Lecture 4
Engineering - What You Don’t Necessarily Learn in School

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http://rotorlab.tamu.edu/me489

September 8, 2011
**Lecture 4**

**Date:** September 8, 2011

**Today:** *What you don’t learn in engineering school*

**How to be a successful engineer:**
12 tracts + four Es + attitude.
Myths on career development. Differences b/w academia and industry

**Reading & other assignments:**
Listen to a few [http://engineeringworks.tamu.edu](http://engineeringworks.tamu.edu)

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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<td>Sep 15 15</td>
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<tr>
<td>Team Hoof-Hearted</td>
<td>Sep 20</td>
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<td>Team RamRod</td>
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<td>Sep 13 13</td>
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<td>Prestige World Wide</td>
<td>Sep 13</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
Assignment 1


Assignment:
what is the issue or issues that impacted you more?
How to embrace the needs of an engineering career?

400 word essay

http://www.asme.org/publication.htm
Engineering – What You Don’t Necessarily Learn in School

David Wisler, PhD, NAE

Aerospace Engineering:
BS - Penn State, MS - Cornell, Ph.D.-University of Colorado

1. 38 years at GE; created GE – University Strategic Alliance
2. ASME Fellow, AIAA Fellow
3. Chair IGTI (ASME Intern. Gas Turbine Inst.)
4. ASME Sr. Vice President
5. Editor ASME J of Turbomachinery
6. **Three Melville Medals**: the highest ASME honor for best original paper
7. At MIT since 2008: promoting initiative to reform engineering education worldwide

MEET THE AUTHOR  http://www.davewisler.com/

Copied from Description for Keynote Speakers – Turbo Expo 2009
Engineering – What You Don’t Necessarily Learn in School

David Wisler, PhD, NAE

At MIT founder of [http://www.cdio.org/](http://www.cdio.org/)

The CDIO acronym stands for:

Conceive, Design, Implement & Operate

A new approach to engineering education

davewisler@mac.com

MEET THE AUTHOR

Copied from D Wisler URL site
1. learn to be business oriented;
2. expect tough, multi-disciplinary problems;
3. learn to work and network in the new multi-cultural and multi-national environment;
4. understand the differences between academe and industry;
5. learn to differentiate all over again;
6. understand the values and culture of their particular company or organization;
7. be open to ideas from everywhere;
8. have unyielding integrity;
9. make their manager a success;
10. support their university and technical society;
11. have fun; and
12. manage their careers.

1. Do a good job and the Company will “take care of you”, or better yet, “take care of you for life.”
2. It’s not what you know, but whom you know that counts.
3. Career planning is my manager’s job.
5. You only get ahead if you work in the current “high visibility” area.
6. I would rather be lucky than good.
7. Just tell me the career path I need to be on to reach my goal.

Manage your career: control your own destiny!
How to: Capture the four E’s

**ENERGY:** demonstrate high energy levels and enthusiasm at work. You are a dynamo who accomplishes things

**ENERGIZE:** Be able to energize others around common goals. Your enthusiasm is contagious.

**EDGE:** Have discernable characteristics that separate you from others in measurable, favorable ways. You can make though yes- and –no decisions.

**EXECUTE:** You consistently deliver on your promises. It is not that you do not never make mistakes or take risks. Overwhelmingly you deliver!

In real estate transactions, there are three + things people consider about buying a piece of property — **location, location, location.**

In your engineering career, there are likewise three important things people will notice about you — **attitude, attitude, attitude.**  
Nourish a **positive, can-do attitude.** It is an important key to success. There are few things, aside from downright incompetence, that can hinder you as rapidly as a bad attitude.

**Recruiters look for a positive attitude + communication skills + experience as a team player + plus professional integrity (grades matter little?)**

The four E’s, a + attitude, and actively controlling your career destiny will not guarantee a successful career, but will put you ahead of the game!
Insights from Leftovers

As competition for jobs in the world market increases, there will be engineers who find jobs and those who make (create) jobs. Innovation required!

The new breed of engineer must possess a broader understanding of the big picture (creativity, economics and the ability to work with others).
Learning all of the technical information and non-technical skills in four or even six years is impractical. ... It would be beneficial for universities to better prepare students with a general knowledge that will best support their job duties and for industry to provide the new hire with specific training prior to “throwing them into the deep end.”

Teams produce better results than individuals, so working more effectively on teams will maintain (increase) our value. Therefore, our soft skills will make the hard cash!
Insights from Gilligan’s Blade

Business skills and awareness, along with teamwork skills, ensure engineering success.

It is important to ask ourselves whether or not what we are doing satisfies the needs of a customer and whether or not it is a useful thing.
Insights from Team Alpha

... in a global marketplace, we could study abroad to adopt to other cultures and learn to communicate effectively across cultural and global barriers.

