About working in groups & writing

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http://rotorlab.tamu.edu/me489
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Today: Writing and Group Work

Is working in groups important?
About writing & writing mathematics

Team Hoof Hearted: Sewage Energy

Reading & other assignments:
Assign 2: The future of education

Other: complete ONE MINUTE PAPER
Schedule group presentations

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Tuesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>The Alphas</td>
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<tr>
<td>Team Hoof-Hearted</td>
<td>today</td>
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<tr>
<td>Team RamRod</td>
<td>Sep 27</td>
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<tr>
<td>Prestige World Wide</td>
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<td>Oct 4</td>
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<td>Dynamics</td>
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<td>Globogym</td>
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<td>Lobster Golf</td>
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- Select ONE EW, listen and discuss as a group
- Group prepares presentation (15 slides max) for (max 15 min) +discussion in class
- Play EW and lead discussion in class

Note: MUST reference all material copied from URLs, journals, textbooks, etc

EW: engineeringworks.tamu.edu
# Schedule Practicing Engineers

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>Sept 13 (T)</td>
<td>Ash Maruyama (Sulzer Turbo)</td>
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<tr>
<td>Sept 22 (R)</td>
<td>Melissa Wilcox &amp; Chris Kulhanek (SWRI)</td>
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<tr>
<td>Sep 29 (R)</td>
<td>Shanna Simmons (Shell)</td>
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<td>Oct 6 (R)</td>
<td>Chad Baker, Randy Williams, Arian Vistamehr (UTGS)</td>
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<tr>
<td>Oct 18 (T)</td>
<td>Sungtae Shin (class TA)</td>
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<td>Oct 27 (R)</td>
<td>Jeff Moore &amp; Dave Ransom (SWRI)</td>
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<tr>
<td>Nov 3 (R)</td>
<td>Murali Chinta, (FMCT)</td>
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<td>Nov 10 (R)</td>
<td>Karl Wygnant (Samsung)</td>
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<tr>
<td>Nov 17 (R)</td>
<td>Dustin Pavelek (Kelm Engineering, LLC)</td>
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All confirmed
Prepare yourself

The top 10

1. Poor planning on one’s part does not constitute automatic emergency from others
2. Know corporate structure + follow chain of command
3. The inquisitive idiot: must ask, but think first
4. Own your project or assignment: anticipate needs
5. Less is more: work smarter, not harder
6. The enemy of good is perfect: learn when to stop
7. Keep a paper trail, write more and write well, It is not what you know, it is what you can prove
8. Leave work at work
9 Mistakes are inevitable: GIGO
10. Save money early, pace yourself

Ash Maruyama (Sulzer Turbo) Sept 13
Material for your own education

The Unwritten Laws of Engineering

1. What the Beginner Needs to Learn at Once
2. Relating Chiefly to Engineering Managers
3. Professional and Personal Considerations

TIMELESS ADVICE FOR ENGINEERS

The Unwritten Laws of Engineering by W. J. King was first published in 1944 as three articles in Mechanical Engineering magazine. It has been in print as a book ever since, becoming a classic of engineering literature. Recent editions, including a trade version, The Unwritten Laws of Business, have revisions and additions by James G. Skakoon. Mechanical Engineering magazine is excerpting laws from the book, presented in three articles just as in 1944, with comments from contemporary authorities.

Published as a three part series in ASME Magazine (October, November and December 2010 Issues)

http://memagazine.asme.org/Articles/
Working in groups

Responses to the December Question of the Month: How often do you work with cross-disciplinary engineering teams?

The majority of readers—62 percent—said they work every day with colleagues who are not mechanical engineers. As for the success of these types of teams, one reader wrote, “It all depends on communication. If the team members communicate, there is a much higher probability of success. However, another issue is to remember that not everyone on the cross-disciplinary team has a good understanding of the work done by the other members. It is important for each member to have a basic idea of what each discipline does and contributes to the project.” Another reader noted that cross-disciplinary teams can be very effective, “especially when technical personnel who are not engineers are involved. Often, skilled trades individuals offer surprising insights into new solutions.”

The next Question of the Month will be posted Jan. 2.
Fact #1 As each bird flaps its wings, it creates uplift for the bird following. By flying in a "V" formation, the whole flock adds 71% greater flying range than if one bird flew alone.

Lesson Learned People who share a common direction and sense of community can get where they are going quicker and easier because they are traveling on the strength of one another.

Fact #2 Whenever a goose falls out of formation, it suddenly feels the drag and resistance of trying to fly alone and quickly gets back into formation to take advantage of the lifting power of the bird immediately in front.

Lesson Learned If we have as much sense as geese, we will stay in formation with those who are ahead of where we want to go and be willing to accept their help as well as give ours to others.
Teambuilding Lessons Learned From Geese

Fact #3 When the lead goose gets tired, it rotates back into the formation and another goose flies at the point position.

Lesson Learned It pays to take turns doing the hard tasks and sharing leadership.

Fact #4 The geese in formation honk from behind to encourage those up front to keep up their speed.

Lesson Learned We need to make sure our honking from behind is encouraging, and not something else.
Fact #5 When a goose gets sick or wounded or shot down, two geese drop out of formation and follow it down to help and protect it. They stay with it until it is able to fly again, or dies. Then they launch out on their own, with another formation, or they catch up with their flock.

Lesson Learned If we have as much sense as geese do, we too, will stand by each other in difficult times as well as when we are strong.

Are there any other team building lessons from nature?
US practicing engineers spend a fair amount of their work time \((25\% \text{ to } 40\%)\) documenting their work. Documentation includes preparing reviews of material (test data and predictions from models), assessing prototypes and troubleshooting hardware; and most importantly, compiling (writing) technical reports or memoranda for customers, upper management, etc.

