

# **Planning versus Reality: Launching a New Multi-disciplinary Engineering Program**

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## **Abstract**

Launching a new academic program is a significant effort. This is especially true when it's multi-disciplinary and in a new emerging field. The development and launch of the new Bachelor of Science in Resource and Energy Engineering (BSREE) program at the University of Texas at Arlington (UTA) has taken four years and required multiple revisions even before the first students have shown up on campus. Significant changes have been made, and are still underway, based on reviews of other related programs, student and market data, and assessment of the program management approach. The program has been approved and UTA is preparing for the first cohort of students in fall 2023.

Texas is a logical choice to start a new resource and energy engineering program. The state produces and uses more energy than any other state in the country. Texas is known for oil, as well as other fossil fuels. What isn't as widely known is that Texas is also a leader in renewable energy. Producing, storing, and distributing energy is highly complex even before adding the challenge of companies combining energy from multiple sources. This complexity was the driver behind the new BSREE program. Industry reported that they are able to find most of the engineering talent needed for each of their individual energy portfolios. What is more difficult is finding enough engineers who have system level understanding of energy management.

Proposing a new program requires a review of existing programs, understanding of student and market interests, and research on employment trends both regionally and nationally. If the data shows potential support for a new program, then a management plan is needed, and a financial model is developed.

The first challenge in developing the BSREE program was to benchmark with existing programs. There are few programs in the U.S. that focus on a broad systems-level approach to resource and energy education. Typical programs are focused on one domain, such as petroleum engineering or mining engineering. Programs focused on renewables, such as solar and wind, are also singularly focused. To better understand the market, the initial review was expanded to include top international programs. The team developed multiple programs of study to balance the depth needed to fully understand energy sources and the breath needed to plan and operate a diverse company that draws on multiple fossil and renewable energy resources.

The second challenge was to develop a clear picture of student and market demand. Energy engineering is a relatively new area and as such it is not tracked by the U.S. Bureau of Labor Statistics. To compensate, surveys of all incoming freshman engineering students were done. Fortunately, Texas also has a relative robust resource to track industry and regional hiring. It also

includes a detailed listing of the most requested skill sets for each job class. Further research was also done on the energy industry in general to see what new graduates were typically hired and what additional training is provided by companies.

The third challenge that is ongoing is to develop and install a program management that supports the multi-disciplinary structure of the program. This includes staffing plans for faculty, administration, advising, and technical support, all significant fixed costs that must be balanced with the projected enrollment model and with the revenue model used by the state. This program was fortunate in that many of the existing university wet and computer labs could be dual proposed until a better forecast of long-term demand is developed.

One recommendation from the experience of launching the BSREE program was the need to better understand local and regional requirements early. Texas requires all bachelors programs plan for 120 credit hours and be completed in four years. There is some flexibility for STEM programs that typically have many four credit courses in math and science. This credit hour cap, combined with the required general education curriculum and accreditation requirements, limits the flexibility in developing a new curriculum. The program of study has also gone through multiple iterations so that minors such as sustainability, wind, solar, and water can be incorporated into the degree based on student interest. Another area to consider is any fast-track options that allow students to move directly from the bachelors to master's program quickly by using dual credit courses. The program has also been revised to provide a stronger background in data science.

A second recommendation is to have two teams. The first team that will be responsible for developing and managing the program proposal through the university and state approval process. This team has a core comprised of a representative from university administration and the college. Additional resource team members from support functions such as facilities, technology, and admissions can be added as needed. The second team is responsible for the curriculum. This team should be operational well before the program is submitted for approval. A detailed review of existing university programs is needed to determine which existing courses can be incorporated into the new degree program and what courses need to be developed. Curriculums evolve and drawing on support from other academic units requires more coordination and management than many predict.

The third recommendation is to evaluate the best approach to incorporate the new program into the existing operation of the college. To keep with the multi-disciplinary nature one option was to house the program from the Dean's office. While this may work for some graduate programs it is more problematic for bachelor's programs. Early management plans included the need to add a significant number of staff and advisors to be available when the program was launched. Issues were identified related to career paths for the new faculty and having a home to focus student activities. The approach selected was to house the program in an existing department, electrical engineering, and then evaluate if it should become an independent department once the program is established.

Institutions continually develop new programs to meet student and industry needs. Our existing approaches may not be effective in the future. The pace of change in student and industry interests will increase so an agile and rapid responsive approach to bringing new programs on-line would be beneficial.