

CoE Roadmap – Educational Innovation

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Here we summarize our vision on **educational innovation** for the College of Engineering (CoE). We have listed our recommendations under three main groups: Engineering Student Life, Curriculum and Faculty Development. All of them share a common theme: the removal of the physical and virtual barriers between departments to allow interdisciplinary collaboration between and among faculty and students. We strongly believe that for our CoE to become competitive and deliver the best education possible, communication and collaboration amongst departments must be fostered and encouraged, both at the research and the teaching levels. These ideas and initiatives clearly align with President Frenk's goal for the University of Miami: achieve excellence in education.

Engineering Student Life

1. Innovation café and design studio: Students will have a place to enhance their design thinking skills: the space will have design studio rooms for creativity activities such brainstorming and collaboration and spaces for informal interactions.
2. Maker space: Students will have access to a variety of equipment and facilities including rapid prototyping. The maker space will work on extended schedules (night and weekend) and will have technical support available to students.
3. Senior Design Expo: The CoE will have a Senior Design Expo day, open to the entire UM community and industry, where design teams present their projects and demonstrate their prototypes. Senior design projects will also be better introduced to students across their academic career.
4. Outreach: The CoE will increase its involvement in K-12 outreach activities to engage the future generations in Engineering. In addition to student club activities, the CoE will support initiatives such as Scout Girls Engineering Day, summer programs, etc.
5. Student Activities & Involvement: Engineering student organizations and projects will be better encouraged and supported through advising, funding, and promotion throughout the University. If leadership and innovation are shown, they will be given extra avenues for activities.
6. Machine Shop: In conjunction with earlier initiatives, the Machine Shop will be reevaluated for its capabilities, administrated in a different fashion, and through funding and attention, revamped for the 21st century with newer facilities, tools, and training.
7. Study Abroad: The College's approach towards study abroad programs in the field of engineering and offered to its students needs to be revised. Students should be able to access information online or through an appropriate liaison at the college. All students should be better informed on how to balance an abroad program with their engineering curriculum. The curriculum should also offer more flexibility with regards to course selections and projections affected by study abroad.

Curriculum

1. BS Level:
 - a. Entrepreneurial Mindset: We embrace the vision and strategy of the Engineering Education Reform through Innovation and Entrepreneurial Mindset (EERIEM) grant proposal submitted by Dean Bardet to the NSF. "EERIEM's main goal is to **reform the instructional administration** in each of the five departments of the College of Engineering (CoE) at the University of Miami, so that **our faculty can become well-versed and engaged in best practices in professional formation and deliver the best possible undergraduate education**. The departmental reforms will be driven by mobilizing the innovation and entrepreneurial mindset that is now blossoming in the innovation ecosystem of Miami and South Florida."
2. MS Level:
 - a. Interdisciplinary professional degrees supervised by Industry advisory boards:

- i. COE will offer professional interdisciplinary Master Degrees taught at schedules compatible with full time working professionals (evening and/or weekend classes).
 - ii. These programs will serve the local Industry and consequently the Industry Advisory Boards will have a key role identifying unmet needs. Departments will invest significant resources in the identification, analysis of the competition (other universities) and design of the professional master programs.
 - iii. Collaboration will weave across the university. The programs will involve other UM Schools to offer a unique blend of technical/professional skills to our graduates. Engineering topics will be complemented with management ones such as project management, persuasive communication, business analytics, leadership, etc. There are currently several Master's programs at the College of Engineering that collaborate between COE and the Business School, the School of Medicine, Music School, and RMAS (currently four degrees in IE and one in BME are offered). We would like to build on these unique programs and expand them collaboratively.
 - iv. All BS/MS students will have the possibility to have the MS coursework fully compatible with the professional programs.
3. PhD Level:
- i. PhD students will have the opportunity to get training in engineering education. Through mentorship, teaching practice, and other initiatives, students will develop the necessary skills to be successful in a teaching career.
 - ii. As a large majority of engineering PhD recipients will work outside academia, the PhD curriculum will also be modified to enable PhD interested students to get prepared for industry. Some of courses of the professional masters will be accepted as part of the PhD coursework.
 - iii. An I-Corps innovation/design course will be offered at Master/PhD level. I-Corps is an NSF initiative that provides a real world, hands-on learning in the process to start a high-tech company.
 - iv. We see an opportunity to offer PhD programs to engineering faculty from institutions in the Americas who invest in faculty development as they increasingly apply for ABET accreditation. Flexible/Dual/Joint degrees between EU countries (England, France, and Spain, for example) and the Americas have proven to be very successful.

Faculty Development

1. STEM Learning Community: The CoE and the College of Arts and Sciences will host a STEM Learning Community (SLC), open to all faculty engaged in STEM undergraduate teaching. SLC will have as permanent members the CoE educator faculty. Through SLC meetings, faculty will discuss ideas, course activities, and technologies to enhance teaching and learning. The SLC is foundational to the improvement of teaching and learning.
2. Partnership with Olin College of Engineering: As part of our collaboration with Olin College we will host a yearly winter innovation in teaching institute, held in Miami.
3. Incentives Mentoring: CoE faculty will have an Individual Development Plan (IDP). The IDP will include 10-year career goals, a primary mentor and specific development activities, among others. The IDP will be updated periodically. The IDP will be supported by incentives including course reductions during training, new curriculums, or mentoring faculty, as well as summer month salaries when designing courses, and a trained teaching assistant. This will tie in with a change in evaluations to account for engagement in active learning.