



## Strategic Plan 2012-2017

### Committee

#### **Membership**

- ✧ Head of the School + Eight faculty members
  - ✧ Anil Bajaj, Ray Cipra, Arvind Raman, Shirley Dyke, Tim Fisher, Eckhard Groll, Peter Meckl, Steven Wereley, Robert Lucht
- ✧ Two students- one undergraduate, one graduate
  - ✧ Bailey Lynch (undergraduate), Ankur Ashtekar (graduate)
- ✧ One to three staff members
  - ✧ Andrew Bean, Laura Edwards, Cathy Elwell
- ✧ One to two alumni, industry representatives, MEAC members
  - ✧ Ron Smith (MEAC, Caterpillar)

### Strategic Plan Highlights

#### **Vision**

To develop Purdue Mechanical Engineering into an intellectually vibrant environment where all engage and contribute for global impact through innovations in scholarship, discovery, learning, and engagement, cherishing our diversity and individual differences.

#### **Mission**

1. **Educating** next generation leaders, scholars, innovators, and entrepreneurs in mechanical engineering.
2. **Nurturing** creative and transformative innovations in mechanical engineering education and research, contributing to solutions to global challenges.
3. **Developing** strategic global partnerships with select institutions with long-term educational, research, and outreach impact.
4. **Serving** the local, state, national, and international communities.

### Strategic Plan Highlights

#### **Key Priorities/Investment Areas**

- ✧ Education & Curriculum
- ✧ Research
- ✧ Physical and Research Infrastructure
- ✧ National and Global Engagement

- ✧ Global Impact through Education and Research
- ✧ Resource Development
- ✧ Professional Development and Recognition
- ✧ Culture and Environment

### **Key Elements- Education and Curriculum- Undergraduate**

*Recruit and retain the most capable, motivated and diverse class, help them obtain a sound and relevant education at Purdue.*

#### **Strategies:**

- i. Continually review the curriculum to maintain competitiveness and societal relevance with a strong emphasis on engineering application through interactive learning, sustainable solutions, advanced analytical skills, and innovative design thinking.
- ii. Promote teamwork via industry sponsored projects that provide opportunities for analytical thinking, programming, fabrication.
- iii. Provide competitive scholarships, promote applications for nationally competitive awards.
- iv. Expand leadership opportunities through student organizations, internships, co-operative experiences and global experiences.
- v. Foster relationships among students and faculty through research experiences and mentoring programs to encourage research and higher learning.

#### **Metrics:**

- i. Overall student grade for the Senior Exit Surveys as well as assessment of individual ME outcomes
- ii. Number and fraction of students with an overall GPA and Engineering index of 3.2 and higher
- iii. Number and fraction of students receiving scholarships and Purdue and national awards
- iv. Average value of various responses for course, instructor and overall program quality from surveys/course evaluations
- v. Number and fraction of students with internships and participating in the co-op program
- vi. Fraction of seniors who enter graduate programs
- vii. Number of ETA sites

### **Key Elements- Education and Curriculum- Graduate**

*Recruit and retain high caliber students from top-tier ME programs, provide challenging and innovative research/education programs, and a quality graduate education.*

#### **Strategies:**

- i. Attractive research/education programs, flexible, broader-impact education, industry internships, competitive compensation, 1<sup>st</sup> year fellowships
- ii. Creative and supportive environment to develop into well-rounded independent researchers and thought leaders
- iii. Highly diverse group of high quality US/international students
- iv. Applicants for nationally competitive fellowships (NSF, GAANN), awards and travel grants
- v. Increased number of PhD graduates pursuing academic careers
- vi. More emphasis on teaching experience for graduate students/training to be faculty

- vii. Opportunities to visit other universities/countries for research
- viii. Business/Entrepreneurship course options, encouraging students to work with Discovery Park
- ix. Graduate student feedback and representation

**Metrics:**

- i. Quality: Average GPA, GRE Scores
- ii. Percentage of underrepresented minority and women
- iii. Percent of entering graduate students who are US citizens, from top tier US and first-tier international institutions
- iv. Level of satisfaction index obtained via graduate student exit survey
- v. Number and percentage of graduate students with external awards and fellowships
- vi. Number and fraction of graduate students accepting tenure track faculty positions
- vii. Number of students going for tenure track positions in universities
- viii. Number of publications with co-authors from other universities
- ix. Number of start-ups by ME graduates
- x. Feedback survey: advisor feedback and department feedback
- xi. Graduate student representation (non-voting)

**Key Elements- Research**

*To pursue breakthrough research extending boundaries of ME into areas of grand challenges, sustainability and others with greatest positive impact on society.*

**Strategies:**

- i. Strengthen position in areas where Purdue is viewed as preeminent, and build upon strong foundation in other areas to become recognized as a top-tier program.
- ii. Recruit and retain exceptional faculty whose interests align with our strategic and emerging research areas.
- iii. Focus efforts on securing large, interdisciplinary, multi-year research projects with significant impact, create incentives and rewards for faculty.
- iv. Annually host technical retreats for faculty to identify broad research themes and grand challenges, and develop capabilities, synergies, proposals, and implementation plans.

