Engineering perspective from today’s engineering students and learning how to engage young engineers

NSPE Leadership Conference & Annual Meeting
July 19, 2013
Minneapolis, MN
• Alex Miller
  – Senior
  – Civil Engineering
  – Current Student Chapter Officer

• Brandon Day
  – Recent grad
  – Civil Engineering
  – Project Engineer, MN Dept. of Transportation
  – Past Student Chapter President

• Chuck Clanton, PE
  – Bioproducts & Biosystem Engineering, Univ Minn
  – Student Chapter Adviser
Alex Miller

UNDERGRAD POINT OF VIEW
Alex Miller

• Rochester
• U of M (Civil Eng)
• Societies
• Student Groups
• Sports
• Balance
• Internships
• MSPE
Univ of Minn Student Chapter

- Seminars
- Focused across all disciplines
- 3 to 4 per semester
Univ of Minn Student Chapter

- Licensure
- Each semester
- 20 to 40 students
Professionally Engineering:
Working in the Private Sector

Kerry Bruggemann, P.E., Mechanical Engineer, Michaud Cooley Erickson

This is the second in a series of presentations on the different sectors of Professional Engineering. This informational session will cover working as a Professional Engineer in Private Sector. Kerry will share her experiences, including what she does and how she became a successful Minnesota engineer.

Date: Thursday, March 7th
Time: 5:00 – 6:00 p.m.
Location: Keller Hall, Rm 3-115

Free pizza and pop provided!

The Minnesota Society of Professional Engineers is for all engineering disciplines.

Interested in joining MSPE? Join free for six months to learn more. Plus, student leadership opportunities available. Contact Katie Jamieson (kjamieson@mnspe.org) or visit www.mnspe.org
Univ of Minn Student Chapter

- Politics, lobbying, lawmaking
- Human resources
- Social networking
- Financial planning

Engineering the Politician
Presenters: Randy Morris, Attorney & Lobbyist, and Bill Kuretsky, Attorney & Public Officer

Randy Morris is an attorney and lobbyist with over 30 years of experience with the Minnesota Legislature. Randy founded Randy Morris Minnesota Government Relations in 2009 and was hired by MSPE in 2011 to serve as our lobbyist. Randy is familiar with issues of interest to the engineering profession and has established relationships with leadership and key legislators.

William H. Kuretsky graduated from the University of Minnesota with a law degree in 1972, practicing law for over 40 years. Bill has served as an Assistant State Attorney General, retiring in 2010. He is currently active as a Public Member on the Minnesota Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience, and Interior Design.

Topics Covered:
- How to work in the political arena and with politicians
- How students can get involved
- Public policy development
- How to interact with engineers and technical people from the politician’s point-of-view

Date: Thursday, October 4th
Time: 4:30 – 5:30 p.m.
Location: Ackerman Hall, Room 209

Free pizza and pop provided!

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Univ of Minn Student Chapter

- MathCounts
- Career fairs
- Activity fairs
Brandon Day

- Army Infantry, 2001
- Started undergrad, 2007, Civil Engineer
- Lead Design – Steel Bridge
- Multiple Bridge Projects During College
- Student Leadership
- Volunteering
- Finished MS, 2012, Structural Emphasis
- Project Manager, TC Public Transportation
- Bridge Design, MnDOT
Hooking kids on engineering

- MATHCOUNTS
- Future City Competition
- The Works Museum
- Science Museum of Minnesota
- Science Olympiad
- Legos
- Robotics competition
Teaching K12 STEM

• Incentives
• Retention

Kids haven’t changed, but technology sure has!

Ros Hjermstad

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freedom to do things like have weiner roasts and go for walks in the spring, but there were limitations, too. The library was very small, and the school day was short because of the bus ride. There were always special projects like solar cookers, string art, and basket weaving. The wasps were replaced by flies, especially during manure-spreading season. There was a ditto machine for making those addable to do things a certain way because “we’ve always done it that way.” That attitude can develop into a rut, but change shakes it up. By being forced to constantly review/revise what is being taught, there is always a continuous motion of improvement.

I’ve been through Behavioral Objectives, Learning Opportunity for Teachers, Madeline Hunter, Outcome Statements, No Child...
Hooking freshmen on engineering

- Applied math & physics
- Freshmen design (creativity)
- **Applied** math & physics
All-university requirements

• Liberal (general) education
• Suggest targeting technology
  – Examples
    • History of science & technology
    • Economics, social & political science for technology
    • Art for CAD
• Freshmen writing (composition)
  – Suggest technical communications
• Skills courses
  – Calculus, speaking, foreign language
• Free electives
Fundamentals vs. advanced topics

• Seven basic engr topics Retained
  – Statics 100%
  – Dynamics 62%
  – Strength of materials 73%
  – Fluids 88%
  – Thermodynamics 94%
  – Heat transfer 67%
  – Circuits 78%
Fundamentals vs. advanced topics

• Seven basic engineering topics
• Replacing with advanced topics
Fundamentals vs. advanced topics
Fundamentals vs. advanced topics

- Basic kindergarten topics
  - Significant figures or digits

13,478,914 lb GHG
Fundamentals vs. advanced topics

• Basic kindergarten topics
  – Significant figures or digits
  – Logarithms
  – Accuracy vs. precision

Accurate, low precision

Precise, low accuracy
Fundamentals vs. advanced topics

• Basic kindergarten topics
  – Simple observation
  – Measurements
  – Data collection & recording
Theory vs. practical

- Computer simulations
- Labs
- Hands-on

It’s called a test tube

Somewhere, something went terribly wrong
Engineering vs. soft skills

• Employers want soft skills
• But at what engineering expense?
Communications

- Speaking
  - Formal large groups, small groups, one-on-one
  - Hostile audience
- Listening
- Personalities
- Conducting meetings
Student activities

• Trade societies
• Engineers without Borders
• Non-technical

Mobile learning center
Internships

- Variable job descriptions & duties
- Complete picture of firm
Senior design / Capstone course

- Industry partnerships
- Doable, 15 weeks
- Multiple answers
- Not proprietary
- Creative, challenging
Senior design / Capstone course

• Multi-discipline
  – Engineers
  – Business
  – Lawyers
Paying for college

At minimum wage

1970       24 hrs / wk
Today      61 hrs / wk
Expectations of new graduates

• Four-year graduation rates
Expectations of new graduates

- Four-year graduation rates
- Dangerous
Multi-generations

- Will be differences
- Open minds
- Work to understand
Looking for first job

• Employers want
  – 25 yr old, 15 yr experience, with Ph.D. MBA, JD......

• Suggest NSPE set up Entry Level Job Search
  – Hook student into the society
Looking for first job

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  – 25 yr old, 15 yr experience, with Ph.D. MBA, JD ……

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Action plan

- 2% of resources
  - Time
  - Dollars
  - Labor
- Mentor, advise, host
- Fundraising
- Supply design problems
- Program review