	Standard Deviation	0.283627298	Standard Deviation	0.21499354
Sample Variance	0.061	Sample Variance	0.124	Sample Variance	0.080444444	Sample Variance	0.046222222
Kurtosis	-1.09980676	Kurtosis	-1.511136713	Kurtosis	-0.110426378	Kurtosis	-0.02392289
Skewness	-0.47458203	Skewness	-0.187793832	Skewness	0.691028248	Skewness	0.741301343
Range	0.7	Range	1	Range	0.9	Range	0.7
Minimum	4.4	Minimum	4.1	Minimum	4.8	Minimum	3.7
Maximum	5.1	Maximum	5.1	Maximum	5.7	Maximum	4.4
Sum	48.1	Sum	46.2	Sum	51.6	Sum	39.8
Count	10	Count	10	Count	10	Count	10
Confidence Level(95.0%)	0.176680122	Confidence Level(95.0%)	0.251903161	Confidence Level(95.0%)	0.202894747	Confidence Level(95.0%)	0.153797114

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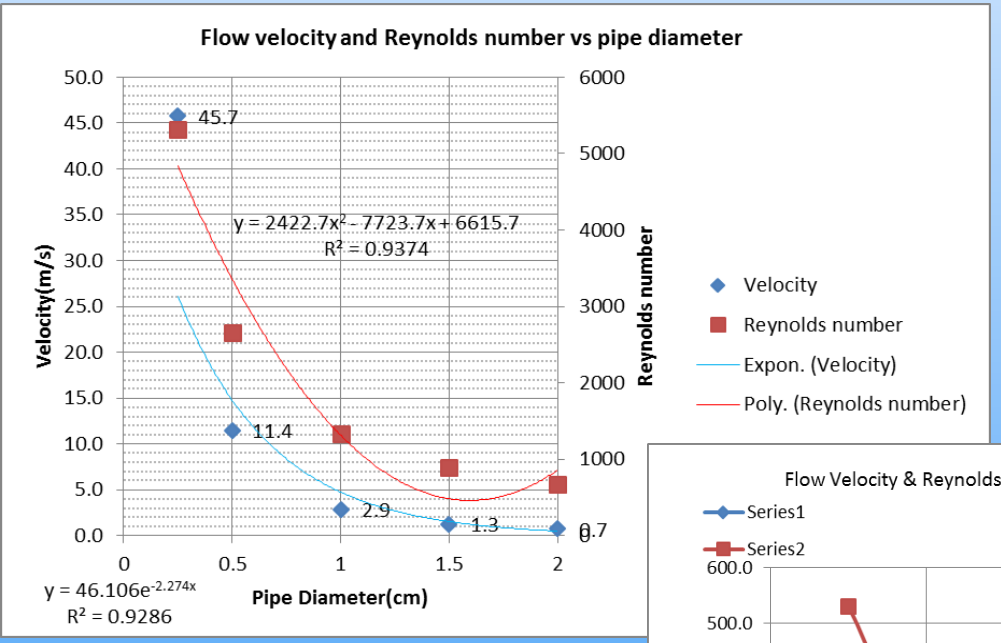
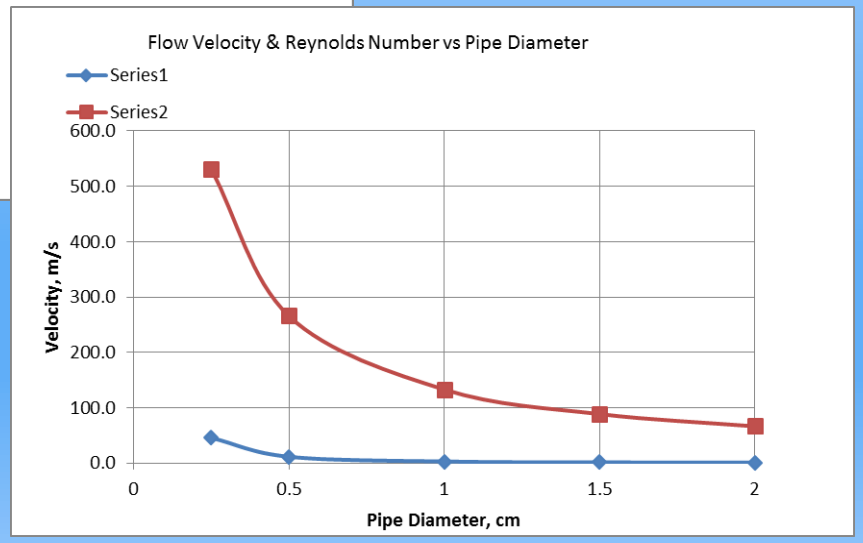
Student Assignment:
Create a plot showing the calculated values of velocity and Reynold's Number for a gas flowing in a pipe, at fixed volumetric flowrate.

