

**Excellence in
Basic and Applied Science and Engineering**

**Dean's Committee Recommendations
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This committee's recommendations are based on three broad thrust areas:
Education, Research and Translation

STRATEGIC GOALS FOR EDUCATION:

Our recommendations are centered on improving the general teaching environment and fostering excellence in instruction such as (i) modernizing courses and laboratories to meet the current qualification requirements for advanced degrees as well as industry needs, (ii) enforcing small class sizes and interactive teaching, (iii) recruiting excellent teaching faculty. Our strategic goals are:

1. Recruit and Graduate High Quality BS Students
2. Significantly Increase Enrollment for MS Students
3. Attract and Support High Quality PhD Students

INTERSECTION WITH PRESIDENT'S 8 MAJOR INITIATIVES:

- Investment in Basic and Applied Science and Engineering
- University-wide Platform for Educational Innovation
- Hemispheric University Consortium
- Access with Excellence
- Culture of Belonging

RECOMMENDATIONS FOR EXCELLENCE IN EDUCATION:

1. A central performance metric for a premier college of engineering is the recruitment and graduation of outstanding BS students. BS graduates go on to wonderful careers, and due to the intimate relationship with their alma mater, they often find ways to give back in a multitude of ways. While CoE might be attracting the highest ACT and SAT score students within the university, we need to find ways to significantly improve retention at the end of first two years. The committee recommends the following action items:

1a. Introduce engineering perspective and relevance to underclassmen courses

1b. Instructional collaboration with A&S for both courses and laboratories

1c. Collect feedback from students who take classes outside CoE

1d. Track retention rates of engineering vs. non-engineering students

1e. Expose underclassmen BS students to their chosen specialization through research opportunities, industry internships, and social and mentoring interaction with successful alumni and engineering faculty

1f. Train faculty in novel teaching methods (blended learning, flipped classroom, online videos etc.)

2. MS students are an important source of tuition revenue and hence, a powerful and quantifiable metric. They often become important representatives – brand ambassadors – of the college within corporate America and enhance the reputation of the school. We should strive to significantly increase our MS enrollment by:

2a. Develop and offer courses relevant to industries specific to each department

2b. Develop specialized Master's program (such as "Masters in Cybersecurity", "Masters in Nanotechnology", "Masters in Energy Management", and "Masters in Healthcare Analytics")

2c. Strive to offer more TA spots to the top incoming MS students

2d. Build career counseling infrastructure specific to Masters' program (industry contacts, job fairs, internship opportunity, matchmaking based on MS projects)

2e. Explore/incorporate hybrid online degree programs directed at the Latin American market

- Pivot existing courses to offer online as part of an existing MS program
- Medium of instruction, teaching assistants, instructors could be bilingual
- Campus visits during winters for access to teaching laboratories
- Move to a quarter system (instead of semester) for the online degrees
- Leverage existing UM resources (such as Laureate education)

3. Outstanding PhD students have immeasurable positive impact on the society, and they allow the faculty to elevate expectations in the program. CoE needs to significantly increase the quality of domestic and international applicants to our PhD program. We recommend:

3a. Evaluate research faculty based on # of PhD students supported

3b. CoE fellowships to top incoming students to rotate through different labs within the first year

3c. Aggressively recruit the top students from local feeder schools (i.e., FIU/FAU/UCF/USF)

3d. Leverage faculty who have relationship with top international schools for outreach

3e. Develop programs for student recruitment and exchange with top schools across the Americas

- 3f. Revamp graduate curricula, encourage trans- department and college coursework
- 3g. Reduce # of required course credits, let advisors/committee decide if additional courses necessary
- 3h. Equip students for NIH, NSF and Foundation for competitive graduate fellowship applications

STRATEGIC GOALS FOR RESEARCH:

- 4. Recruit and Retain Faculty With Research Excellence
- 5. Develop Infrastructure for Interdisciplinary Research & Teaching
- 6. Flagship programs, Cluster hiring, Associated resources

INTERSECTION WITH PRESIDENT'S 8 MAJOR INITIATIVES:

- 100 New Talents for 100 Years
- Investment in Basic and Applied Science and Engineering
- Problem-based Interdisciplinary Collaboration
- Hemispheric Innovation Hub
- Hemispheric University Consortium

RECOMMENDATIONS FOR EXCELLENCE IN RESEARCH:

- 4. There is a direct correlation between prominence of research programs established by a college's faculty and its national reputation. We should aim to drive the College of Engineering into the *top quartile of engineering research rankings* (currently in the second quartile) primarily by recruiting, equipping and rewarding the most productive research faculty as well as motivating and helping current faculty become more productive. Towards that end, this committee recommends the following action items:

4a. Support, recognize, and reward faculty and staff excellence

4b. Enforce a department specific variable faculty workload model by tracking research funding, PhD students and credits taught per re Track faculty member

