Lecture 27
The ideal engineering prof. & open access (+/-)

Luis San Andres

December 6, 2011
<table>
<thead>
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<th>Date: December 6, 2011</th>
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<td>Today: CLOSURE</td>
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<tr>
<td>Discussion <strong>On Open Access &amp; Science for the commons</strong></td>
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<td>The ideal engineering professor</td>
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<td>Course survey of outcomes</td>
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<td>The modern engineer: <strong>what you need to know</strong></td>
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<tr>
<td>Other: <strong>Fill in ONE MINUTE PAPER – ONE LAST TIME</strong></td>
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</table>
How is school preparing you?

Your success in engineering school also depends on your teachers (faculty).

What are the attributes of the ideal engineering professor?
The ideal engineer professor

Individual attributes, attitudes & personal skills

- Genuinely interested in producing educated and successful engineers
- Demonstrates a responsibility for his/her students’ growth, both in school and out
- Enthusiastic about teaching and demonstrates it
- Wants to teach (and can!) more than do research; focuses on teaching
- Cares about students’ learning (exercises patience and respects students)
- Cares about students as people with lives; friendly towards students
- Have realistic performance expectations
- Build a trust relationship with students
- Interacts well with students, approachable; enjoys the interaction

300+ students

Compilation by Prof. R.M. Alexander at TAMU MEEN 381 (April 2006)
The ideal engineer professor

Individual attributes, attitudes & personal skills

- Organized; well-structured instruction
- Delivers information in an interactive, compelling manner
- Motivates students
- Answers questions without demeaning or ridiculing students
- Dedicates time for students outside of class (office hours, help sessions, etc)
- Laid back personally, yet academically challenging (but fair & reasonable)
- Be willing to admit mistakes
- Possesses the highest degree of integrity and character

Compilation by Prof. R.M. Alexander at TAMU MEEN 381 (April 2006)
The ideal engineer professor

Mechanics & logistics of teaching

- Be prepared for lecture; lectures follow a logical sequence
- Be on time to class & dismiss class on time (respect student’s time)
- Assure usefulness and learning content of assigned work
- Return graded work in a timely way (important for frequent feedback to students)
- Maintain control of class
- Appropriate use of humor and “entertainment” approach fosters student engagement
- Conduct class in an interactive and engaging manner
- Design good tests and exams over the material covered—no tricks or new material

Compilation by Prof. R.M. Alexander at TAMU MEEN 381 (April 2006)
The ideal engineer professor

Communication skills

• Effective verbal communication requires the faculty to speak English proficiently (mentioned by almost every student)
• Clear and effective written communication (including legible handwriting) is critical for class notes, assignments, exams, etc
• Clearly convey ideas & concepts
• Use multiple ways to convey information
• Thoroughly explain theory with applications – after all, this is engineering
• Relate to the real world through engineering applications
• Use illustrations that are familiar to the students
• No “death by Power Point” lectures
• Emphasize learning, rather than “rote” training (memorization)

Compilation by Prof. R.M. Alexander at TAMU MEEN 381 (April 2006)
The ideal engineer professor

Engineering Experience & Knowledge

• Faculty should have engineering experience in industry
• Utilize that experience to motivate and provide illustrations to the students
• Use the classroom (and lab) as opportunities to discuss research activity; this would help students understand the value of research in your field

• Faculty should be knowledgeable and up to date in his/her field
• Faculty should also have a reasonable breadth of engineering knowledge
• Possess a thorough understanding rather than a memorized, regurgitated approach
How many of your teachers fit closely the students’ ideal profile?
Discussion: Open Access?

90+% of group presentations relied on web content, w/o access to traditional sources such books, journals, newspapers, etc.

For the generation that created Wikipedia, Facebook and YouTube, it is natural to post ideas and data online in order to share them – it’s faster and universally available.

The Internet has changed the way people connect and communicate. The web has also changed the way science is made; it is faster and feverish.

Discussion: Open Access?

Should knowledge be free and immediately available?

What is the impact of open access on the media, the public and public policy?

What are the advantages / disadvantages of universal (open) access to information & knowledge?

Discussion: Open Access?

What is the impact of OA on your BS education and competitive advantage? What about the impact of OA on students from other (poor) countries?

What will Open Access due to our knowledge-base technical society?
Will OA enable the less advantaged to come up to speed?
Will the playing field be leveled for all societies?

We are already seen the consequences of matching LOW COST manufacturing + the INTERNET (knowledge)…..

Is Science to become a “shared intellectual commons?” Will Science flourish with more adepts and practitioners or will there be dangers on its misuse and its exploitation?

Will printed journals disappear (subscription model)? Is it the end of peer review (quality control)? Will plagiarism become more rampant?
Open Access resources

Science in the 21th century will be vandalized and common, and better for it. Quinn Norton, SEED, December 2006

http://grade guru.com Notes sharing by students, for students

http://ocwconsortium.org/ Open Course Ware Consortium

http://ocw.mit.edu Open Course Ware MIT

http://www.khanacademy.org/ Free Education for all!