DISPLAYS OF DATA

The Need: An Example





DISPLAYS OF DATA
The Approach

The Approach

Principles of Analytical Design[1]:

1. Show comparisons, contrast and differences
2. Show causality, mechanism, explanation, systematic structure
3. Show multivariate data; that is show more than one or two variables
4. Completely integrate words, numbers, images, diagrams
5. Documentation: Thoroughly describe the evidence.
6. Content counts most of all. Analytical presentations ultimately stand or fall depending on the quality, relevance and integrity of the evidence.

[1] Tufte, Edward R., Beautiful Evidence , Graphics Press LLC, Cheshire, CT, 2006; www.edwardtufte.com

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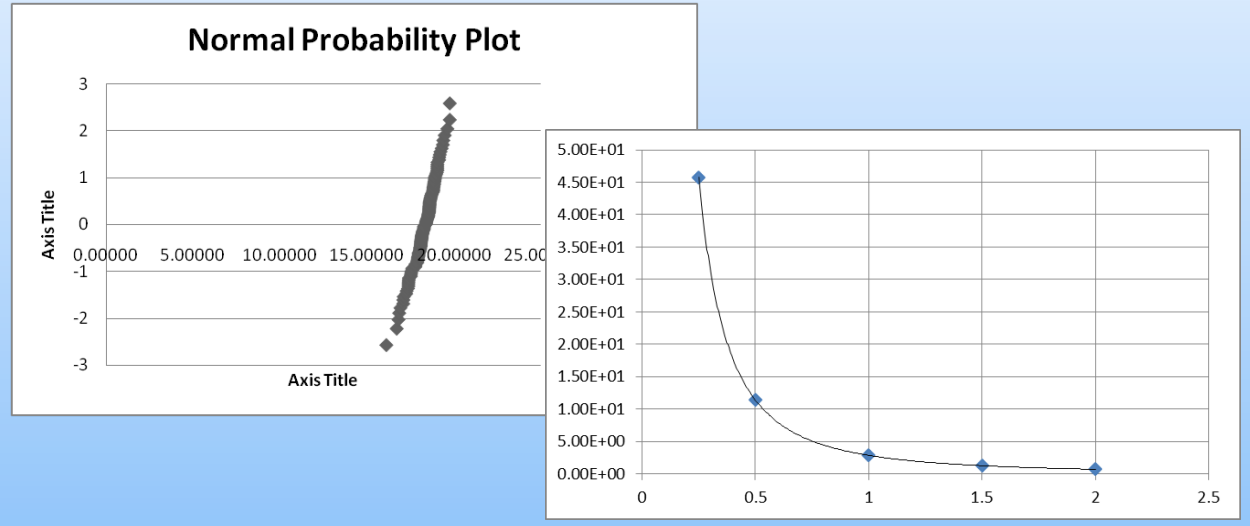

DISPLAYS OF DATA

Mini Exercise

Statistic		Paint Type			
		Current Primer	Primer 1	Primer 2	Primer 3
Mean		4.810	4.620	5.160	3.980
95% Confidence Interval for Mean	Lower Bound	4.633	4.368	4.957	3.826
	Upper Bound	4.987	4.872	5.363	4.134
Std. Deviation		.2470	.3521	.2836	.2150
Minimum		4.4	4.1	4.8	3.7
Maximum		5.1	5.1	5.7	4.4
Range		.7	1.0	.9	.7

