



**WELDON SCHOOL OF  
BIOMEDICAL ENGINEERING**

**STRATEGIC PLAN**

**2017-2022**

## PREAMBLE

The Department of Biomedical Engineering at Purdue University was formed in 1998 through the integration of the emerging academic infrastructure of the then two-year-old Biomedical Engineering Graduate Program, that is a partnership with the Indiana University School of Medicine, and the research resources of the Hillenbrand Biomedical Engineering Center. This linking of the only doctoral program in biomedical engineering in Indiana with a productive research enterprise laid a cornerstone for programmatic growth. This first new engineering department at Purdue in 40 years served as both an internal hub for cross-disciplinary graduate research and teaching as well as a visible focal point for external collaborations and funding. The department rapidly coalesced an outstanding faculty that focused its efforts on the solution of important clinical problems through technological means. Over the past two decades, biomedical engineering faculty members have been inventors on more than 100 issued U.S. patents with over half licensed, resulting in royalty income that surpasses that of any other academic unit on campus. With continued growth, including the addition of an undergraduate degree program, the construction of the Martin C. Jischke Hall of Biomedical Engineering, and the generous support of the Weldon family, the department became the Weldon School of Biomedical Engineering in 2004.

The Weldon School is poised to undergo major programmatic and faculty growth in order to meet the talent and technological needs of the rapidly growing medical device and biotechnology industries. Expansion of our research and graduate programs further enhance our already strong collaborative ties to these companies, especially those within Indiana. In addition, the continued development of our undergraduate program allows us to educate a new type of Purdue engineer who is optimally qualified to solve medical problems through a unique set of analytical and design skills. Through these and related initiatives, the Weldon School of Biomedical Engineering faculty, staff, students and alumnae/i improve health and the practice of medicine worldwide.

## VALUES

- We strive for our students, alumnae/i, staff, faculty, and colleagues to be extremely successful. Success is shared.
- Improving the practice of medicine through new knowledge and technologies is a school driving force.
- Our environment fosters innovation and continuous improvement both within the classroom and the laboratory.
- Collaboration across scientific disciplines is considered necessary and is facilitated.
- Extramural partnerships are mission critical. We take great pride in being outstanding partners.
- The diversity of individuals that comprise the school is cherished and ever-expanding.
- Honest, caring, and ethical behavior is required.
- Our commitment to provide outstanding educational programs that meet emerging needs is steadfast.
- The opportunity to grow and continuously improve our school is appreciated, challenging, and exciting. This excitement is contagious to all who are involved.

## **MISSION**

To be the premier source of well-educated biomedical engineers and of medical innovations and technologies, fostering strong academic, industrial, and clinical ties, and thereby achieving significant healthcare impact.

## **VISION**

Our vision is to improve quality of life through pioneering discoveries and their technological translation, and to educate future leaders in the medical device and biotechnology fields. From 1998-2022, we will move Purdue from having no formal academic programs in biomedical engineering to one with a preeminent and highly visible Weldon School of Biomedical Engineering with hundreds of top students, the finest faculty, innovative educational programs, ground-breaking research, cutting-edge facilities, and far-reaching strategic partnerships.

## **GOALS**

To realize this vision and thereby significantly impact healthcare, we have set the following primary goals:

1. Continue to grow an outstanding, diverse, and research-intensive faculty through strategic recruitment in emerging areas;
2. Expand and enhance the curriculum and student body to strengthen our educational programs;
3. Elevate our research programs and capabilities, and amplify their industrial and clinical impact, through targeted extramural partnerships and entrepreneurship;
4. Extend the reach and heighten the visibility and recognition of all of our efforts.

