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Engineering and Computer Science Update

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ECS Board of Advocates
October 5, 2012

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What I will cover this morning

- A little about myself
- Faculty transitions
- ABET
- Observations from my first two months
- Things we need to do this year

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A little about myself

- Delighted to be at Baylor and have the opportunity to work with all to continue building ECS
- I am here to serve and lead through my service
- In my first two months, I've spent more time outside of my office than in my office
  - Visiting ECS departments
  - Meeting Board members
  - Orientations
  - Meeting companies

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A recent picture of my family

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From California to Qatar, I rarely turn down an opportunity to play a good golf course

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How the Lord got me to Baylor

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My most recent assignments

- Associate dean of engineering at TAMU and deputy director of the Texas Engineering Experiment Station (2011-2012)
  - TEES had ~$150m in research expenditures
  - Worked with engineering programs across the TAMU system
- Department head, mechanical engineering at TAMU (2003-2011)
  - 60+ faculty, 1200 undergrads, and 400 grad students
  - $15m/yr in research expenditures

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New faculty in ECS

- **Dr. Mack Grady**
  - Electrical and computer engineering
  - Ph.D. Purdue University
  - Prior faculty experience at UT-Austin
  - Electrical power grid
    - Integration of Photovoltaic Systems
    - Impact of high altitude nuclear weapons

- **Dr. Michael Poor**
  - Computer Science
  - Ph.D. Tufts University
  - Prior faculty experience at Bowling Green State University
  - Human-Computer Interaction
  - Game Development

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ABET Update

- ABET evaluated all three of our engineering programs
  - Engineering
  - Mechanical Engineering
  - Electrical and Computer Engineering
- Evaluators saw plenty of strengths in our programs
  - Interdisciplinary junior and senior design classes
  - Good communication with rest of campus
  - Provide unique opportunities for our students
    - ECS learning and living center
    - Engineers with a mission

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ABET update – Cont'd

- The evaluators also found some issues…the program needing the most work was BSE
  - It was considered "deficient" with respect to evaluating student outcomes
- All programs had weaknesses related to their program educational objectives (PEOs)
  - Most common cited ABET shortcoming
  - Will require rewriting PEOs and doing alumni survey to assess the new PEOs
- ECE and BSE had a weakness related to assessment of outcomes in our design course

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ABET update – Cont'd

- The ABET team also had several concerns
  - Lack of space for undergraduate labs and design projects in all programs
  - Lack of discrete mathematics in ECE
  - Unspecified resources for the BSE program

We are optimistic that the deficiency and weaknesses can be addressed and most cleared up before the ABET final report is voted in July 2013.

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Observations from my first two months

- Baylor has quality leadership at the top
- Faculty are behind *Pro Futuris*
- ECS has a great group of faculty and staff dedicated to providing a quality education for our students
  - Concern for teaching and students
  - Volunteer for recruiting and outreach

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Our faculty and students reach out to local schools to engage students about engineering

- Lorena Elementary School, 2nd grade – May 2012

- Lorena High School – May 2012

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Observations….cont'd

- ECS provides a unique experience for students who live in the Northside LLC
  - Great interaction with faculty member in LLC and advisors
  - Retention (New students enrolled fall 2011)*
    - 78.0 % in LLC enrolled in engineering fall 2012
    - 54.5% not in LLC enrolled in engineering fall 2012
  - Grade point average for first semester
    - 3.28 for those in LLC
    - 2.78 for those non in LLC

***Includes only retention in engineering. Retention in the university is much higher**

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Observations…cont'd

- ECS provides excellent experiential learning experiences for the students
  - I^5 program in China
  - Engineers with a mission
  - Computing for Compassion (C4C)
  - Baja car
- Size of ECS has reached "critical mass" to attract attention of large corporate recruiters
  - Had largest ever STEM fair this fall

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Observations…cont'd

- ECS is producing excellent graduates
  - Quote from a major oil company recruiter

"All 7… interviewers thought that the best students they interviewed were comparable to the best students they've seen at other schools…..your best ME, EE, PSCM, and Logistics students are (in our opinion) comparable to the best at Texas A& M, UT, Texas Tech, Rice, Georgia Tech, etc"

  - Quote from TAMU faculty member (J. Grunlan)

The undergrad engineering program there [Baylor] is excellent, which I'm observing firsthand with David Hagen (B.S. in Mechanical Engineering in 2011).

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Observations…cont'd

- Computer Science has more visibility than the engineering programs because of the International Collegiate Programming Contest (ICPC)

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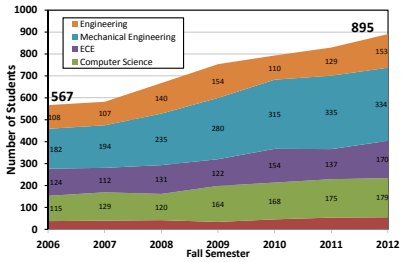
We have had rapid growth over the past six years with Mechanical Engineering growing the most



Note: about 1/2 of the Engineering students eventually switch to Mechanical Engineering

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The rapid growth in ECS has jeopardized the quality of our programs

- Larger classes, particularly at the lower division
- More crowded teaching laboratories – noted as a concern by ABET
- Reduction in faculty/student interaction
- Insufficient support staff for size of program
- Mechanical engineering is the program of most concern