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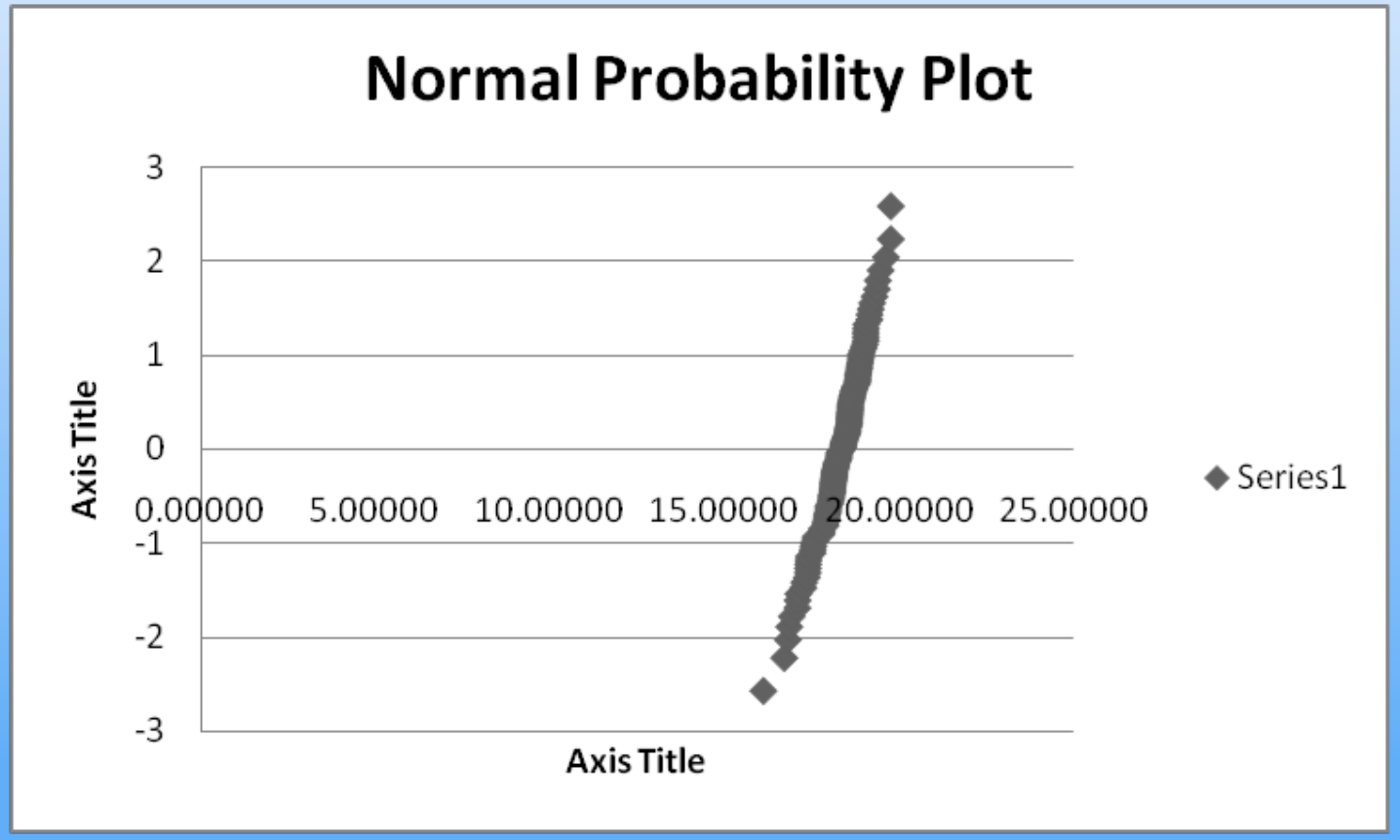

DISPLAYS OF DATA

Use guidelines to critique this plot

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DISPLAYS OF DATA
PITCH Guidelines

PITCH Guidelines

- Formatting should help bring out the message the author wants to deliver by showing data
- Formatting must never distract from the message

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Typical Components of a Table

- Table Number
- Table Title
- Headings (column, row)
- Table Body
- Notes to Tables

