George R. Brown School of Engineering

Wade Adams, Senior Faculty Fellow, MEMS, September 17, 2013

2013 Rice Global E&C Forum XVI
Rice Centennial 1912-2012
Mechanical Engineering Laboratory, 1912

2013 Rice Global E&C Forum XVI
Engineering Students, 1913
GRB Vision Statement - 2013

• **Make a difference.** Develop leading research and educational programs in areas where Rice is well-positioned to make a difference: *energy, water, nanomaterials, health and information technology and big data.*

• **Enhance our strengths** in *materials science, computational engineering, robotics, and neuroengineering.*

• **Develop leaders.** Be pre-eminent in *engineering education* and the education and development of tomorrow’s *leaders and entrepreneurs.* “L & E – ship”

• **Be open/take risk.** *Build on and exploit our unique strengths to increase our opportunities and impact in the USA and beyond.*
ENGINEERING DEPARTMENTS

BIOENGINEERING
CHEMICAL AND BIOMOLECULAR ENGINEERING
CIVIL AND ENVIRONMENTAL ENGINEERING
COMPUTATIONAL AND APPLIED MATHEMATICS
COMPUTER SCIENCE
ELECTRICAL AND COMPUTER ENGINEERING
MECHANICAL ENGINEERING AND MATERIALS SCIENCE
STATISTICS

2013 Rice Global E&C Forum XVI
Engineering Graduate Student Growth: 2006-2012

- PhD students: 20% growth (572)
- Professional Masters students: 495% growth (125)
- Total GS enrollment: 40% growth (727)
- Grad degrees awarded: 47% growth (193)

34% (65) of all graduate degrees awarded in 2012 were to women, compared with 30% (39) in 2006.
Engineering Undergraduate Student Growth 2006-2013

Undergraduate students: 41% growth (1335)
Undergrad degrees awarded: 37% growth (287)

34.6% women (20% nationally)
22.7% underrepresented minorities (16.5% nationally)

33% of Rice undergraduates are Engineers!
SoE Research Expenditures

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<tr>
<th>Fiscal Year</th>
<th>Research Expenditures</th>
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<tr>
<td>FY06</td>
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2013 Rice Global E&C Forum XVI
e2i: Energy & Environment Initiative

Mission: To build a world recognized energy and environmental center for excellence to meet global demands for energy security and affordability in an environmentally sustainable manner.

Transformative Needs:
1) Science & Engineering Solutions
2) New Business Models
3) New Public Policies & Legislation
4) Social Sustainability > Right to Operate in Communities
CIVIC ENGAGEMENT

School of Engineering supports activities in our Houston neighborhood and way beyond!

Engineers Without Borders in Nicaragua

DREAM Project

Washington, DC, Interns

2013 Rice Global E&C Forum XVI
COMPETITION WINNERS

CivSAFE
ASME iShow Semi-Finalists
(Will compete with 9 other teams in Montreal in June)

Breath Alert
Dell Social Innovation Challenge Semi-Finalist

VaxNation
1st Prize National Academy of Engineering Institute of Medicine
Go Viral to Improve Health Collegiate Challenge

Design/Build
OEDK

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PRIOR FEEDBACK FROM INDUSTRY LEADERS

– > Big Brains…smart, really smart, energetic…BUT BUT, BUT …

– > Success not so much determined by technical abilities as what you do with them

– > Effectiveness depends on character, motivation, determination, communication, teamwork, strategizing, taking responsibility, commitment to “make it happen no matter what”
RICE ENGINEERING EXPERIENCE

PREPARES YOU FOR YOUR FUTURE

✓ Learn how to learn—quickly!
✓ Design systems and devices to solve real-world problems
  ✓ Create new knowledge through research
✓ Take fundamental discoveries out of the lab into the World
  ✓ Understand engineering in global/social context
✓ Develop leadership and teamwork abilities
Towards 2112
American Education:
*The T Shaped Individual*

- Subject Matter Expertise
- Communicate
- Coordinate/Teams
- Advocate
- Anticipate
- Get stuff done
ENGINEERING LEADERSHIP

• Real-world engineering
• Potential for interdisciplinary projects—get undergrad and grad students (even from different departments) to work together!
• Encourage clubs
• Explore business opportunities of design challenges.
• Encourage entrepreneurship
• Win the Rice Business Alliance!
ENGINEERING LEADERSHIP –

some stuff you can’t teach/learn in the classroom...

Show initiative, make decisions in face of uncertainty
Possess urgency and will to deliver
Take responsibility
Be resourceful and flexible
Show integrity and make ethical decisions
Build trust and loyalty
Know the relevant context
Relate well to others
Create purposeful and compelling visions of future
Deliver on the vision (make it happen no matter what)

New Offices in Abercrombie

2013 Rice Global E&C Forum XVI
HOW DO YOU ACQUIRE LEADERSHIP QUALITIES?

*Not* just in the classroom!
Learn by doing!

Seek mentored practice and get feedback (coaching)!

Internships and projects — very helpful — *WE NEED MORE*

Competitions and Clubs

*Being effective is not a spectator sport!*

2013 Rice Global E&C Forum XVI
RCEL / OEDK COLLABORATION

ENGI 120: Introduction to Engineering Design

• Teach Rice engineering students to be creative designers, starting freshman year.
• Semester-long team engineering design experiences for freshmen.
• Projects are motivated by real clients on campus and in the community, who advise the teams.
• Teams build prototypes in the OEDK, learn to use OEDK resources in future clubs, classes
• Teams are coached by older engineering students in RCEL’s Apprentice Leader Program.
RCEL / OEDK COLLABORATION

ENGI 120: Introduction to Engineering Design

Program has become very popular

• Spring 2011 pilot: 20 students
• 2011–2012 academic year: 81 students
• 2013–introducing second section: 160 students/academic year

Summer Design Internship in OEDK

• Standout ENGI 120 students serve as leadership/design interns in OEDK the following summer.
• Further develop ENGI 120 prototypes to address client needs, industrial design, intellectual property.
• Mentored leadership/project management practicum.
• Great experience – in need of sustainable funding.
Oshman Engineering Design Kitchen II
Basement Expansion
Smart Car Ad in South Africa
Roadblocks

• Vision without funding is hallucination.
  • Da Hsuan Feng – UT Dallas

• Vision without hardware is delusion.
  • Lockheed engineer

• Money buys progress.
  • John Przybysz – Northrup Grumman
Questions?

Internships and design projects – let me know:

elt@rice.edu

Thank you!