Current Topics in BME ABET Accreditation
Moderator

Debbie Wells, BS BME, MBA

Chair, BMES Accreditation Activities Committee (AAC)

Chief Technology Officer/Deputy Program Manager, AECOM

Email: debwells@cfl.rr.com
Jenny Amos, PhD

BMES Representative to the Engineering Accreditation Commission (EAC) of ABET

Teaching Associate Professor, Department of Bioengineering, University of Illinois at Urbana-Champaign

Email: jamos@illinois.edu
Announcements

• The archived recording will be available shortly after the webinar on the BMES website.

• You may submit questions throughout the webinar by using the online chat function. Your questions will be addressed after the speaker presentations.

• Please take a few minutes to complete the brief survey following the webinar to provide us with your feedback.
Lead Society

• BMES is the lead society for BME and BioE program ABET EAC evaluation
• Cooperating societies include:
  – American Ceramic Society
  – AIChE
  – ASABE
  – ASME
  – IEEE
• On a visit or when reviewing an interim report, PEVs serve as representatives of ABET, BMES, and their home society (if applicable)
BMES and ABET

- BMES Accreditation Activities Committee (AAC)
  - Membership approved by BMES Board of Directors
  - Coordinates all BMES activities related to ABET
  - Membership includes
    - Chair (3-year term)
    - PEV Assignment Coordinator (4-year term)
    - QA Coordinator (4-year term)
    - Four Members-at-Large [MAL] (4-year term)
  - Ex Officio Members
    - BMES Reps to ABET BoDel and EAC
  - Corresponding Members
    - Chair of Council of Chairs, (BME and BioE ABET accredited undergraduate programs)
Who is the BMES AAC? (2019-20)

- **Jenny Amos**, Ph.D.
  University of Illinois at Urbana-Champaign
- **Gail D. Baura**, Ph.D.
  Loyola University Chicago
- **Paul Benkeser**, Ph.D.
  Georgia Institute of Technology
- **Edward Berbari**, Ph.D.
  Indiana University-Purdue University Indianapolis (IUPUI)
- **Dan Cavanagh**, Ph.D.
  Bucknell University
- **John D. Gassert**, Ph.D., P.E.
  Milwaukee School of Engineering
- **Michele J. Grimm**, Ph.D.
  Michigan State University
- **Benjamin S. Kelley**, Ph.D., P.E.
  Baylor University
- **Noshir Langrana**, Ph.D.
  The State University of New Jersey
- **Jon Moon**, Ph.D.
  MEI Research, Ltd
- **Steven Schreiner**, Ph.D., P.E.
  The College of New Jersey
- **James A Sweeney**, Ph.D.
  Oregon State University
- **Cedric F. Walker**, Ph.D. P.E.
  Tulane University
- **Jennifer Wayne**, Ph.D.
  Virginia Commonwealth University
- **Debbie Wells**, MBA
  AECOM/Kennedy Space Center
Role of BMES AAC

- Solicit nominations for PEVs
- Assign PEVs and mentors for requested visits
- Train PEVs – especially wrt Program Criteria
- Review visit reports for program and curriculum trends
- Review PEV assessments for QA
- Facilitate the development and review of BME Program Criteria
ABET PEV Training Requirements

• PEV candidates participate in a 1½-day face-to-face training workshop after completing online training encompassing six modules:

  1. Welcome and Overview
  2. The Accreditation Process
  3. The Role of the PEV
  4. Quality Improvement of Student Learning
  5. Applying the Criteria
  6. The PEV Appraisal Process

• Society-specific training (i.e., BMES)
Assistance for BMES PEVs

- PEVs participate in BMES AAC training
- BMES PEVs do not go on an observation visit
- Each new PEV is assigned a mentor for their first year
  - Answer questions during training
  - Sounding board before, during, and after the visit
- All PEVs are assigned a consultant from the BMES AAC
  - Help with questions related to Program Criteria
- If PEVs have questions during a visit
  - First line of assistance is the Team Chair
  - If question remains or a 2nd opinion is warranted, contact consultant and/or mentor
All EAC programs must demonstrate they satisfy General Criterial for Baccalaureate Level Programs (Eight criteria)

1. Students
2. Program Educational Objectives
3. Student Outcomes
4. Continuous Improvement
5. Curriculum
6. Faculty
7. Facilities
8. Institutional support
Program Criteria

Paul Benkeser, PhD

BMES Representative to the EAC of ABET

Professor, Wallace H Coulter Department of Biomedical Engineering, Georgia Institute of Technology

Email: pbenkeser@gatech.edu
What Are Program Criteria?