DISPLAYS OF DATA

Guidelines for Tables

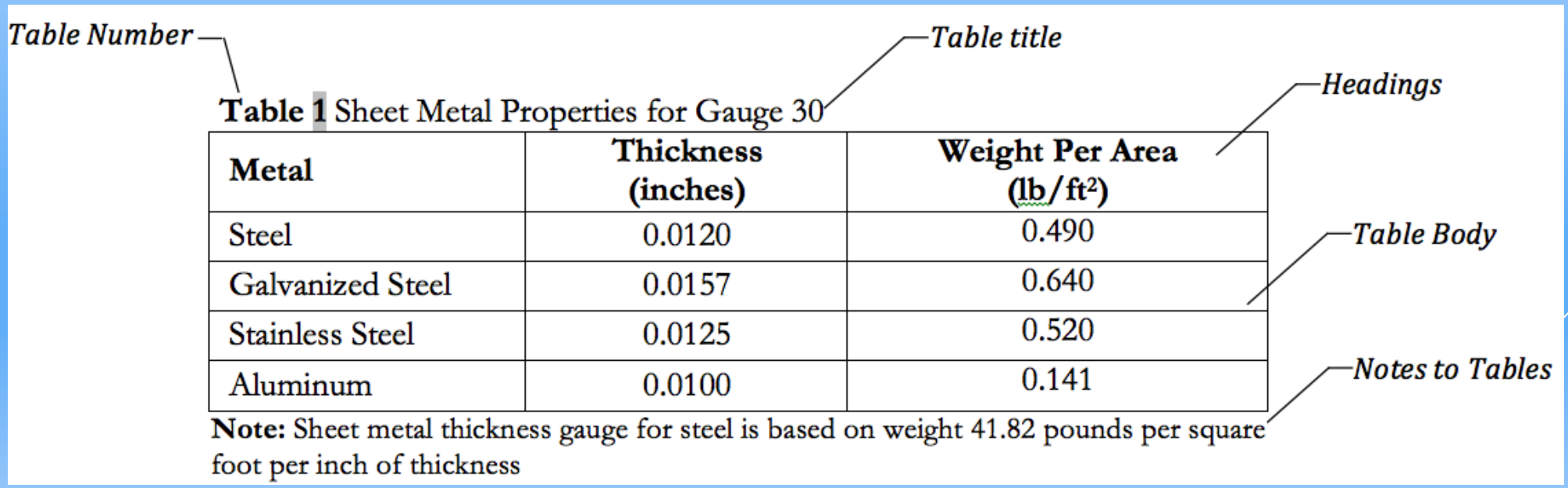

Table 1 Sheet Metal Properties for Gauge 30

Metal	Thickness (inches)	Weight Per Area (lb/ft²)
Steel	0.0120	0.490
Galvanized Steel	0.0157	0.640
Stainless Steel	0.0125	0.520
Aluminum	0.0100	0.141

Note: Sheet metal thickness gauge for steel is based on weight 41.82 pounds per square foot per inch of thickness

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DISPLAYS OF DATA

Guidelines for Tables

Table Content and Usage

- Practice information integrity and efficiency
- Provide clear table title and headings
- Verify that elements included in the table are relevant to the narrative.

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Table 2 Inspection Cost

p	P_a	N	Sampling Inspection [n. I+ (N-n).p.P_a+(N-n).(1-P_a).I]	No Inspection [N.p.A]	100% Inspection [N.I]
0	1	30	14	0	2,250
0.005	0.956	38	270	163	2,250
0.01	0.863	43	603	325	2,250
0.02	0.648	50	1,224	650	2,250
0.03	0.467	52	1,661	975	2,250
0.04	0.334	52	1,936	1,300	2,250
0.05	0.24	50	2,102	1,625	2,250
0.06	0.173	48	2,199	1,950	2,250
0.07	0.126	45	2,253	2,275	2,250
0.08	0.093	45	2,282	2,600	2,250
0.09	0.068	41	2,296	2,925	2,250
0.1	0.05	39	2,300	3,250	2,250

Table title is not explanatory

Meanings of abbreviated column headings may not be clear to the reader

Inconsistent number of decimal places

Poor use of lines

Poor organization: Left justified headings combined with right justified data columns reduce clarity

UNDERSTANDING THE INFORMATION PRESENTED IS DIFFICULT DUE TO POOR FORMATING AND POOR PRACTICE OF INFORMATION EFFICIENCY.

DISPLAYS OF DATA

Guidelines for Tables

Appropriate labeling including units of measurement where appropriate

Sufficient space between columns data to be distinct

Highlighted critical information

Table 2 Inspection Cost Comparison for Three Inspection Alternatives

SAMPLING INSPECTION GUIDE			INSPECTION COST ($)		
Proportion Defective in Lot [p]	Probability of Acceptance [P_a]	Average # Inspected [n]	Sampling Inspection	No Inspection	100% Inspection
0.000	1.000	30	14	0	2,250
0.005	0.956	38	270	163	2,250
0.010	0.863	43	603	325	2,250
0.020	0.648	50	1,224	650	2,250
0.030	0.467	52	1,661	975	2,250
0.040	0.334	52	1,936	1,300	2,250
0.050	0.240	50	2,102	1,625	2,250
0.060	0.173	48	2,199	1,950	2,250
0.070	0.126	45	2,253	2,275	2,250
0.080	0.093	45	2,282	2,600	2,250
0.090	0.068	41	2,296	2,925	2,250
0.100	0.050	39	2,300	3,250	2,250

Note: N = 5,000; A = $6.50; I = $0.45
Sampling Inspection = [n.I+ (N-n).p.A.P_a+(N-n).(1-P_a).I]
No Inspection = [N.p.A]
100% Inspection = [N.I]