Dr. San Andres URL posts all his engineering class notes and research technical presentations
Lecture 27
Closure

Luis San Andres
December 6, 2011
Modern Engineering Needs

National Academy of Engineering (NAE) 2007

Vision 2020:
To enhance the nation's economic productivity and improve the quality of life worldwide, engineering education in the US must anticipate and adapt to the dramatic changes of engineering practice.

Besides the necessary technical skills, what else is needed from US engineers?
ABET Engineering Criteria 2000: Outcomes (a-k)

Upon graduation students must demonstrate an ability to

a) Apply knowledge of mathematics, science and engineering
b) Design and construct experiments, as well as to analyze and interpret data
c) Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d) Function on multi-disciplinary teams
e) Identify, formulate and solve engineering problems
f) Understanding of professional and ethical responsibility
g) Communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) Recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Qualities of modern engineer
This class was about:

An Introduction to the practices of modern engineering:

a) application of the sciences (mathematics and physics) and engineering principles to satisfy needs, and

b) other tracts that will ensure the engineer’s survival and continued success in the profession
What were the expectations?

Will learn the various skills that an engineer exercises daily in his/her work, the dos & don’ts of practical engineering, the competitive advantages that will keep you ahead.

How to learn to be an active learner
How to respect & protect intellectual property
Management: time, schedules, resources & own career

Team player: how to work & how to communicate with others

Responsibility own & world (global village), ethics and safety

Innovation how to learn it, how to practice it.
What is expected from someone who has just earned a B.S. in Mechanical Engineering?

“Obviously, a recent B.S should master a body of knowledge.

But we should also expect him/her to apply that knowledge with some measure of judgment.”
What is needed?

What are some of the qualities that companies and employers look for when recruiting YOUNG engineers?

D. Wisler in his article (Lecture 1) writes:

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

In your eng 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
<table>
<thead>
<tr>
<th>Class Outcomes</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Somewhat Satisfied</th>
<th>Dissatisfied</th>
<th>N/A</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Help students to realign their thinking and learning processes by having a vision of real engineering work</td>
<td>26</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>2 Facilitate the exploration of a topic of mutual interest by students and lecturer</td>
<td>24</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Provide a platform for students to engage in in-depth discussion on a specific (scientific) issue and to present their ideas clearly in oral and written form</td>
<td>20</td>
<td>11</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Offer students a diversity of scientific topics to choose from, exposing them to areas that they may otherwise not have the chance to experience</td>
<td>29</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Establish a rapport between lecturer and students, creating opportunities for mentorship in the students’ later UG years and beyond</td>
<td>20</td>
<td>13</td>
<td>1</td>
<td></td>
<td></td>
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</table>
## Class outcomes - evaluation

<table>
<thead>
<tr>
<th>Class Outcomes</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Somewhat Satisfied</th>
<th>Dissatisfied</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help students to realign their thinking and learning processes by having a vision of real engineering work</td>
<td>76%</td>
<td>24%</td>
<td>0%</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>Facilitate the exploration of a topic of mutual interest by students and lecturer</td>
<td>71%</td>
<td>29%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide a platform for students to engage in in-depth discussion on a specific (scientific) issue and to present their ideas clearly in oral and written form</td>
<td>59%</td>
<td>32%</td>
<td>9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer students a diversity of scientific topics to choose from, exposing them to areas that they may otherwise not have the chance to experience</td>
<td>85%</td>
<td>12%</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish a rapport between lecturer and students, creating opportunities for mentorship in the students' later UG years and beyond</td>
<td>59%</td>
<td>38%</td>
<td>3%</td>
<td></td>
<td></td>
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</tbody>
</table>
Vision EC 2020: Skills to succeed

• Prepared for global competency
• Superb communication skills (written & oral)
• Trained in teams that work and deliver
• Ready for open-ended multidisciplinary problems with no unique answer
• Ready for innovation and to embrace change
• Show absolute professional integrity

• DO MORE WITH LESS
• DO THINGS RIGHT THE FIRST TIME
Thanks to

For their hard work and cooperation.
See class feedback (recommendations) at [http://rotorlab.tamu.edu/me489](http://rotorlab.tamu.edu/me489)