4c. Invest in educators, lecturers, and research staff so that research programs can be expanded without sacrificing class-size or teaching capabilities

4d. Establish bridge fund mechanism to maintain healthy research programs in the fluctuational realities of research funding

4e. Facilitate research collaboration with the promotion of dual appointments and the creation of trans- department and college research centers

- 5. We include ideas and strategies for successful growth of our research enterprise involving *infrastructure, management, and cultural changes* that can establish a unique and highly desirable research environment within College of Engineering at University of Miami:

5a. Foundation of a multi-college centers to foster discussion and collaboration while enabling multi-disciplinary teams that are seeing increased emphasis in grant announcements

5b. Core facilities for research and teaching

- Structural and materials lab
- Imaging and characterization center
- Software licenses for various computational tools.
- Expanded cloud system for teaching and research
- Multidisciplinary prototyping lab (3D printers, laser manufacturing etc.)
- Modernized machine shop with helpful staff members

5c. Hire dedicated staff to enable industrial contracts and export control defense contracts to remain competitive in a funding atmosphere where traditional grant avenues are no longer reliably sustainable

5d. Develop a professional marketing plan to publicize the UM engineering research endeavor (hire public relation staff to promote and disseminate research updates such as new grants, new publications, etc.) from CoE

5e. Promote CoE research to prospective students, Miami and FL citizens, ranking websites, and our peer institutions across the nation

5f. Develop a federal lobbying strategy to highlight CoE focus areas and engages program managers of different funding agencies in DC

- 6. Leveraging the strengths of each department or establishing new programs along with the cluster hiring can establish flagship programs for national reputation.

6a. Identify strategic plans for strengthening existing research program and needs for new program for highly recognizable research impact.

- 6b. Cluster hiring to have a critical mass within CoE or other schools. The area of cluster hiring within the strategic areas discussed in item number 8.**
- 6c. Hiring high profile faculty or research team**

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STRATEGIC GOALS FOR INNOVATION AND TRANSLATION:

7. Focus on Translation and Commercialization of Novel Science and Technologies
8. Build Bridges Between CoE and other UM Schools And Colleges

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RECOMMENDATIONS FOR EXCELLENCE IN FOR INNOVATION AND TRANSLATION:

7. The College of Engineering can make significant advances toward top quartile bracket by recognizing *entrepreneurial activity as a third leg of its mission* combined with excellence in teaching and research. Business spinouts resulting from transfer of technologies developed at CoE will be excellent training grounds for our students, focus the faculty to conduct translational research and have an enormous impact on the state economy, particularly south Florida. The committee recommends:

7a. Provide tangible incentives and rewards for entrepreneurial activities

7b. Market UM CoE as a South Florida hub for innovation

7c. Develop formal BS/MS internship program with UM partners in Industry and Government

7d. Create CoE positions for "Professors of Practice" and hire industry executives to fill them on a temporary contractual basis

7e. Invest in resources for formal training in soft-skills such as leadership and entrepreneurship

7f. Create a spectacular incubator space that inspires and facilitates teaming and training for university spinouts

8. Much of the best work in science and engineering emerges when interdisciplinary teams work collaboratively on common problems. This committee strongly feels that we should encourage interdepartmental, inter-college and inter-university research collaborations. *Assigning value to interdisciplinary collaborations*, recognizing its value during the evaluation of promotion and tenure, would be a one such mechanism. True interdisciplinary collaborations take time to establish and needs continual efforts from the college faculty and administration. We recommend the following action items:

8a. Identify strategic areas where translational alliances can be built with the School of Business, Arts and Sciences, Miller School of Medicine, School of Architecture, and RSMAS

- Energy (Physics, Chemistry, Architecture, Public Administration)
- Resilience (Architecture, Public Administration)
- Smart Cities & Communities (Computer Science, Architecture)
- Water/Food/Energy Nexus (RSMAS, Architecture)
- Sustainability (Business, Architecture)
- Climate Science (RSMAS)
- Big Data (Computer Science, Math, CCS, Biostatistics)
- Surveillance (Computer science)
- Robotics (Computer science)
- Active Materials (Chemistry, Biology)
- Synthetic Biology (Biology, Biochemistry and Molecular Biology)
- Computational Biology (CCS, Biology)
- Genome Editing (Biology, Biochemistry and Molecular Biology)
- Nanotechnology (BioNIUM)
- Health Monitoring (Public Health)

8b. Lead the writing and submission of trans-department and trans-college grants to the Federal and State funding agencies (NSF ERC, NSF SC&C, NSF STC, NIH CTSI, NIH P grants, DoD and DoE multidisciplinary grants, USAID, DHS, etc.)

8c. Initiate a PRA/CREF type internal funding mechanism to support the seed work of potentially successful collaboration amongst these schools