Detailed information in notes

Typical Structure & Components of a Plot

with emphasis on XY (scatter) Plots

- Figure Number & Figure Title (plot in document)
- Plot Title
- Axis Labels
- Axis Numeric Scale
- Axis Number Format
- Legends
- Plot Symbols and Lines
- Grid Lines (major/minor)

Guidelines include

- Issues and Advice
- Examples

DISPLAYS OF DATA

Guideline for Plots

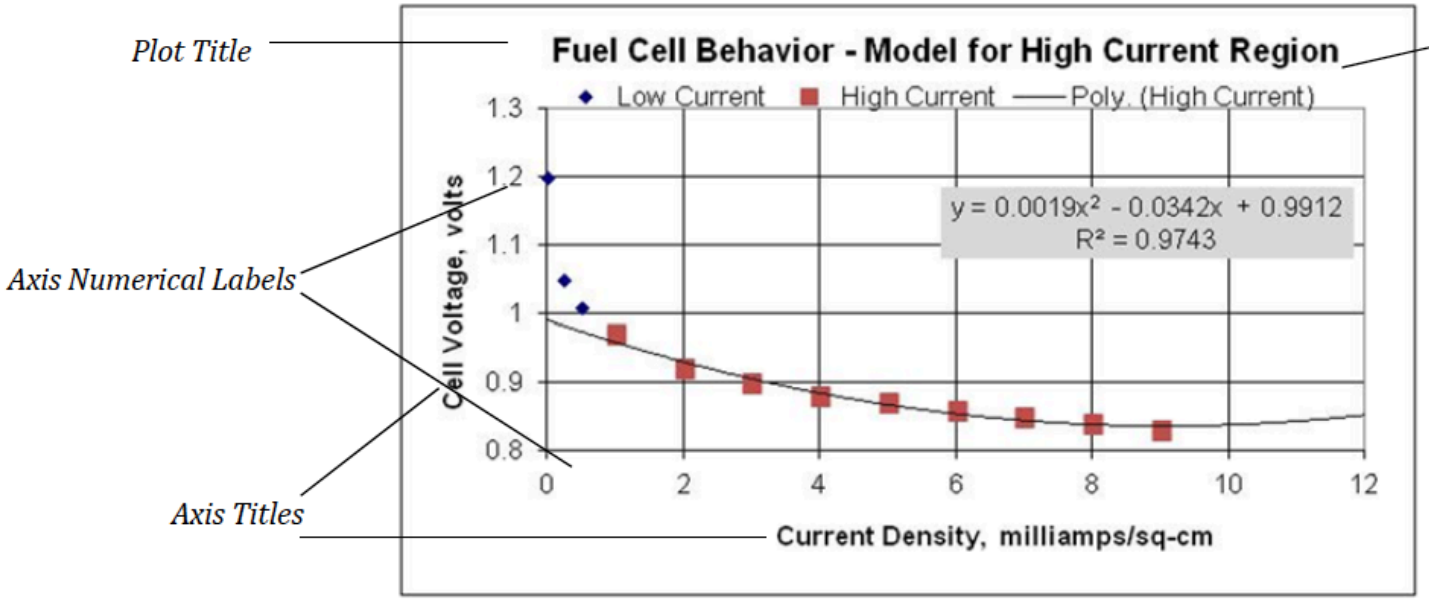

Figure 1 – Example XY Plot

*This plot uses **symbols** to represent the **experimental** values and a **smooth curve** to show values **calculated** from an equation that relates the dependent to the independent variable. Note the intent here is to show contrast between **experimental** and **predicted** values.*

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TAGLIATELA COLLEGE OF ENGINEERING

EASC3345 - APPLIED ENGINEERING STATISTICS
PITCH ASSIGNMENT_1 – RUBRIC

Component	Specification
Written Report (10%)	• Structure your report in a clear, easy to follow format • Use correct statistical terminology • Include data important to your discussion within the text, give complete data information in an appendix with a brief note to that effect in the text • Provide references for the source of any information in your work that is not yours such as data obtained from other sources • Provide your report in one document prepared using word processor software • Prepare all visual data displays included in your submission in Minitab
Memo Format (10%)	• Include the following structure in your memo: o **a heading**: includes the recipient, the sender (author), the subject, and the date o **a summary paragraph**: presents a summary of the entire memorandum, reports the most significant results o **a main body**: provides more detailed results including visual displays o **a concluding paragraph**: includes summary of the major points. o **an appendix**: includes extreme detail such as tables of raw data, the full set of values, etc.
Descriptive Statistics (20%)	• Compute all relevant descriptive statistics • Include computer outputs (if calculated by software) • Include formulas and calculations steps (if calculated manually)
Visual Data Displays (Histogram and Probability Plot) (20%)	• Use clear headings to identify purpose • Label the plot (meaningful title, properly labeled axis including units) • Include meaningful and easy to understand legend if needed • Include a descriptive caption for all visual data display
Probability Calculations (20%)	• Compute all relevant probabilities • Include computer outputs (if calculated by software) • Include formulas and calculations steps (if calculated manually)
Interpretation & Justification (20%)	• Discuss results of your data analysis to formulate a conclusion • Provide appropriate numerical summaries and their discussion • Include appropriate interpretation of visual displays • Justify your explanations through your visual data displays and/or numerical summaries • Specify clearly any assumptions that you make

