

## **Finally Begun**

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A lot was accomplished at the Spring BMES Board Meeting at the end of February, but, as far as I was concerned, the biggest accomplishment was the passage of a motion to support progress toward registration of bio-based engineers. I have really thought that this step would be the one that defines our discipline as separate and distinct. I have written before about the formation of a new discipline with biology and engineering at its central core. It has not been easy, especially because there are so many opportunities these days in bioengineering that the field is attracting lots of attention from those in other disciplines who begin working with medicine or biology, but who have not had the core of bioengineering education given to those who have been in bioengineering from the start. With this constant influx of participants who are not themselves bioengineers by training, it has been difficult to reach consensus about what constitutes a bioengineer and what expectations there are for them.

A separate discipline is distinguished not only by scope of technical knowledge, but also by methods. We have only recently begun to agree on the essential technical knowledge part (as evidenced by Rob Lindsenmeyer's surveys), but I doubt whether many people have even thought about methods. Nonetheless, an exam to license bioengineers gives legal recognition of bio-based engineers as a separate field of engineering practice equal in the eyes of the law with mechanical, electrical, chemical, and civil engineering. It is a rite of passage, and we are on our way.

The licensure process has several steps. The first is the fundamentals of engineering (or FE) exam that is supposed to test engineering knowledge common to the first two years of engineering education (that is, before splitting into discipline-specific tracks). There may not be any bio-based questions on the FE exam, except if we push for some to be included. I personally think that biology is so important these days that all engineers should have at least one course in basic biology (and, preferably, a biology for engineers course that gives them biology useful for understanding systems of living things and their responses to the physical, chemical, and biological environment in which they are found—but that is the topic for other discourses). Anyway, there may be a few biology questions on the FE exam, but we can't expect many.

The next step in the examination process is the engineering practice exam taken after at least four years of certified engineering experience. Two parts comprise this exam: a common part, usually administered in the morning of the exam day, and a specialized part given in the afternoon. There is a lot of commonality in the knowledge base for all bio-based engineers, and this common knowledge should fulfill the a.m. requirements. I have written previously about what I think should constitute some of this material. No matter whether the prospective engineer has interest in medicine or biofuels, systems biology or ecology, there are principles and facts that would be expected to be known by all.

The afternoon portion of the exam could be filled with applications-specific questions. It would be here that we distinguish among agricultural, biochemical, bioenvironmental, biological, biomechanical, biomedical, or the myriad of other bio-based engineers and their areas of application. I assume that all interested professional

societies would cooperate on content for the first part of the exam, but perhaps separately produce the second part.

All this is years in the future. Between now and then there is much work to be done and details to be worked out. Several levels of approval are required. However, we have taken the first definitive step—it is a step that clearly looks to the future and a time when biomedical engineering and bioengineering will have come of age, achieved the recognition that we have so desired, and can proudly mark this as our domain.