## OBJECTIVES

### 1. Increase the impact and recognition of our undergraduate program

#### *Strategies:*

- recruit and retain a more diverse student body that successfully contributes to the impact of biomedical engineering
- integrate more experiential learning activities into the curriculum to develop high-impact skills for our graduates to excel in their careers
- continue to expand relationships with industry, government, clinical, and academic partners for increased participation in experiential learning (e.g., design teams, internships, co-ops, study abroad) and targeted placement opportunities
- enhance training for design teams that compete in national and international engineering design competitions
- further enhance the competitive advantage of our students toward obtaining national and international fellowships and placement into selective graduate programs
- expand the national and international presence of our program

#### *Metrics and Milestones:*

- establish alliances with at least three extramural and three intramural entities for recruiting and supporting a more diverse student body within three years
- obtain funding (e.g., from NIH, NSF) for a summer research program for undergraduates with a diversity emphasis within five years
- incorporate independent and team-based learning modules for skills development (e.g., CAD design, rapid prototyping, circuit design, and 3-D printing) that supplement the curriculum, within the next two years
- establish three new clinical partners that provide clinical exposure and opportunities for student interns during summer or the academic year within five years
- add six new companies with internship or co-op placements, two of which are globally located, within three years
- fully incorporate entrepreneurial and marketing training (e.g., Lean Launchpad, business plan development) into junior and senior design within two years
- have at least half of senior design project teams connected with industrial, academic, or clinical partners for mentoring, and establish at least two long-term funding sponsors within four years
- triple the number of senior design projects that translate to design competitions or intellectual property protection, with at least two per year yielding international impact, within three years
- fully implement a research scholars program (three course series) that trains undergraduates from sophomore through senior year within two years
- double the number of students enrolling at top graduates programs within five years
- publish at least one paper per year or receive at least one additional federally-funded grant for our innovative educational program components per year
- establish two new international exchange programs, with one being at a Spanish language institution, within three years

## 2. Reach prominence in innovation and impact of our graduate programs

### *Strategies:*

- continue to implement a comprehensive student recruitment plan to enroll the most qualified and diverse applicants in each graduate research area of excellence
- grow our thesis master's program to provide a much larger pool of top talent for both industry partners and subsequent doctoral training
- develop our professional master's degree into the top program in the nation with a high value focus on medical device development and regulatory affairs
- develop a comprehensive infrastructure that facilitates the generation of graduate training grants
- continue to intentionally mentor and guide doctoral students and post-doctoral fellows toward leadership careers in academia and industry
- create a national and international reputation that distinguishes our program for innovation and training in our four graduate research areas of excellence and in global settings

### *Metrics and Milestones:*

- grow our current alliance with the University of Puerto Rico at Mayaguez and partner with at least one new Historically Black College/University or Minority Serving Institution each year to increase mentoring and recruitment of a diverse pool of undergraduates into our graduate programs
- establish an action team of faculty, staff, and student members who initiate and grow diversity and inclusion activities in the School within one year
- have at least 10% of our incoming graduate class be under-represented minority students within three years
- improve the quality and national reach of our distance education courses at the graduate level to attract a pool of distance students of over 100 within three years
- have at least 25% of our graduate courses offered via Engineering Professional Education each year within three years
- triple the total number of on-campus (professional plus thesis) master's students within three years
- expand professional development training, including clinical and industry immersions, and develop a series to enhance the effectiveness of written and oral communication within two years
- develop career-path mentoring documents for all graduate students within one year
- establish a mentorship program that includes teaching and grant writing and guide at least 20% of graduating doctoral students into academic post-doctoral positions, with half of these subsequently taking faculty positions at top institutions each year, within five years
- annually mentor and guide 20% of our post-doctoral fellows into faculty positions at top institutions within five years

- secure at least four new or renewed nationally-funded graduate training grants that distinguish our graduate research areas of excellence and doctoral program within four years