DISPLAYS OF DATA

Integration into Courses

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EASC1112 - Fuel Cell H2 Storage Project Grading Rubric				
	Possible		Grade	
Memo Format		10		
correctness of writing (English)	4			
Intro paragraph	2			
main body, with discussion	2			
concluding paragraph	2			
Memo Content		25		
Intro Para has results, overview	7			
Discuss results, how done, run time	6			
Discuss tank selection, run time, 3 choices	6			
Reflection on what was learned	6			
Spreadsheet		50		
Heading (author, course, project, date)	5			
Problem statement, diagram	5			
Calculations documented	5			
Input data section clearly shown	5			
uses references to data, rel/abs cell ref's	5			
Calc of hydrogen density & specific volume	5			
flows at peak & avg - mol/s, std & act L/min	5			
Velocity & Re No at 2 to 6 cm diam	5			
Plot - follows guidelines, has both sets	5			
Table of storage volumes	5			
Results		15		
density, spec vol, mole, volume flows	5			
Tank volume calc - correct & copyable	5			
Selection of tank, calc of op time	5			
Final Grade				#####

DISPLAYS OF DATA

Integration into Courses

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DAVID ADAMS

PITCH Consultant

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COPE PRINCIPLES IN ACTION

The COPE Booklet

- *COPE* is an acronym for *Clarity, Organization, Precision and Economy*. Results of faculty/employer/alumni surveys highlighted these qualities as critical and desirable in engineering communication. *COPE: A Technical Writing Guide for Engineers* embodies these qualities in 14 guidelines.

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THE 14 *COPE* GUIDELINES; EACH GUIDELINE INCLUDES EXAMPLES AND REVISIONS

Clarity

- ***C1. Maintain a Flow of Related Words***
- ***C2. Use Parallel Constructions***
- ***C3. Use Pronouns with Care***
- ***C4. Use Consistent Terminology***

Organization

- ***O1. Group and Order Information***
- ***O2. Use Forecast & Echo Structures***
- ***O3. Use Lists and Text Tables***
- ***O4. Design for Complexity & Length***

Precision

- ***P1. Use Exact Terminology***
- ***P2. Use Modifiers with Care***
- ***P3. Fix and Develop the Line of Reasoning***

Economy

- ***E1. Cut Unnecessary Words***
- ***E2. Use Strong Verbs***
- ***E3. Make Good Decisions about Active/Passive Voice***

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A QUICK EXERCISE IN APPLYING A *COPE* GUIDELINE

The handouts include an excerpt from the *COPE* booklet and a brief passage for review and revision. Let's see how you do in a six-minute revision exercise.

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APPLYING THE *COPE* GUIDELINE IN C.1 COULD RESULT IN THE REVISION BELOW

3.0 RESEARCH GOALS AND METHODS

The main premise of this proposal is that, through appropriate implementation of recent advances in information, communication, and computing technologies, it is possible to design more intelligent traffic control. The primary goal of this research is to determine what improvements can be realized if we add speed as a signal control parameters rather than considering speed as a fixed link attribute.

3.0 RESEARCH GOALS AND METHODS

The main premise of this proposal is that it is possible to design more intelligent traffic control through appropriate implementation of recent advances in information, communication, and computing technologies. The primary goal of this research is to determine what improvements can be realized if we add speed as a signal control parameters rather than considering speed as a fixed link attribute.

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EVEN THIS REVISION COULD BE IMPROVED BY APPLYING A COUPLE OF THE ECONOMY GUIDELINES

3.0 RESEARCH GOALS AND METHODS

The main premise of this proposal is that it is possible to design more intelligent traffic control through appropriate implementation of recent advances in information, communication, and computing technologies. The primary goal of this research is to determine what improvements can be realized if we add speed as a signal control parameters rather than considering speed as a fixed link attribute. (61 words)

3.0 RESEARCH GOALS AND METHODS

The main premise of this proposal is that one can design more intelligent traffic control by exploiting recent advances in information, communication, and computing technologies. The primary goal of this research is to determine possible improvements in traffic control by considering speed as a signal control parameter rather than as a fixed link attribute. (54 words).

