Presentation

Most non-South Dakota students come from Minnesota
- 5 accredited Minnesota programs
- Still come here

What is the possibility for an interdisciplinary Ph.D.?
- There would be interest by the M.E. Department
- There is possibility and a nice step on the ladder
- There would still be resource needs
- It would be nice if there could be an in-between step
- The inter-discipline model has been done elsewhere
- Tried in the past but didn’t gain traction at the state government & legislative levels
- What are the logistics to add an M.E. Ph.D. - Sister program to the Electrical Engineering Ph.D. – without any funds?
- Can the University propose to BOR a temporary Ph.D. program to pilot for next 3-5 years
- If there aren’t enough students then easier to be accountable at a single department level
- Have had to turn down students because we don’t have Ph.D.s
- Only resource they need is the

Library
- ILL is excellent
- Don’t see any problems with library
- Library is good to help with ASTM Standards for testing

Enrollment
- Other engineering specialties are down
- Mechanical Engineering is up
- Has been up for past 10 years here and nationally
- People like the hands-on nature of M.E.
Has the fee helped?
- It has been a big asset
- There have no student complaints or even inquiries
- Did have a few questions from parents

Can we strongly connect the Ph.D. program to ABE? Is this the way to build it? Is there a willingness in both departments?
- It is certainly an avenue

Are you fully staffed?
- No
- Thinking about adding a sophomore advisor to take some of the load off the faculty
- M.E. recruits students who sometimes peel off and move into other SDSU programs
- People like the hands-on but don’t like the amount of Math necessary for a M.E. degree
- Would also like a technician that could be dedicated to the materials lab
  - This would help research efforts
  - Rather call them a “technologist” instead of “technician”

How many students are in the SDS of M Ph.D. program?
Hard to track at this point
Mechanical Engineering
Status, Strengths and Future Directions

Strategic Planning Committee Visit
March 23, 2012

Status - Faculty

Faculty

- 10 University-allocated faculty positions
  - 8 tenured/tenure-track (including department head)
    - 3 Professors
    - 2 Associate Professors
    - 3 Assistant Professors
  - 2 instructors
- 2 instructors on soft funds
- 2 half-time GTA’s assist with lab instruction
- 5 GTA’s on minimum stipends
Strengths - Faculty

- Faculty with diverse backgrounds and degrees from a mix of respected engineering institutions:
  - University of Illinois – Urbana/Champaign
  - Iowa State University
  - Missouri University of Science and Technology
  - North Dakota State University
  - University of North Dakota
  - Pennsylvania State University
  - Rensselaer Polytechnic Institute
  - South Dakota State University
  - Tsinghua University

Challenges - Faculty

- Workload associated with undergrad program

<table>
<thead>
<tr>
<th>University-Funded Staffing Numbers per Department</th>
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<tbody>
<tr>
<td>Faculty Staff</td>
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<thead>
<tr>
<th>Degrees Awarded per T/T Faculty</th>
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<tbody>
<tr>
<td>BSME</td>
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<tr>
<td></td>
</tr>
<tr>
<td>MS</td>
</tr>
<tr>
<td>MSME</td>
</tr>
<tr>
<td>PHD</td>
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<table>
<thead>
<tr>
<th>Student-to-Faculty Ratio</th>
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<tbody>
<tr>
<td>SDSU M.E.</td>
</tr>
<tr>
<td>32.4</td>
</tr>
</tbody>
</table>

*Regents Fact Book Fiscal Year 2011, SDBOR
Challenges - Faculty

- Salary compression

<table>
<thead>
<tr>
<th>Average Salary By Rank</th>
<th>Full Prof.</th>
<th>Assoc. Prof.</th>
<th>Asst. Prof.</th>
<th>Instructor</th>
<th>Lecturer</th>
<th>Half-Time GTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME</td>
<td>$188,061</td>
<td>$87,085</td>
<td>$76,797</td>
<td>$60,157</td>
<td>$47,609</td>
<td>$10,627</td>
</tr>
<tr>
<td>SDSU ME</td>
<td>$87,154</td>
<td>$77,676</td>
<td>$71,944</td>
<td>$55,012</td>
<td>$45,000</td>
<td>$12,532</td>
</tr>
<tr>
<td>OK Survey</td>
<td>$127,447</td>
<td>$92,425</td>
<td>$80,333</td>
<td>$57,153</td>
<td></td>
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</tr>
</tbody>
</table>

Status - Staff

- Staff – University-Allocated
  - 1 Secretary
  - 1 Fabrication Technician
- Staff – Externally Funded
  - Business & Marketing Manager for Materials Evaluation & Testing Lab (METLAB)
  - Post-Doc Research Associate with Bio-Fuels Lab
  - Quarter-time Bookkeeping Assistant
Challenges - Staff

- Research activity has increased accounting load
- Tasks formerly completed by others have been pushed downward through implementation of software/online systems
- New sophisticated research & lab equipment requires dedicated expertise to operate and maintain

Challenges - Staff

<table>
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<tr>
<th>University-Funded Staffing Numbers per Department</th>
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<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Faculty</td>
</tr>
<tr>
<td>Staff</td>
</tr>
</tbody>
</table>
Status - Students

<table>
<thead>
<tr>
<th>Year</th>
<th>Undergraduate</th>
<th>Graduate</th>
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</thead>
<tbody>
<tr>
<td>2007</td>
<td>296</td>
<td>17</td>
</tr>
<tr>
<td>2008</td>
<td>294</td>
<td>28</td>
</tr>
<tr>
<td>2009</td>
<td>320</td>
<td>28</td>
</tr>
<tr>
<td>2010</td>
<td>308</td>
<td>19</td>
</tr>
<tr>
<td>2011</td>
<td>337</td>
<td>21</td>
</tr>
</tbody>
</table>