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Here's how Mechanical Engineering compares to its Big XII peers in the undergraduate program

School	Students	Faculty	Student/Faculty
UT	999	67	14.9
WVU	458	28.3	16.2
TCU	210	12	17.5
KU	388	19.25	20.2
OU	534	19.5	27.4
Baylor	410	14	29.3
TTU	923	31.3	29.5
KSU	676	22	30.7
ISU	1256	35	35.9
OSU	894	24.25	36.9

ASEE Data

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Here's how mechanical engineering compares to other private programs

School	Students	Faculty	Student/Faculty
Rice University	146	16	9.1
Northwestern	242	24	10.1
Notre Dame	336	31.5	10.7
Vanderbilt	296	14.25	20.8
USC	470	22	21.4
Baylor	410	14	29.3
Brigham Young	939	26	36.1

ASEE Data

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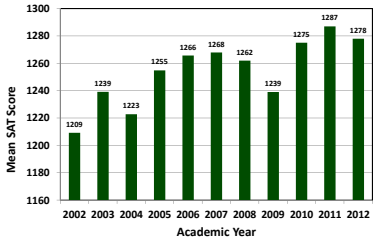
More observations…..Our incoming student quality has improved over the past decade



Comparison to other faith based schools: Notre Dame - 1430, BYU - 1315

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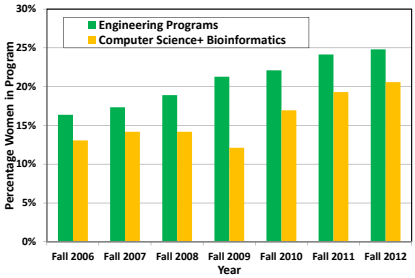
ECS has done very well in recruiting women to our programs



National average for ME and ECE is about 13%.

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Observations…cont'd

- Research expenditures in all programs are modest

Department	Expenditures
Computer Science	$563k
Electrical and Computer Engr.	$252k
Mechanical Engineering	$562k
TOTAL	$1,377k

Other faith based schools: Notre Dame - $41.2m, BYU - $9.4m
Note: Both offer Ph.D. degrees in several engineering programs

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Observations…cont'd

- Lack of Ph.D. programs in CS and ME will affect the growth of our graduate and research programs
  - Currently have 56 graduate students (10 Ph.D.)
- Research infrastructure at Baylor is still in its infancy, is improving, but needs to continue to grow
  - Important for attracting new faculty and funding

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Observations…cont'd

- ECS is space constrained
  - Problem areas
    - Faculty offices
    - Student design projects
    - Undergraduate laboratory
  - By comparison
    - TCU has 40% more space for a program 1/3 our size
    - TAMU has 40 to 50% more sf/faculty than ECS
- Completion of the BRIC is vital for the growth of ECS research
  - No room for research in Rogers Building
  - BRIC will be a draw for recruiting new faculty

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Observations…cont'd

- ECS is short of support staff
  - Needs assistance in laboratories, advising, and administrative assistants
- ECS endowments are insufficient for a program our size
  - Current endowments are about $2.5M
  - No professorships or chairs to attract prominent faculty to Baylor
  - No fellowships to get best graduate students

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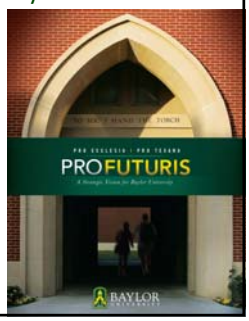
Pro Futuris will help set the agenda for ECS during the next 10 years

- Potentially good for ECS
  - Approve new graduate programs
  - Increase Ph.D. production
  - Strengthen experiential learning and research opportunities
  - Forge collaborations with industry within the BRIC
  - Provide outstanding (research) facilities…and a supportive infrastructure



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Other aspects of *Pro Futuris* that will impact ECS

- There will be more flexibility for ECS to manage enrollment and improve the quality of incoming students
- There will be increased focus on retention of undergraduates
- There should be more resources available for ECS as new endowments are developed
  - Vital for moving ECS forward – Our current endowments are only about $2.5 million

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Strategic action we need to take this year

- Develop a strategic plan that aligns with the aspirations in *Pro Futuris*
  - Needs to address key areas for ECS
    - Strategic research areas for each program
    - Undergraduate programs
    - Graduate programs
    - Creation of new degree or certificate programs
    - Infrastructure to support teaching and research
    - Engagement with industry
    - Development priorities

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Tactical actions we need to take this year

- Address issues raised by the ABET visit
  - Weaknesses in ME and ECE
  - Deficiency and weaknesses in EGR
- Complete proposal for design center to temporary relieve space in Rogers Building
- Complete enrollment management plan proposal
  - "Pre-engineering" or "freshmen engineering"
  - 1100 SAT minimum

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Tactical actions we need to take this year

- Hire six faculty committed to quality teaching and building a research program at Baylor
- Get Ph.D. programs in both Computer Science and Mechanical Engineering approved
- Work with development to increase endowments
- Work to increase visibility of engineering programs in major industries in the state
- Develop articulation agreements with other faith based schools in state that don't have engineering programs

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THANKS FOR YOUR TIME

Questions?

BAYLOR BEARS