(*) Group leaders in red

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Student 1</th>
<th>Student 2</th>
<th>Student 3</th>
<th>Student 4</th>
<th>Student 5</th>
<th>Student 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Alphas</td>
<td>Chris Tarnick</td>
<td>Adam Castillo</td>
<td>Dane Price</td>
<td>Michael Pappas</td>
<td>Travis Frazier</td>
<td></td>
</tr>
<tr>
<td>Team Hoof-Hearted</td>
<td>Jose Zummar</td>
<td>Andres Gonzalez</td>
<td>Trevor Akers</td>
<td>Kimberly Caleon</td>
<td>Chris Chapman</td>
<td>Lee Ellington</td>
</tr>
<tr>
<td>Team RamRod</td>
<td>James Bohn</td>
<td>Arlo Swanson</td>
<td>Daniel Ramirez</td>
<td>Hari Krishna Shrestha</td>
<td>Garret Wilbanks</td>
<td>Tyler Barry</td>
</tr>
<tr>
<td>Prestige World Wide</td>
<td>Paige Guilbeaux</td>
<td>Rachel Solari</td>
<td>John Ryan Davis</td>
<td>Brandon Merrill</td>
<td>John Ross Norton</td>
<td></td>
</tr>
<tr>
<td>Dynamics</td>
<td>Michael Penny</td>
<td>Tiffany Hargett</td>
<td>Bryan Castillo</td>
<td>Will McGiness</td>
<td>Daniel Records</td>
<td></td>
</tr>
<tr>
<td>Globogym</td>
<td>Barret Heinrich</td>
<td>Will Young</td>
<td>Evan Purcell</td>
<td>Chris Vrana</td>
<td>John McElhany</td>
<td></td>
</tr>
<tr>
<td>Lobster Golf</td>
<td>Billy Gifford</td>
<td>Porter Nelson</td>
<td>Kyle Papso</td>
<td>Brian Bourgeois</td>
<td>Dan Gessner</td>
<td>Seung Ri Park</td>
</tr>
</tbody>
</table>
Congratulations!

Tyler Barry
Travis Frazier
Barret Heinrich
Seung Ri Park
Dane Price
Daniel Records
Chris Vrana

Best of the best, a productive professional career and a rewarding personal life.
For those students still in school

How can I better prepare myself for working as an engineer in the real world?

Recommendations from students at National University of Singapore
Fall 2009
## How can I better prepare myself for working as an engineer in the real world?

### AREAS

<table>
<thead>
<tr>
<th><strong>Communication</strong></th>
<th><strong>METHODOLOGY</strong></th>
<th><strong>BENEFITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Be more outspoken</td>
<td>• Be well read</td>
<td>• Increase fluency and effectiveness in conveying a message and ideas</td>
</tr>
<tr>
<td>• Voice opinion in the correct way (i.e. respectful yet powerful)</td>
<td>• Develop the habit of proofreading</td>
<td>• Be able to speak to others at their frequency</td>
</tr>
<tr>
<td>• Be precise in writing</td>
<td>• Develop the habit of writing well (e.g. vocabulary)</td>
<td>• Increase confidence</td>
</tr>
<tr>
<td>• Attending presentations workshops</td>
<td>• Attending lessons to improve writing</td>
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### Teamwork

<table>
<thead>
<tr>
<th><strong>Teamwork</strong></th>
<th><strong>METHODOLOGY</strong></th>
<th><strong>BENEFITS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Participate in school-wide projects</td>
<td>• Learn to communicate with corporate representative</td>
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<tr>
<td>• Join an interest group or (professional) society</td>
<td>• Have the experience of working with a diversity of people</td>
<td></td>
</tr>
<tr>
<td>• Play a active part in all group assignment and ask for feedback</td>
<td>• Learn to solve problems derived from diversity in members</td>
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</tr>
<tr>
<td>• Be receptive to working with different people (regardless of background, gender, culture, nationality).</td>
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</table>
How can I better prepare myself for working as an engineer in the real world?

<table>
<thead>
<tr>
<th>AREAS</th>
<th>METHODOLOGY</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience</td>
<td>• Take part in internships&lt;br&gt;• Go on field trips&lt;br&gt;• Attend conferences, exhibitions and seminars conducted by industry representatives</td>
<td>• Obtain first-hand working experience to prepare for real work&lt;br&gt;• Gain exposure in different working styles&lt;br&gt;• Creating a more realistic expectations of one’s future workplace</td>
</tr>
<tr>
<td>Knowledge</td>
<td>• Active Learning&lt;br&gt;• Take classes from other disciplines&lt;br&gt;• Read newspapers and magazines, but discern the information thoroughly before accepting it.&lt;br&gt;• Simply meet more people outside your Dept (ME).</td>
<td>• Gain knowledge and understanding in various disciplines&lt;br&gt;• Able to address the concerns from other disciplines&lt;br&gt;• Gain ability to integrate cross-faculty knowledge and act as a bridge between the engineering and non-engineering communities</td>
</tr>
</tbody>
</table>
1: To effectively prepare students to work as a team, it is fundamentally important to change the existing stereotype that “engineers do things by themselves” and establish the importance of teamwork as part of the curriculum.

2: Out there, it is not about merely solving ‘problem number three’, but about how efficient an engineer can work together with other individuals. In turn, efficiency requires fine communication skills.

3: Group work should not be done at the last minute, as it compromises discussion opportunities.
4. .. students have the impression that working alone is more effective than working in a team. This is because they think that being able to work alone will cause them to stand out from the crowd. However they do not realize that having this mentality can have adverse effects on their career in the future.

5. To prepare for this, students must practice teamwork, understand related disciplines and increase their exposure to the world. Our society, being a multicultural society, already provides opportunities for cross-cultural interactions which must not be neglected.
Closure

Keep as long as you live the desire to learn & help others. It’s been a privilege to teach you and to learn from you.

Contact lecturer at

Lsanandres@tamu.edu

Learn more on his work at

http://rotorlab.tamu.edu

and his music at

http://www.ies3.com/ElSanto

Thanks!