

BEEC Share and Learn Report: October 2023

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Topic: What is ABET?

Resources:

- <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2022-2023/>
- <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2022-2023/#GC3>
- <https://catme.org/> - for design classes and showing criterion 5 (teamwork) in Criterion 3: Student Outcomes

Presentation Overview and Q&A (was integrated within talk):

- ABET Report and Definitions
 - PEOs – program educational objectives vs. SOs – student outcomes
 - Concern – satisfies but need to
 - Weakness – program lacks a strength of compliance
 - Deficiency – not meeting criterion
- Criterion 1: Students
 - Need to be advising students on curriculum and career matters
 - Can be dedicated person or not
 - Have enforced policies for transfers, taking courses at other institutions or credit for work in lieu of taking courses
 - Christine Question: How do you balance flexibility and making sure they follow the curriculum in order?
 - Need to have it built in to be modular if you are having a lot of exceptions, and if are having a lot of exceptions, then you need to change your policy
 - Has auditing system to ensure all students take appropriate classes in proper order
 - Exceptions must be documented well
- Criterion 2: Program Education Objectives
 - Describes what graduates are expected to attain within a few years of graduation
 - The program can decide what they have to know and can be within a few years of graduation and not immediately afterwards
 - Up to individual program to define, but you need a system to periodically review these and need to be documented that they systematically review them
 - Don't need to assess them, just have them, have constituencies, and a way of reviewing them in a systematic manner
- Criterion 3: Student Outcomes
 - Describes what students should know at the time of graduate
 - Outcomes 1 – 7, must be taught throughout curriculum
 - E.g. 1 – students should have something in the class where they have to identify, formulate, and solve an engineering problem
 - Question: Nicole Ramo – can you define what the “complexity” of ABET outcomes is for criterion 1?
 - There is a definition of complex engineering problem, and what rises to level of the complex engineering problem
 - Complex engineering problems definition: include one or more of the following characteristics: involving wide-ranging or conflicting technical issues, having no obvious solution, addressing problems not encompassed by current standards and codes,

involving diverse groups of stakeholders, including many component parts or sub-problems, involving multiple disciplines, or having significant consequences in a range of contexts.

- <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2022-2023/#GC3>
- Can research count as engineering design? Can an AI project meet this?
 - If you structure your capstone project in a way that it meets these, then yes, but it's up to the program that it demonstrates that it does
 - Engineering Design: a process of devising a system, component, or process to meet desired needs and specifications within constraints. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and engineering sciences are applied to convert resources into solutions. Engineering design involves identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade-offs, for the purpose of obtaining a high-quality solution under the given circumstances. For illustrative purposes, examples of possible constraints include accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability,
- 5 – many use catme to show that they can function on a team, but it doesn't show how they plan tasks etc., they do show collaboration and inclusiveness though in the software
- Criterion 4: Continuous Improvement
 - Document processes for evaluating extent to which student outcomes are being attained and utilized as input for continuous improvement actions
- Criterion 5: Curriculum
 - Must include a min of 30 semester hours of college math (calculus and higher) and basic sciences with experimental experience appropriate to the program
 - Min of 45 semester credit hours of engineering topics appropriate to the program, consisting of engineering and computer science and engineering design
 - Jenny Amos Question: Do you split it or count it as engineering only or science only?
 - Biomed doesn't have this problem since we tend to have chemistry, biology, etc. but there are issues for what "counts" for things like biotransport – is it science with cell bio or is it engineering? Some will count ½ science and ½ engineering. It is up to the program evaluator
 - Culminating major engineering design experience
 - Appropriate engineering standards – you need to show they used ISO/ASTM/IEC, program FDA standards? – when they experiment to test prototype they need to pull ISO/ASTM standard and design experiment based on that
 - Make sure you make a list of all the capstone projects and a list of standards each project used
 - Christine King Question: I struggle to get access to the ISO standards as they're expensive, any advice?
 - Scott Wood: we're able to sometimes get access to ISO standards through interlibrary loans
 - Jenny Amos: if your library can't help it's ok. You don't see the details, just that they know there are a list of standards and then how it applies (or would be applied). You can usually see the table of contents for it or get a summary and then students can comment on how it applies.
- Criterion 6: Faculty:

- Faculty members are sufficient in numbers, qualified, demonstrate sufficient authority to ensure guidance of the program (e.g. are they in control of the curriculum) and are integrated in implementing the evaluation, assessment, and improvement of the program
- Need enough faculty to teach the program and the right faculty to teach all of the classes
- Criterion 7: Facilities
 - Classrooms, offices, labs, and equipment for students to attain student outcomes
 - Nicole Ramo: from out visit, lab safety (e.g. MSDS sheets, biological waste, disposal procedures, etc.) seemed like more of a focus than I expected.
 - Makerspace: are they safe, are they trained to use the equipment. 3D printers have exhaust need to have ventilation and taken care of
 - Library should have access to journals and search engines like PubMed etc.
- Criterion 8: Institutional Support
 - School must provide resources to attract, retain, and provide support for qualified faculty
- Question: Nicole Ramo – how honest do you be when you are talking about lack of support from school for the project? What is the line between advocacy for program an not being the reason behind not being accredited?
 - If it's a common problem it will be heard across the departments and can be used to instigate support, so don't be shy to mention it
- Accreditation Policy and Procedure Manual (APPM)
 - If you are accredited, PEOs, SOs, enrollment, and graduation data must be online
 - Documentation must be in English even if in international school
 - Make sure tracks are available online as well and well documented
 - MSDS and safety is very emphasized and should be available online
 - No need for the textbooks and supporting materials be printed, can all be digital now and provided before they come
- Program Criteria for BioMed Programs
 - Breadth and depth across range of engineering and science topics can be defined by program themselves
 - Must have applied principles of engineering, bio, physio, chemistry, calculus physics, math, and statistics
 - Solving bioeng problems with living and non-living systems
 - Analyzed/model/design bioeng devices, systems, processes
 - Making measurements on and interpreting data from *living* systems
 - Histology and MRIs count! But simulated ones don't, needs to be a living system
 - Nicole Ramo Question: Do most programs typically assess these points?
 - You can assess them but it's not required to report to ABET
 - Karissa Tilbury Question: can these be technical electives or must they be a part of the core curriculum?
 - Every student has to be able to experience them, so easiest is through core curriculum, but you can have different options that are different for each track, but all students must have it somewhere
 - Nicole Ramo Question: We had students do EMG/ECG labs and shared posters with other faculty, and program evaluator said you have to have an IRB to do it?
 - It's because it counts as generalizable knowledge and dissemination of findings, should be a lab report for
 - Karissa Tilbury Question: to be a program evaluator, you must have a degree in engineering. We have faculty without these degrees, to be a program evaluator you must have an engineering background because you are evaluating design. Where is the line in regards to teaching design being taught by those without engineering degrees? Will this be a red flag?
 - If they have experience with medical devices/consulting, it can substitute, but you need to explain it to program evaluating officer
- What can you do?

- Volunteer to be program ABET coordinator
- Volunteer to be a Program Evaluator (PEV) – is a service to society and you can learn a lot about other programs and how to apply it to your own institution
 - You will get a mentor to contact during visits for questions you may not know the answer to
 - You get a training mentor