8.5% are women
More than 40% are not from SD

Comfort Enrollment
250 Undergrads

Status – Undergrad Program Enrollment Trend

Enrollments – BS in Mechanical Engineering
Strengths - Students

- Scholars
  - Undergrad Research Participants
  - Goldwater Scholar
  - DOD SMART Scholar
  - Briggs Scholars
  - Honors College Students
  - Successful in Graduate Schools

- Leaders

- Sought by Employers

Strengths - Students

- Innovators
  - Capstone Design Projects – Approximately 12 projects in progress with various external and internal sponsors

- Internships/Coops
  - 60% of M.E. grads completed internships in 2011 (up from 37% four years ago)
  - 19 different employers (60% in South Dakota)
Internship/Coop Locations

3M, Brookings, SD
Aero Race Wheels, Estherville, IA
AGCO, Jackson, MN (2)
Basin Electric (Deer Creek Station), White SD
Bobcat/Doosan, Gwinner, ND (3)
City of Sioux Falls - Landfill Gas Recovery, Sioux Falls, SD
Daktronics, Brookings, SD (5)
General Motors, Pontiac, MI
Goodrich, Jamestown, ND
Horton, Inc., Britton, SD
Manitou Group (Gehl), Madison, SD
Missouri River Energy Services, Sioux Falls, SD
Omaha Public Power District, Omaha, NE
Raven Industries, Sioux Falls, SD
Sioux Corporation, Beresford, SD
Terex Utilities, Watertown, SD
Trail King, Mitchell, SD
West Plains Engineering, Sioux Falls, SD
Xcel Energy- Monticello Nuclear Plant, Monticello, MN

Students – Professional Organizations

- ASME
- SAE
- ASHRAE
- Pi Tau Sigma
Status/Strengths - Program

- Freshman Advising Program
  - This new program has freed up valuable faculty time and has also provided improved advising services to the freshmen

- Program Fee
  - It is hard to overstate how important the Program Fee funds are to our academic program
  - We can now afford equipment, software, and services that are needed for a competitive program

Status – Research & Outreach

- Materials Evaluation & Testing Lab (METLAB)
- Bio-Fuels Lab – Thermochemical Energy Conversion
- SD Wind Application Center
  - Wind For Schools Program
- Energy Analysis Lab
- Photo-Active Nanoscale Systems
- Multi-Body Dynamic Systems
- Heat Transfer/Computational Fluid Dynamics
Status - Research

- Research expenditures of $1.77 million in FY11
- Level of activity will not be sustainable with current resources and program configuration

How do we compare?

<table>
<thead>
<tr>
<th>Total External Sponsored Research Expenditures per T/TT Faculty</th>
<th>Mean</th>
<th>10 Percentile</th>
<th>Median</th>
<th>90 Percentile</th>
<th>SDSU ME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$151,178</td>
<td>$67,534</td>
<td>$135,000</td>
<td>$228,337</td>
<td>$221,605</td>
</tr>
</tbody>
</table>
Benefits - Research

- More than $2 million worth of state-of-the-art testing and analysis equipment acquired in last 3 years
- Equipment is available for and used by other departments on campus
- Annual output of conference and journal papers has more than doubled
- Increased opportunities for undergrads and M.S. students to participate in funded projects

Challenges - Research

- Insufficient T/TT FTE’s to form a critical mass for sustained success

- M.S. program is an inefficient model for sustained success in externally funded competitive research
  - Start/Stop – Faculty perform the bulk of the work
  - Must use post-docs instead of Ph.D. students to support complex projects – cost twice as much and leave without SDSU’s “stamp”
  - Funding agencies are less confident in the ability of a program to deliver results without a Ph.D.-level graduate students
Challenges - Research

- New faculty startup resources have improved but are still not at a level that will support consistent success

<table>
<thead>
<tr>
<th>Total Startup Package for New Faculty Hires</th>
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<tbody>
<tr>
<td>Mean</td>
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<tr>
<td>$204,140</td>
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</tbody>
</table>

- Insufficient lab and office space has been a big problem

- Our program is unlike our counterparts at the University’s selected peers in one major way – we do not have access to a Ph.D. program

Status - Outreach

- Energy Analysis Lab & SD Wind Application Center
  - State Agencies
  - Regional Industries
  - General Public
  - K-12 Schools
- METLAB
  - Government Agencies
  - Regional Industries
- Alumni/Employers
  - Good working relationship
Status - Facilities

- Current Space Allocation: 12,380 ft² in CEH
- Proposed Space Allocation: 16,745 ft² in CEH after relocations
- Proposed Capstone Design Lab Space in new AME Building: 5000 ft² dedicated space plus additional shared space

Challenges – Facilities

- Office Space
- Research Lab Space

Future Directions

- Academics/Scholarship
  - Strive for Alignment of Resources and Program Configuration that Supports Expectations for Faculty Performance
    - New T/TT FTE’s
  - Accreditation
  - Expand Scholarships
  - Explore new course/program delivery concepts
Future Directions

- Academics/Scholarship
  - Students choose our university and our program because of what we are now
  - We need to be sure that we don’t eliminate the attributes that make us attractive and set us apart from other programs as we shape ourselves for the future

Future Directions

- Research/Outreach
  - Leverage our current successes
  - Expand existing engagement with regional industries/agencies
  - Strengthen graduate program
  - Ph.D. Program

- Facilities/Resources
  - Acquire critical space and new facilities
  - Seek a higher level of private support
Conclusion

- Thank you for your time & attention
- Questions?