How to Write a Technical Memorandum

A general format to present your technical work
“Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should not have unnecessary lines and a machine no unnecessary parts. This requires NOT that the writer makes all his sentences short, or that he avoids all detail and treats his subjects only in outline, but that every word tells.”

**ASME:** Technical reports and essays AVOID

a) WRITING in first person

b) PASSIVE voice (poor English)
Words from Sir Francis Bacon

Reading maketh a full man.
Conference a ready man, and
Writing an exact man

Thoughts to ponder? What is their meaning?

English author, courtier, & philosopher;
advocate of inductive reasoning in science;
wrote "Advancement of Learning" 1605, "Novum Organum" 1620, "New Atlantis" 1627
Bacon (1600’s)

“Reading maketh a full man. Conference a ready man, and Writing an exact man”

To achieve knowledge (no just facts or information), one must **know the past**, i.e. read what has been done before to have a perspective (working knowledge) of the progress made.

**Work the present**, i.e. be able to discuss the subject with others. Be able to reproduce past knowledge with a sincere acknowledgment of the limitations on the current state-of-art.

**Write** about the subject incorporating your knowledge and point of view into the history of the device or problem studied. Only writing allows you to comprehend the totality of a subject and its full scope or purpose within the sciences. **Writing allows you to predict the future with full conviction of the past!**
Writing mathematics

To share your ideas with people who may be not physically present, you have to write them down. **Mathematical ideas have to be written using mathematics.** Just as English prose is needed for writing in subjects other than English, mathematical writing is needed for writing in any subject where mathematical ideas or models are used. Scientists, **engineers**, and some social scientists have to write mathematics.

Every year, we buy ten cases of paper at $35 each; and every year we sell them for about $1 million each. Writing well is very important to us.
- Bill Browning, President of Applied Mathematics, Inc. (MATLAB)

Source: [http://www.math.unl.edu/~gledder/PeerReview/Writing.htm](http://www.math.unl.edu/~gledder/PeerReview/Writing.htm)
Writing mathematics

Source: http://www.math.unl.edu/~gledder/PeerReview/Writing.htm

Your mathematical work should be embedded in a narrative
Good mathematical writing must be self contained.

Know your audience
Generally it is best to focus on the problem statement, description of methods, and explanation of results rather than on the details of the calculations.

Organize your writing carefully
Any paper longer than one page should be divided into sections with descriptive headings.

Use active language and the present tense
Write about the problem and its analysis, not the history of your work on it.

Practice with a Technical Memorandum
Writing: about assumptions

“How should I decide which ones to make?”
“How much are we allowed to assume?”

Stating assumptions can be arduous, seemingly endless. Nonetheless the work must be done! In a University, usually your teacher states the facts (assumptions) for a closed problem.

However, in my experience, the more detailed the assumptions are, the more you and others can gauge the accuracy of a result. In essence, knowledge of what is missing or assumed usually points out to the differences between real life (actual application) and a prediction (numbers).
About writing

Need good resources/examples of how to write technical memos/reports and/or lab reports

Please visit TAMU Writing Center: Business & Professional Writing

http://writingcenter.tamu.edu/c/how-to/business/

Includes CVs, Memos, Executive Summaries, Lab reports, etc
How to communicate in words

The qualities of a good technical report

A technical report must be

a) interesting,

b) with a clear narrative from the introduction, through the work carried out to a clear expression of substantial conclusions and recommendations,

c) of sufficient significance and relevance to the professional community that it will be referred to and used by other workers in the field.

Read/practice document “The qualities of a good technical report”. Posted on course URL site
When writing a tech report for an experiment you performed, how can you avoid both 1st person and passive voices?

Examples:

“We measured…” Active but 1st person

“…. was measured” Third person but passive
Avoiding passive voice

AWFUL

*We* measured the temperatures at the inlet and exhaust of the engine..

Inlet and exhaust engine temperatures *were* measured....

BETTER

*During the experiments,* thermocouples recorded temperatures at the inlet and exhaust of the engine....
AWFUL

Bearing loads were reported by Authors () …….

The loads were shown to decrease with increasing rotor speeds…..

The results are shown in Figure X

To improve the accuracy, Authors () introduced a 3 control volume method to calculate bearing forces

BETTER

Authors () report(ed) loads for various test bearings

The experimental results show the bearing loads decrease as rotor speed increases

Figure X depicts the results

Authors () introduced a three control volume method to predict more accurately bearing forces as a function of…
What are the most important things to remember when giving a presentation in industry + (stockholders and CEOS)? Is it OK a little humor? OK to use lots of visual & pictures?

Humor is always welcome (breaks the ice).

Good Visual output (beautiful & simple, complete yet concise). Show that you care!

DO NOT show equations (no differential eqs. or lengthy formulas) or too busy graphs and tables (no more than 2 graphs, each with no more than three curves)

+++

MUST DELIVER a CLEAR MESSAGE!
Questions

How to relay highly technical information to an audience w/o a technical background?

Make it interesting and relevant to the audience. Avoid equations. Pictures and simple graphs help.

Know your audience and keep it short & concise.

Use Kawasaki’s rule
10 slides - 20 minutes - 30 size font
Let’s be more proactive!

Tell me (and the class) what you are already doing to improve your soft skills, including ethical and professional issues, multiculturalism, etc.

We are in this together!

Prediction is very difficult, specially about the future. N. Bohr

The best way to predict the future is to invent it. A. Kay
Questions?

Next lecture

About ethics & professional integrity in academia and engineering practice