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CLARITY: A COPE TUTORIAL

C.1 Maintain a Flow of Related Words

Narrated by Prof. Nadiye Erdil

(Click on each slide to advance to the next.)

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PLACE SUBJECTS AND VERBS IN PROXIMITY

- You can add clarity to your writing if you avoid putting a large number of words between the subject and verb. The passage that follows violates this guideline. We highlight the problem and then show you how you might revise the passage.

HERE IS A PASSAGE THAT VIOLATES THIS GUIDELINE

Here is the original version.

- A synthetic bone material, in order to withstand a load equal to or greater than that of the bone being replaced, must have mechanical properties that mimic the function and ability of human bone tissue.

Here is the problem.

- A synthetic bone material **in order to withstand a load equal to or greater than that of the bone being replaced**, must have mechanical properties that mimic the function and ability of human bone tissue.

HERE IS ONE WAY TO FIX THE PROBLEM

So turn this sentence…

- A synthetic bone material **in order to withstand a load equal to or greater than that of the bone being replaced**, must possess mechanical properties that mimic the function and ability of human bone tissue.

Into this sentence

- **In order to withstand a load equal to or greater than that of the bone being replaced,** a synthetic bone material *[subject]* must possess *[verb]* mechanical properties that mimic the function and ability of human bone tissue.

HERE IS ANOTHER WAY TO FIX THE PROBLEM

A second possible revision…

- A synthetic bone material *[subject]* must possess *[verb]* mechanical properties that mimic the function and ability of human bone tissue **in order to withstand a load equal to or greater than that of the bone being replaced.**

But does this revision really provide greater clarity?

This version does bring the subject and verb close together, but moving the modifying phrase to the very end makes it harder to link the subject and the load requirement.

IN SUMMARY…

- Writers must often consider the order of words in a sentence. A poor choice in that regard can complicate a reader's ability to follow the precise meaning in a passage.
- If word order in a sentence is unclear, readers may try to mentally rearrange the ideas (which is really the writer's job), or they might just miss some important relationship. When such issues show up repeatedly in a longer report, they really make the readers' task more difficult and may even discourage or annoy them.
- Following this guideline is a matter of recognizing patterns of words, and choosing the pattern that makes the passage clear. Engineers are supposed to be good at pattern recognition, so this guideline should be easy to follow.

SAMUEL DANIELS

Associate Professor of Mechanical Engineering

Tagliatela College of Engineering

University of New Haven

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LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines

- 3rd Year Lab Reports: A work in progress.
- Process
  - Faculty from chemical, civil, mechanical, systems, electrical, and computer engineering and physics are developing a common structure for 3rd year lab reports
  - Each discipline will develop supporting documents matching common structure maintaining consistency across disciplines

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LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines: Current Status

- Common lab report format – Completed (See handout)
- Supporting documents (discipline specific)
  - Assignments sheets – Next step, Fall term
  - Grading rubrics
  - Advice tables
  - Annotated "Model" reports for students

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- Presumption: Engineering disciplines do NOT have a common lab report format.
  - Different types of documents
    - Hypothesis testing
    - Project Reports
    - System Design
    - Data Analysis
  - Different Content Areas
    - Executive Summaries
    - Letters of Transmittal
    - Abstracts, Methods & Materials, Equipment List, …
- Goal: Unify reporting format with optional sections selected for each type of document needed.

LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines: Process Steps Followed

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LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines: Process Steps

1. Instructors for 3rd Year lab/design courses ***selected*** to form the team.
2. Propose common lab report components making inclusion in specific report format optional.
3. Characterize each lab component collectively to share among disciplines and establish common language.
4. Build agreement on which components fit into three standard report categories:
   - Data acquisition & Analysis
   - Project or System Design
   - Hypothesis Testing

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- Meeting were ALL "Face to Face"
- A respected Arbiter resolves differences
- Include Physics & Chemistry!!
- Be prepared for LONG discussions
- Build understanding of different views of what each component is.

