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Frequently Asked Questions by ME Program Evaluators

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The ME Program Evaluator should take a holistic approach to evaluating a program. Do not feel that you must find something negative in order to be a successful evaluator.

Mechanical Engineering Program Criterion

1. Curriculum

The program must demonstrate that graduates have the ability to apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations) to model, analyze, design, and realize physical systems, components or processes; and have the ability to work professionally in both thermal and mechanical systems areas.

Why were the ME Program criteria revised?

The revised ME program criteria were developed to provide flexibility so that programs can respond to the broadening field of mechanical engineering, can better differentiate program educational objectives, and can accommodate the increased interests of mechanical engineering students to pursue a wide variety of career paths.

Why are multivariate calculus and differential equations singled out for special attention in the ME Program Criteria?

Multivariate calculus and differential equations are part of the technical core for mechanical engineers. All graduates must be able to apply knowledge of these subjects.

What is meant by the term “basic science”?

In the previous version of the criteria, basic science was considered calculus-based physics and chemistry. In order to ensure that future engineers can adapt to emerging fields, a broader science background may be necessary. The revision gives a mechanical engineering program sufficient latitude in defining this curricular area consistent with its program objectives. Basic sciences include physics, chemistry, ecology, geology, biology, and other topics.

How can someone be a mechanical engineer without requiring depth in physics?

As described above, rather than prescribe specific science courses, the new program criteria define the student outcomes: that graduates be able to “model, analyze, ... physical systems, components or processes...” A program can now determine which basic science courses are essential for a graduate to develop those outcomes consistent with the program’s objectives.

Why are statistics and linear algebra no longer explicitly mentioned?

The new criteria attempt to be less prescriptive and allow programs to determine the manner in which their students learn the mathematics necessary to support their program objectives.

What does “*realize physical systems*” mean?

The objective of "realize" is for students to validate their designs of physical components or systems. Mechanical engineers work with physical systems that range from molecular scale (nano-devices) to large scale power plants. Hence realization can involve an actual build experience, prototyping, assembly of built components, outsourcing, or simulations of physical systems to validate a design. Realization can be introduced into the curriculum in various ways and does not require that students perform actual fabrication. Students may rely on technicians or use off the shelf components. Program evaluators need to be flexible in evaluating how programs realize physical systems. Realization does not have to be associated with the major design experience; however, students must have an understanding of the importance and complexities of manufacturing a physical system to meet the specifications to which it was designed.

What does “*have the ability to work professionally in both thermal and mechanical systems*” mean?

Students must acquire the necessary knowledge and skills in both thermal and mechanical systems to enter engineering practice upon graduation. Although some open-ended design experience is expected in both thermal and mechanical systems, the criterion does NOT require a major design experience in both areas, Some programs may have greater emphasis on one stem than the other.

Criterion 5 requires that “*Students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.*” What are some examples of how mechanical engineering programs might accomplish the major design experience?

A mechanical engineering program might structure the major design experience in the following manner:

- 1) designing and fabricating a system, process or device while incorporating multiple realistic constraints (e.g. safety, economic, ergonomic, etc.) and appropriate engineering standards such as those of the ASME
- 2) designing a system, process or device and integrating an engineering simulation with explicit consideration of external factors to demonstrate why configuration A is better than configuration B
- 3) making measurements on an existing system, process or device, conducting a design study (including constraints and standards) and recommending modifications. Testing to validate the design would be a big plus, but should not be expected considering the limited time and resources available for the typical major design experience.

Questions or Comments? Please email Sonia Moin, ASME Manager, Education at moins@asme.org