• Established by lead societies, with input from constituents, and approved by ABET

• Provide specificity needed for interpretation of general criteria

• Limited to areas of:
  – Curricular topics (supplementing GC Criterion 5: Curriculum)
  – Faculty qualifications (supplementing Criterion 6: Faculty)

• Programs must demonstrate that these program criteria are met
BME/BioE Program Criteria

These program criteria apply to engineering programs that include “bioengineering,” “biomedical,” or similar modifiers in their titles.

1. Curriculum

The structure of the curriculum must provide both breadth and depth across the range of engineering and science topics consistent with the program educational objectives and student outcomes.

The curriculum must prepare graduates with experience in...:
BME Program Criteria con’t

The curriculum must prepare graduates with experience in:

• applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations), and statistics;

• solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems;

• analyzing, modeling, designing and realizing bio/biomedical engineering devices, systems, components, or processes; and

• making measurements on and interpreting data from living systems
Key Concepts:

demonstration of student learning

- The Program Criteria by themselves are not outcomes and thus are not subject to the assessment and evaluation requirements of Criterion 4
  - A program must demonstrate the curricular topics within the Program Criteria are included in the program’s curriculum
  - Many programs choose to use syllabi, textbooks, lecture slides and examples of student work as evidence
- If a program includes Program Criteria curricular topics within their student outcomes, then (and only then) the Criterion 4 requirements do apply
Key Concepts:
Breadth and depth

• **Breadth & depth** across range of engineering topics
  – Implied by title of program
    o Program has freedom to identify engineering topics relevant to the discipline
  – Should be evidence of a breadth of engineering topics
    o As defined by the program
  – Should be evidence of a depth of learning in a subset of the engineering topics
    o As defined by the program
Key Concepts:

Applying principles...&...Solving problems

- **Applying principles** of biology & human physiology
  - Specific subtopics are not defined, programs have the freedom to determine subtopics
  - Independent or integrated coursework in these topics should be in evidence

- **Solving bio/biomedical engineering problems**, including those associated with the interaction between living and non-living systems
  - Program should demonstrate that the curriculum includes the application of this foundational knowledge to the solution of BME-relevant problems/challenges
Key Concepts:
Differential equations...and...Statistics

• Experience in applying principles of mathematics (through differential equations) and statistics
  – Curriculum must include differential equations and statistics
    o Both/either stand-alone courses and integration of these topics into other courses are acceptable
Key Concepts:
Making measurements and interpreting data

• Must prepare graduates with experience in making measurements on and interpreting data from living systems
  – Data must not only be measured, but also interpreted (evaluated)
  – Programs must identify and provide evidence on how they meet this criterion
Key Concepts:
Interaction between living and non-living systems

• Solving BME problems including those associated with the interaction between living and non-living systems
  – There is no specific list of which interactions or problems must be addressed
  – Programs must identify and provide evidence on how they meet this criterion
Common Issues...all EAC

1. Students: Inconsistent advising & monitoring
2. PEOs: Constituents; related to mission
3. Outcomes: Attainment not measurable
4. Cont. Improve: Documentation; anecdotal
5. Curriculum: Satisfy capstone requirements
6. Faculty: Number, workload, prof development
7. Facilities: Insufficient space; unsafe
8. Inst Support: Open positions; support staff
Recent Shortcomings...BME

1. Students: Advising and prerequisites
2. PEOs: Constituent needs and systematic
4. Cont. Improve: Continuous and close loop
5. Curriculum: ES credits and “standards”
6. Faculty: Faculty number with rapid growth
7. Facilities: Heavy use and space with growth
8. Inst. Support: tech staff with growth
Basic Reminders

• PEVs must complete a thorough review of all the materials provided by the school prior to arriving on campus.

• The team chair will require PEVs submit their visit forms, including their recommendation and exit statement, early and often.

• The accreditation-action recommendation is a team decision and must be based on the self study report and on-campus evidence.

• All report material furnished to the team chair, must also be furnished to the BMES AAC mentor or consultant.
Final Points

• Programs must provide information to show that Program Criteria are met
  – Includes self study and on-campus documents

• Program criteria will differ between programs of different types
  – Don’t let concerns raised about PC’s in other programs influence you if they do not apply to BME/BioE

• The same levels of shortcomings are applied to the PC’s as other criteria
  – None, Concern, Weakness, Deficiency
QUESTIONS?
BMES Activities and Events

BMES 2019 Annual Meeting

Oct 16-19, 2019 – Philadelphia

BMES ABET Criteria Workshop Panel

Thursday, 17-October-2019; 1:30-3:00 ET