### **3. Excel in research productivity and translation**

#### *Strategies:*

- bolster strategic faculty recruitment process to meet critical research needs
- mentor and support recruited faculty to quickly initiate research programs
- encourage and facilitate large, multi-investigator research proposal submissions
- foster intramural research alliances with complementary partners around large-scale initiatives (e.g., Purdue Institute for Integrative Neuroscience, Regenstrief Center for Healthcare Engineering)
- create research consortia to catalyze the formation of research centers
- grow complementary inter-institutional research partnerships (with e.g., National Institute on Drug Abuse, Jackson Laboratories, Indiana University School of Medicine)
- increase national awareness of our graduate research areas of excellence

#### *Metrics and Milestones:*

- have school research committee perform a comprehensive SWOT analysis within one year
- have each new faculty member receive extramural funding within two years of joining Purdue
- convert one partner seed grant into a federally-funded grant each year
- receive one center-level grant in each of our four graduate areas of excellence within four years
- submit one Engineering Research Center level grant within five years
- double extramural research funding over the next five years
- have at least one faculty member from each graduate research area of excellence assume a high-level leadership role in a pertinent professional society or National Academy committee each year
- develop a related reference or text book within each graduate research area of excellence within five years

### **4. Lead in entrepreneurial and clinical impact**

#### *Strategies:*

- assess on-campus entrepreneurship instructional offerings and programs available to students, staff, and faculty
- broadly promote and support faculty, staff and student entrepreneurial efforts
- further strengthen our strategic partnership with the Indiana University School of Medicine in clinical technology translation and interdisciplinary education

- partner with key intramural and extramural entities (e.g., The Innovation and Commercialization Center at Purdue and Purdue Research Foundation's Office of Technology Commercialization) to accelerate technology translation to industry
- continue to embed entrepreneurship instructional programs in our educational and research framework at all levels

*Metrics and Milestones:*

- perform a comprehensive SWOT analysis of on-campus entrepreneurship courses within one year
- develop pertinent entrepreneurship training roadmaps and course menus for students, staff, and faculty within two years
- generate at least five issued U.S. patents, with two licensed, per year
- launch at least two new start-up companies per year
- have one start-up company based upon biomedical engineering technology raise Series-A venture funding each year
- maintain patent license royalties from biomedical engineering technologies above that of any other academic unit at Purdue
- place at least ten graduates per year at nascent healthcare and biotech start-up companies in Indiana within five years
- embark upon at least one comprehensive clinical study of a translated research technology each year

## **5. Enhance visibility, recognition, and communication**

*Strategies:*

- further institutionalize and enhance a systematic award nomination process for faculty, staff, and students
- establish our School as a collection of thought leaders in each graduate research area of excellence
- continue aggressive marketing and communications of achievements, initiatives, and partnership opportunities

*Metrics and Milestones:*

- create comprehensive database of nomination materials for each faculty and staff member within two years
- receive at least five prestigious extramural faculty awards per year
- receive at least three university or college-wide staff awards per year
- host an on-campus meeting/workshop in each graduate research area of excellence every other year
- develop an accompanying journal publication or special issue to publicize each meeting/workshop outcomes
- host an on-campus workshop in a pertinent education or engagement area every other year

- create a distinguished seminar series and have each graduate research area of excellence host a renowned visitor every other year
- complete a comprehensive web content update within one year
- receive far-reaching national/international news coverage of a major breakthrough or initiative each year

## **6. Expand facilities for research and instruction**

### *Strategies:*

- develop programmatic plan for Innovation Wing of Martin C. Jischke Hall including support of the Purdue Life Science Pillars and industrial partners

### *Metrics and Milestones:*

- resource, design, and construct Innovation Wing within three years

## PEER INSTITUTIONS FOR BENCHMARKING

Case Western Reserve University  
Duke University  
Georgia Institute of Technology  
Johns Hopkins University  
Massachusetts Institute of Technology  
Northwestern University  
Rice University  
University of California – Berkeley  
University of California – San Diego  
University of Michigan  
University of Minnesota  
University of Pennsylvania  
University of Texas – Austin  
University of Washington  
University of Wisconsin – Madison