**Metrics:**

- i. Number of faculty publications in high-impact peer-reviewed journals. Journals include those with broad high impact (e.g. Nature and Science) and high impact journals relevant to specific mechanical engineering research fields
- ii. Number of publication citations (total and per faculty member), including h-index values for each faculty member
- iii. Number of national and international awards (total and per faculty member) for research and professional progress
- iv. Research grants awarded, proposals submitted, and research expenditures (total and per faculty member)

### **Key Elements- Physical and Research Infrastructure**

*Create a physical infrastructure that provides an outstanding professional environment, encourages communication and engagement, and facilitates success in discovery and learning.*

#### **Strategies:**

- i. Develop plans for renovation of the ME building, developing faculty and student spaces.
- ii. Increase the quality of undergraduate laboratories and classrooms, and equip with state-of-the-art equipment.
- iii. Increase the amount of multidisciplinary project space that is available for undergraduate projects.
- iv. Create community research space to encourage increased interaction within and between the department's research areas.
- v. Develop Zucrow facilities plans, and experimental facilities for Herrick labs.

#### **Metrics:**

- i. Number of square feet of community research space
- ii. Number of square feet of laboratory space for undergraduate laboratory courses and senior design
- iii. Number of square feet of multidisciplinary project space (e.g., for Solar Car, EcoCar, etc.)
- iv. Number of joint research projects with faculty and students outside of ME

### **Key Elements- National and Global Engagement**

*Encourage faculty, staff and students to pursue personal responsibility, accountability and service at local, national and international levels. Promote entrepreneurial activity, development of intellectual property invention disclosures, patents, etc.*

#### **Strategies:**

- i. Encourage faculty, staff and students to increase involvement and leadership in local, national and international organizations related to ME
- ii. Foster the development of intellectual property (inventions, disclosures, patents, etc.)
- iii. Strengthen relationship with industry partners through collaborative research, technology transfer, and student interactions
- iv. Create outreach programs that interact with and guide secondary school students
- v. Strengthen faculty, staff and student participation in service learning opportunities- EPICS, Solar Decathlon, SURF, Global Design Team Projects, EcoCar
- vi. Continue to create international experiences for faculty, staff and students- further increase already existing collaborations, develop new collaborations, create opportunities for staff
- vii. Formalize and increase financial support and incentives for faculty, staff and students to participate in global programs- travel assistantships, sabbatical leaves versus change in work locations, summer teaching assignments

#### **Metrics:**

- i. Number and fraction of faculty, staff, and students (both undergraduate and graduate) involved in organizations and societies, as members and as leaders
- ii. Number of conferences hosted at Purdue
- iii. Number of invention disclosures and patents, total, per faculty, and per year

- iv. Number of industry funded research projects, number of faculty who consult with industry, number of short courses conducted for industry, number of faculty who advise long distance, industry-sponsored, non-resident MS students, number of students who co-op and intern
- v. Number of faculty, staff and students participating in secondary school outreach programs, e.g., FIRST Robotics, State Science Fair, etc.
- vi. Number of active partner institutions- faculty, staff and student visits/stays at partner institutions per year, percent of students having an international experience by graduation
- vii. Money available and given out per year for travel assistantships; percent of faculty taking sabbatical leaves to international locations; number of faculty lead programs abroad

**Key Elements- Global Impact through Education and Research**

*Educate undergraduate and graduate students who will be successful in a global environment. Cultivate and expand research relationships with prominent international research organizations.*

**Strategies:**

- i. Implement a cost benefits analysis for our global education offerings, find which ones can scale up and which ones will be elite, and which ones can be de-emphasized
- ii. Strengthen existing study abroad partnerships to ensure an outstanding experience for the students, identify top partners and key deficiencies and opportunities, propose new action items
- iii. Expand study abroad partnerships, develop strategy and basic requirements, add 3 new study abroad partnerships with overseas ME programs targeting India and Latin America
- iv. Increase undergraduate student participation in GEARE and Engineering Term Abroad Programs
- v. Expand existing relationships with global universities to include overseas research opportunities for faculty and students
- vi. Use global engagement to improvement recruitment of top grad students

**Metrics:**

- i. Number and fraction of students enrolled in global education programs (summer, semester, year)
- ii. Student exit polls/interviews; job offers, starting salaries for global education participants versus rest of students
- iii. Number of international study abroad partnerships (existing and new)
- iv. Number and percent of international exchange students who come to our School
- v. Number of papers published that have a co-author from an international institution
- vi. Number of graduate students who engage in a research experience overseas (university or industry)

### **Key Elements- Resource Development**

*Secure and improve the School's financial foundation as a means to continually improve its programs and physical facilities, while balancing short and long term goals.*