- Excerpts, Executive Summary discussions

- Difficulty Scheduling – "Coffin nails"

LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines

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LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines

Would you use the lab report sections in your 3rd year courses?			
Sections	ME, CE, ChemE	EE, CPE, SYS	SYS, PHYSICS
Letter of Transmittal	✓	✓	✓
Cover Page	✓	✓	✓
Abstract	✓	✓	✓
Table of Contents	✓	✓	✓
Executive Summary	✓	✓	✓
Introduction	✓	✓	✓
Literature Review	✓	✓	✓
Methods and Materials	✓	✓	✓
Data and Results	✓	✓	✓
Discussion	✓	✓	✓
Works Cited	✓	✓	✓
Appendices	✓	✓	✓

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LABORATORY REPORTS IN 3RD YEAR COURSES

Building Consensus for Common Guidelines: Next Steps

- The "common" lab report format handout includes a description of each section.
- Continue lab report team meetings to develop:
  - Assignments sheets
  - Grading rubrics
  - Advice tables
  - Annotated "model" reports for students
- Maintain communication to assure a common presentation to students. These are "College" standards.
- QUESTIONS?

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DAVID HARDING

Professor of Chemical Engineering

Tagliatela College of Engineering

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PITCH IN SENIOR DESIGN

Overview of PITCH elements in the senior design sequence.

- Five PITCH elements in the senior design sequence
- Three unique PITCH elements in senior design

- Design Proposal
- Design Poster
- Design Report
- Progress Reports
- Oral Presentations

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- Letter of Transmittal
- Title Page
- Table of Contents
- Project Summary/Executive Summary
- Project Description/ Problem Statement
- Project Goals
- Literature Search and Patent Search
- Project Design
- Work Plan
- Cost
- Team Qualifications
- References
- Appendices

DESIGN PROPOSAL DOCUMENT

Overview of the Design Proposal Document

- Design proposal elements
- Design proposal guidelines

These major Design Proposal elements have been agreed upon

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1. Technical Communication Products:

a) Plan, design and produce letters, and formal reports (proposals).

2. Technical Communication Habits:

a) Use appropriate format and content;

b) Exhibit clear, precise and logical expression;

c) Demonstrate appropriate organization, level of detail, style and tone for a given audience, situation and purpose;

d) Demonstrate appropriate syntax and correct usage of grammar and spelling;

e) Highlight or identify critical information;

h) Work effectively to produce multi-author communications.

PITCH OUTCOMES

PITCH Outcomes in Design Proposal

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- Development of design proposal guidelines
- Initial outline with possible elements provided by David Adams – summer 2013
- Initial meeting with representatives from each program – August 2013
- Draft TCoE design proposal guidelines
- Second meeting with representatives from each program – October 2013
- Second draft TCoE design proposal guidelines
- Third meeting with representatives from most programs – November 2013
- Final draft TCoE design proposal guidelines

DEVELOPMENT OF THE DESIGN PROPOSAL GUIDELINES

Process of development of design proposal

Built consensus to develop a common document for use by seven programs

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- Design Proposal Guidelines
  - Final guidelines, implement fall 2014
  - Advice table and grading rubrics under development (12/14)
- Poster Presentations
  - Guidelines and grading rubric being revised
  - Advise table under development (5/15)
- Design Reports
  - Beginning process to build consensus
  - Development of common guidelines
  - Advice table and grading rubrics to be developed

PITCH IN SENIOR DESIGN

Status report for the three distinct PITCH elements related to the Senior Design Sequence

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PITCH IN SENIOR DESIGN

PITCH Elements in the Senior Design Sequence by Program

	Proposal	Status Reports	Final Project Report	Poster	Oral Presentation
Chemical Engineering	1	2	1	1	1
Civil Engineering	1		1	1	1
Computer Engineering	1	2	1	1	1
Electrical Engineering	1	2	1	1	1
Mechanical Engineering	[1]	6	1	1	2
System Engineering	1		1	(1)	1
Computer Science	Vision Statement	Documentation - UML	Users Manual	1	Proof of Concept

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PITCH URL

www.newhaven.edu/engineering/PITCH/

- Student Resources: Contains advice tables and guidelines
- Faculty Resources: Contains this presentation and some other links

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- Jean Nocito-Gobel [jnocitogobel]
- Mike Collura [mcollura]
- Nadiye Erdil [nerdil]
- David Adams: djadams46@att.net
- Sam Daniels [sdaniels]
- David Harding [dharding]

PITCH CONTACTS

Please contact workshop presenters for further information about PITCH, its design, its implementation, and all the speed bumps along the way.

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ACKNOWLEDGEMENTS

The Davis Educational Foundation funded the development and implementation of PITCH at the University of New Haven

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QUESTIONS?

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