Engineer or Technologist? Which Fits Best?

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Abstract

There is an ongoing discussion of the benefits of an Engineering degree versus an Engineering Technology degree. Perhaps the first question that the student must answer is what are their expectations and desires for a career as an engineer? If their interests lean toward mathematics and research, then the path could lead to a career as an engineer. If their interests lead toward hands-on and product development, then the path could lead to a technologist. Some of the commonalities and differences will be discussed in this paper.

Introduction

What distinguishes a BSE and a BSET? Should you care? To answer the question, you must know what the letters stand for. In the first case, the E represents Engineering. In the second, the ET stands for Engineering Technology. There may be an even more defining term as each can cover specific engineering programs such as Electrical (BSEE/BSEET), Mechanical (BSME/BSMET), Industrial (BSIE/BSIET), and so forth. You may ask again, why should you care? To better understand the difference can be approached by looking at the ABET program criteria (1,2) used as part of the process in accrediting university programs. It should be noted that ABET has additional requirements for accreditation as outlined in the ABET Accreditation Policy and Procedures Manual. (5) (ABET was formerly known as the Accreditation Board for Engineering and Technology.)

Discussion

In general, a program must meet the General Criterion (3) as specified by ABET for accreditation, and the Program Specific Criterion (4) as identified by the title of any given program, i.e., Electrical Engineering, Computer Engineering, Computer Science, and so forth. While not going into detail, the ABET General Criterion (3) includes:

> Criterion 1 – Students – progress is monitored to ensure graduates attain Program Educational Objectives.
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> Criterion 2 – Program Educational Objectives – established and consistent with institution mission and program's expectations.
>
> Criterion 3 – Student Outcomes – documented outcomes that prepare student to achieve Program Educational Objectives.

> Criterion 4 – Continuous Improvement – program has documented processes for assessing and evaluating the extent student outcomes are achieved.
>
> Criterion 5 – Curriculum – must effectively develop subject areas in mathematics, technical content, and physical and natural science.
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> Criterion 6 – Faculty – must have expertise and educational background expected.
>
> Criterion 7 – Facilities – classrooms, offices, laboratories and equipment must be adequate.
>
> Criterion 8 – Institutional Support – Must be adequate to ensure the quality and continuity of the program.

In looking at the criterion in depth, that specified by ABET, the Engineering Accreditation Commission (EAC) for BSxE programs, and the Engineering Technology Accreditation Commission (ETAC) for BSxET programs, most of the criterion appear to match almost word for word. For example, Criterions 1, 2, 4, 6, 7, and 8 are similar enough as to appear with only minor wording differences. In Criterions 3 and 5, there are some wordings to more clearly identify the differences of the two programs, where "design" is more frequently found in the BSxE programs, and "technology" found in the BSxET programs. For example, in Criterion 3.c, the EAC wording for Student Outcomes is:

> "(the student must demonstrate) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (2)"

In the ETAC version, Criterion 3.d, the wording is similar, but with subtle differences:

> "(the student must demonstrate) an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational
>
> objectives. (2)"

Note the emphasis on the design aspects of the BSxE program versus the problem-solving emphasis in the BSxET program.

In a similar manner, Criterion 5 from EAC requires programs to include a year of college level mathematics, generally calculus, differential equations, probability, and statistics, plus a year and a half of engineering topics consisting of engineering sciences and engineering design appropriate to the student's field of study. In the ETAC program requirements, mathematics through calculus is the only requirement, and the course content is to include a technical core for the student specialty, as well as the development of student competency in the use of equipment and tools common to the discipline. The fundamental difference is in more emphasis on the theory approach to the BSE program and the technical content for the BSET program.

With so many common criteria points, what then may be the difference? From an industry perspective, the main difference I have seen over the years is that BSET graduates more quickly adapt to industry needs. Whether in field operations, manufacturing, product test, or any number of other typical engineering classed assignments, the BSET graduate appears to have a better grasp on application of curriculum courses to real world problems. That is not to say that the BSE graduate cannot adapt and be productive, but it appears that the BSET graduate has accumulated more general knowledge along the way, while the BSE graduate has the edge in the theoretical aspects. If an assignment involves heavy use of advanced mathematics, then the BSE graduate most often has the edge over the BSET graduate – as one would expect based on accreditation curriculum requirements. One might argue that the additional mathematics required for the BSE degree set the bar too high for the BSET graduate to be successful, but that is not the case. In most industrial applications, the graduate, BSE or BSET, will find little, or no, requirement for the application of higher mathematics, even in the use of calculus! What industry is looking for is the student who has a well-rounded background and education, who can come into the position and be successful quickly. From my experience, the BSET graduate can perform satisfactorily more quickly than the BSE graduate in such areas as Manufacturing Engineering, Manufacturing Automation, Field Engineering, Quality Assurance, and Product Test to name just a few opportunities for the new graduate engineer.

A major drawback to the BSET graduate is that the US Federal Government does not recognize the BSET degree as being an "engineer". As a result, the BSET graduate cannot apply for, and hope to win, jobs with the Federal Government advertised as being "engineering opportunities". That is a sad commentary on the understanding by the Department of Labor, as the BSET graduate will be as successful as the BSE graduate for most engineering applications or opportunities. It is my understanding that the Federal Government is currently reviewing that limited position in order to enable BSET graduates to be classed as "engineers" for government career opportunities. In a similar manner, some states will not recognize the BSET degree when it concerns becoming a Professional Engineer (PE). The state requirements may require a BSE degree from an accredited program, thus eliminating that avenue to the BSET graduate. It is a minor point, as most industry opportunities do not require PE certification for opportunities, thus the BSET graduate is on an equal footing in most career opportunities.

Conclusion

The question remains, which avenue should you pursue? It depends! If you enjoy mathematics, using the knowledge to solve complex problems in design projects, then the BSE may be the correct choice. On the other hand, if you would rather work with your hands using the knowledge base gained in school, then the BSET may be the proper choice. Either choice is a good one, so decide your strong points and interests and let the chips fall where they may! Enjoy your career as an Engineer or Technologist, the choice is up to you.

References:

1. ABET (2018), *Criteria for Accrediting Engineering Programs*, Baltimore, MD.
2. ABET (2018), *Criteria for Accrediting Engineering Technology Programs*, Baltimore, MD.
3. ABET (2018), *General Criteria*, Baltimore, MD.
4. ABET (2018), *Program Specific Criteria*, Baltimore, MD.
5. ABET (2018), *Accreditation Policy and Procedure Manual*, Baltimore, MD.

About the Author

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