#### **Strategies:**

- i. Increase the endowment for unrestricted uses (e.g. special initiatives, program and facilities enhancements)
- ii. Increase the endowment for restricted uses (professorships, undergraduate scholarships, graduate fellowships, start-up expenses)
- iii. Review development plan to broaden initiatives to enhance the funding base for the School annually

#### **Metrics:**

- i. Complete the fund-raising goals for 2009-14: Renovations, Student Access and Success, Innovative Learning Environments, Faculty Creativity and Discovery, Leadership Development, Global Initiatives, Other (primarily unrestricted)
- ii. Measure % of alumni participation in making contributions to fundraising initiatives school-wide
- iii. Measure \$ raised
- iv. Increase # of fellowship endowments
- v. Increase # of unrestricted endowments

### **Key Elements- Professional Development and Recognition**

*Encourage faculty, staff, and students to participate in activities that will enhance their career, develop their skills, and help them become more creative and productive researchers/educators. Actively promote recognition through internal and external award nominations.*

#### **Strategies:**

- i. Encourage bold ideas- research, curricular enhancements, instructional resources, engagement; encourage one- and multi-year goals, success measures- encourage applying for University initiatives
- ii. Encourage and support participation in professional development activities
- iii. Increase Purdue and national award nominations
- iv. Implement School level staff and graduate student awards
- v. Incentivize research- plan fiscal policies, return of resources for strategic initiatives

#### **Metrics:**

- i. Number of faculty, staff and students who participate in professional development activities, such as conferences, workshops, sabbaticals, study in a second discipline, provost, fellows, CIC Fellow, etc.
- ii. Number of Purdue and national level awards received by faculty, staff and students
- iii. Number of scientific meetings organized by ME faculty

## **Key Elements- Culture and Environment**

*Create an environment where faculty, staff and students are treated with respect and where superior teamwork is achieved. Provide a safe, comfortable, multi-level workplace and learning environment.*

### **Strategies:**

- i. Encourage open atmosphere and generation/sharing of ideas
- ii. Provide diversity training that includes respect and tolerance
- iii. Provide teamwork training to enhance performance
- iv. Encourage sense of inclusiveness, pride in Purdue ME
- v. Encourage cultural/social interaction to enhance the multi-levels of ME

### **Metrics:**

- i. Level of satisfaction index obtained via new faculty, staff and student environment survey
- ii. Percentage of faculty, staff and students who complete diversity training
- iii. Percentage of new employees (faculty, staff and students) who complete safety training
- iv. Percentage completion of annual lab and office safety audits
- v. Number of professors featured in lab videos; monthly featured "ME person/activity"
- vi. Number of cultural/social events

## **Strategic Plan Priorities**

### **1. Education/Learning – Undergraduate**

- Continually review the curriculum to maintain competitiveness and societal relevance with a strong emphasis on engineering application through interactive learning, sustainable solutions, advanced analysis skills, and innovative design thinking. (Rank 1-9pts)
- Expand leadership opportunities for a diverse student-body through student organizations, internships, co-operative experiences and global experiences. (Rank 2-3pts)

### **2. Education/Learning – Graduate**

- Recruit and retain diverse high caliber students from top-tier US/International programs. (Rank 1-8pts)

### **3. Physical and Research Infrastructure**

- Develop plans to provide support for the upkeep of state-of-the-art laboratory equipment for advanced research– School and College of Engineering funds for service contracts for essential equipment. (Rank 2-5pts)

### **4. Physical and Research Infrastructure**

- Develop Zucrow facilities plans, and experimental facilities for Herrick Labs. (Rank 1-7pts)

### **5. Research**

- Identify opportunities early-on securing large, interdisciplinary, multi-year research projects with significant impact, create incentives and rewards for faculty. (Rank 1- 7pts)
- Strengthen positions in high-impact areas where Purdue is viewed as preeminent, and build strategically in emerging areas. (Rank 2-6pts)
- Strengthen positions in high-impact areas where Purdue is viewed as preeminent, and build strategically in emerging areas. (Rank 2-6pts)

- Recruit and retain exceptional faculty whose interests align with our strategic and emerging research areas. (Rank 3-4pts)
- Relationship building with industry, including collaborative research and equipment donations. (Rank 4-3pts)

#### 6. **Engagement – national/global**

- Continue to create international experiences for faculty, staff and students- further increase already existing collaborations with financial support and incentives (e.g. travel assistantships, sabbatical leaves versus change in work locations; summer teaching assignments). Develop new collaborations, as necessary. Create opportunities for staff. (Rank 1-4pts)
- Strengthen relationship with industry partners through technical dialogue, technology transfer, student interactions including class projects, internships, technical consultations, and guest lecturing. (Rank 2-3pts)

#### 7. **Professional Development and Recognition**

- Incentivize research– plan fiscal policies, return of resources for strategic initiatives, reward structure. (Rank 1-5pts)
- Increase Purdue and national award nominations. (Rank 2-3pts)

#### 8. **Resource Development**

- Increase the endowment for unrestricted uses (e.g. special initiatives, program and facilities enhancements). (Rank 1-7pts)