Be the guy/gal who can do a lot with a little!
Technology grows at an exponential rate … engineers are left with no option but to adapt to new technologies or become outdated.

Networking is vital!

Who you know or what you know? A myth

SPRING 2011
Insights from Classic Style

Knowing that we all need to work towards career advancement instead of relying on others makes it a whole different ballgame.

We should have fun with our job, while most educators, especially before college, seem to detest even the thought of encouraging happiness!

Nothing is fun until you’re good at it,
“Battle Hymn of the Tiger Mother,”
Amy Chua, 2010

SPRING 2011
Insights from Last Pick

Modern engineers must strive to add value to themselves whenever an opportunity arises. A smile and pleasant attitude are an easy way to enhance a career.

Address the person before the problem

if you have fun and love what you do, you will never work a day in your life.

SPRING 2011
### Differences: University & Industry

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<th>University</th>
<th>Industry</th>
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<tr>
<td>1. More individual oriented</td>
<td>1. More team oriented</td>
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<tr>
<td>2. Is it original work?</td>
<td>2. Can we leverage existing work?</td>
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<tr>
<td>3. Does it contribute to science?</td>
<td>3. Does it contribute to the business?</td>
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<tr>
<td>4. Will it make archival publication?</td>
<td>4. Will it make it into production?</td>
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<td>5. Is it interesting to do?</td>
<td>5. Is it worthwhile financially?</td>
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<th>Industry</th>
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<td>6. Develop the equations, analysis, etc. from first principles</td>
<td>6. Fit a curve through the data and/or anchor the existing analysis</td>
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<tr>
<td>7. Is it original and complete from scientific (physics) perspective?</td>
<td>7. Is it institutionalized into the system from an engineering perspective?</td>
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<tr>
<td>8. Graduate when thesis finished</td>
<td>8. Meet schedule and budget</td>
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<tr>
<td>9. Publish, publish (or perish)</td>
<td>9. Customer, customer, customer</td>
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## Differences: University & Industry

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<th>Industry</th>
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<tr>
<td>10. Sound scientific process</td>
<td>10. Design practices, templates</td>
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<td>11. Non-profit institution</td>
<td>11. Profit institution</td>
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<tr>
<td>12. Solve roadblock issues as they occur</td>
<td>12. Identify &amp; manage risks carefully up front with risk abatement plan &amp; critical path scheduling</td>
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<td>13. Professors (especially tenured) are independent</td>
<td>13. Formal management process up to shareholders</td>
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Insights...from past students

We must admit that present (eng) curricula are unsatisfactory, and have to change classroom assignments to ready for adjust in industry ..... Engineers have moved to become problem solvers, innovators, leaders and team players. 

**A company life cycle depends on technology enablers:** its engineers
Tools have changed, processes evolved and yet eng. students are still faced with learning the basics.......The necessary broad education is learnt (the hard way) in the first days at work; most of the times following a strong cultural shock

Understanding the workplace does no end with one’s company, but also extends into being aware of global events in the world market.
For starters, step out of the ME department and learn relevant knowledge from beyond the scope of engineering. Expanding one’s horizon will boost one’s standing in his field of work…..

Learning is never limited to the classroom; constant self improvement is necessary to stay competitive.
… it comes back to our desire for self-improvement. **After all, no success can come without hard work.** Hence, we ought to **get out of our comfort zone** and be more **pro-active in acquiring the skills and mindset** to embrace the needs of a modern engineering career.
Engineers must have dedication and passion. Not only do they envision, design, develop, and support new products and services, but they also make sure that every minor detail is in place, such as staying within budget and being on schedule.....

The only constant is change

A change is needed and we can be the catalysts for its ignition!
Insights from Singapore

.. must realise that this article is taken from United States, therefore issues addressed are mostly directed to the US context. However, we cannot deny that these are extremely relevant to Singapore too.

As Singaporeans are generally individualistic as trained in a competitive education environment from a young age, students will find it difficult to adapt in the working industry.
As Asians, we tend to be more conservative and reserved. To break from this convention, we must become more vocal and constructive during tutorial discussions. Schools should also encourage their students to participate more in oral presentations.
Engineering in South Korea

**Strengths:**
- Better relationship (long term includes social)
- Job security (stability encourages + attitude)
- Cheaper labor (than in other developed hubs)
- Team players (background in military helps)

**Weaknesses:**
- Communication skills (English)
- Less job mobility
- Cultural limitations (unique)
- No old hands:
  MOST ENGINEERS transition to managers when they become OLD
- Low wages (pay) detract bright students to become engineers

are good engineers good managers?
Questions?

Next lecture
Communication skills
Writing technical memoranda in engineering practice