



ENGINEERING
TEXAS A&M UNIVERSITY

The Future of Engineering Licensure in the face of Changing Engineering Education

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Students are learning differently



Students are learning differently



Using the chat feature, guess which engineering major is taking this lab class.

Schools are teaching differently



Number of engineering majors in 1900 **2**

Number of engineering majors in 1980 **12**

Number of engineering majors in 2020 **22**

Even accreditation occurs differently



“In 1997, following nearly a decade of development, we adopted Engineering Criteria 2000 (EC2000), considered at the time a revolutionary approach to accreditation criteria. EC2000 focused on outcomes (what is learned) rather than what is taught. At its core, EC2000 affirmed the importance of institutions establishing clear objectives and assessment processes to ensure that each program provides graduates with the technical and professional skills employers demand.”¹

“The findings from this study² strongly suggest that improvements in student learning have indeed resulted from changes in engineering program curricula, teaching methods, faculty practices, and student experiences inside and outside the classroom.”

¹<https://www.abet.org/about-abet/history/>

²<https://www.abet.org/wp-content/uploads/2015/04/EngineeringChange-executive-summary.pdf>

Even accreditation occurs differently



Importantly, EC2000 enables. . . No, MANDATES. . . accredited engineering programs to constantly reflect and, when necessary as determined by stakeholders, make adjustments to their curricula through a continuous improvement process.

ONE LAST THING

**Industry Coyote,
Wylie's lesser
known brother.**



**Industry is requiring
that engineering
graduates have more
multidisciplinary
background**

Texas A&M's Response



Launched in September 2020, the Department of Multidisciplinary Engineering offers innovative options for students who want to specialize in a non-traditional engineering field or to study a blend of engineering disciplines. Some of our specializations prepare students for new and emerging career fields.

An example. . .



- The Bachelor of Science in Interdisciplinary Engineering enables students to select up to 58 credits of their coursework (128 credit hour degree).
- A student wishing to specialize in **Mobility Engineering**, for example, might select courses in:
 - Mechanical engineering
 - Electrical engineering
 - Computer science
 - Civil engineering
 - Aerospace engineering

How does one license such an engineer, who could go on to design autonomous vehicles, or infrastructure related to such?

Further. . .



- Multidisciplinary engineers could force a solution:
 - Pick a specialty and pass that exam; many engineers even from traditional disciplines naturally do this anyway.
 - **But is that the best solution?**
- How do we ensure licensure is guaranteeing the safety of society?
- Can or should licensure be used as a means to provide credibility to graduates coming from a non-traditional discipline?
 - Would, or should, industry value a licensed multidisciplinary engineer over a non-licensed one?

My thoughts



- Licensure must remain an essential element of the practicing engineer's credibility and credentialing.
 - Protects society. Keeps curricula in check. Provides substance to the engineer's complete education.
- Traditional licensing models should remain (e.g., mechanical, electrical, etc), but there **should be developed a means to evaluate and license a multidisciplinary engineer.**

Exploring that idea further



- Borrowing from ABET, EC2000 was transformative because it evaluated the output as determined by stakeholders.
 - Perhaps PE licensure can consider a mode of licensure that requires the practicing engineer to develop a portfolio consisting of past, present, and projected future engineering work demonstrating essential engineering skills (design, solid technical skillset), with a regularly evaluated continuous improvement plan and feedback loop. Putting lifelong learning front and center, making it essential to licensing.

One more thing. . .

- Engineering for non-engineers?
 - YES!
 - Minor for Engineering Concepts
 - 5 courses
 - Basic calculus required (too restrictive?)
 - Concepts of design, ethics, systems-level thinking, and engineering analysis topics covered throughout minor and along certain discipline lines.
- Launched in Fall 2020 with 18 students after only “word of mouth” advertising.



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Thank you for your attention.