An Inside View on ABET Engineering Accreditor Training

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Elizabethtown College
Computer Engineering Program
Inside View?

- Most of talk based on notes from one-day accredditor training at ASEE 2001 conference
  - 95% of participants ABET accreditors
- Speaker presently helping accredit program(s) at Elizabethtown College
  - previous experience with EET accreditation at Purdue
Agenda

- What is ABET?
- Program requirements
  - Curriculum
  - Objectives
  - Outcomes
- Are you ready for ABET?
- Example program
ABET is:

- The Accreditation Board for Engineering and Technology
- Since 1932
- 31 engineering and technical societies
- Accredits >2500 engineering, technology, computing, and applied science programs at > 550 colleges & universities
ABET structure

- Participating Societies
  - Board of Directors
    - Engineering Accreditation Commission
    - Technology Accreditation Commission
    - Computing Accreditation Commission
    - Related Accreditation Commission
    - Industrial Advisory Council
    - International Activities Committees
    - Other Standing and Ad-hoc Committees
    - Executive Committee
ABET standards

- ABET standards prior to 2000
  - more “prescribed”

- ABET 2000 standards
  - set up systems with feedback
  - define your own program
    - give supporting evidence for quality and coverage
    - ABET will hold you to your standards
Program must:

- Set goals
- Have internal assessment involving all contributors to program
- Document results (based on "Outcomes")
- Demonstrate results used to continuously improve
Program should be defined by:

- **CURRICULUM**
- **OBJECTIVES**
- **OUTCOMES**
Different ABET requirements for each type of program

Some ABET requirements apply to all programs
Example: a **Computer Engineering CURRICULUM** should include:

- **Breadth and depth** across a range of engineering implied by topic
- Probability and statistics, calculus through differential equations, discrete math
- Basic sciences, computer science, and engineering necessary to **analyze and design** complex electronics and software
All CURRICULUMS should:

- Not allow skipping prerequisites
- Have a major design component
  - a "culminating experience"
    - based on knowledge and skills acquired in earlier coursework
- Ok to require non-typical courses
  - just explain why
OBJECTIVES

- Clearly state in *vision* and *mission*
- Split objectives ok
  - e.g., "equal emphasis on preparing students for graduate school or employment."
- Non-typical objectives ok
  - e.g., "program strengthened by multi-disciplinary setting"
- Giving students tools for life-long learning is always a good objective
OUTCOMES

- Typically **faculty** assess outcomes for “major” courses
- Surveying graduates **not** a good way to assess outcomes
- Outcomes specified as **“Criterion 3”**
  - specify whether or not criteria equally weighted and why
  - all criteria must be met by some part of program
ABET “Criterion 3”
OUTCOMES:

(a) An ability to apply knowledge of mathematics, science and engineering.
(b) An ability to design and construct experiments, as well as to analyze and interpret data.
(c) An ability to design a system, component, or process to meet desired needs.
(d) An ability to function on multi-disciplinary teams.
(e) An ability to identify, formulate and solve engineering problems.
(f) An understanding of professional and ethical responsibility.

(g) An ability to communicate effectively.

(h) A broad education necessary to understand the impact of engineering solutions in a global and societal context.

(i) A recognition of the need for, and an ability to engage in life-long learning.

(j) A knowledge of contemporary issues.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Are you ready for ABET?

- Is the program sufficiently staffed?
  - ABET uses the "FTE" (Full Time Equivalent)
  - 1 FTE may be composite of several faculty members
  - ABET judges if enough faculty for:
    - student-faculty interaction, advising, service activities, professional development, and interaction with industry
  - faculty qualifications also assessed
Are you ready for ABET?

- Have there been enough graduates from program?
- Is it clear how program is administered?
  - who establishes content?
    - department Chairs?
    - program coordinators?
    - both?
  - accredditor team will be formed accordingly
Are you ready for ABET?

- Is there enough equipment to support the program?
  - if a concern, include acquiring equipment as part of "Continuous Improvement Plan"
  - demonstrate how added equipment has improved program in the past

- Have "Outcomes" been achieved regardless of any lack of resources? (e.g., money, equipment, faculty)
Are you ready for ABET?

- Is institution fully accredited?
- Has institution pledged enough resources (money and people) to the accreditation process?
  - self-study and documentation takes much time and effort
- Has "Self-Study" been completed?
Elizabethtown College, Elizabethtown, PA

Strong liberal arts core in curriculum

"U.S. News America’s Best Colleges":
- ranked #2 comprehensive, bachelors, North
- admissions standard: “more selective”
- 1,735 students
- 26% business, 19% education, 12% health professions, 10% biology, 10% communications
Example

- Computer Engineering (CENGR) most likely candidate for accreditation
- Others being considered
  - Industrial Engineering (IENGR)
  - Engineering Physics (EGRPY)
- Relationship with related majors considered
  - Computer Science (CS and CSBIS)
  - Physics (PHYS)
  - 3-2’s (PRENG) -- BA Etown, BS Engr. PSU
History of Elizabethtown College degrees conferred in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, PRENG
Elizabethtown College BS degrees in Engineering conferred over past 10 years:

- CENGR: 25
- EGRPY: 10
- IENGR: 6
Example

Trends in Elizabethtown College BS Engineering degrees conferred over past 10 years
Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, and PRENG conferred over past ten years
Trends in Etown degrees in CENG, CS, CSBIS, EGRPY, IENG, PHYS, and PRENG conferred over past ten years.
Example

Etown "computer related" degrees conferred over past ten years
Example

Etown "non-computer related" degrees conferred over past ten years
Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, PRENG conferred over past ten years separated by "computer-related"
Complete History of Etown degrees in CENGR, CS, CSBIS, EGRPY, IENGR, PHYS, and PRENG conferred (seperated by "computer-related")
## Example CENGR outcomes

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<tr>
<th>Elizabethtown College Computer Engineering</th>
<th>Credit/Contact</th>
<th>Required</th>
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<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
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## Example FTE’s for CENGR

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Degrees</th>
<th>Rank</th>
<th>Primary Department</th>
<th>Years of Teaching Experience</th>
<th>Years of Industry Experience</th>
<th>Full Time Equivalent</th>
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<td>Member #1</td>
<td>BS, MS, PhD</td>
<td>Assistant Prof.</td>
<td>Phys &amp; Engr</td>
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<td>Member #2</td>
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<td>Lecturer</td>
<td>Phys &amp; Engr</td>
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<td>30</td>
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<td>Member #3</td>
<td>BS, MS, PhD</td>
<td>Associate Prof.</td>
<td>Phys &amp; Engr</td>
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<td>15</td>
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<td>Member #4</td>
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<td>Member #5</td>
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<td>Phys &amp; Engr</td>
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<td>Member #7</td>
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<td>Professor</td>
<td>Phys &amp; Engr</td>
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Questions still being discussed

- FTE distribution?
- Best option for Etown College?
  - BS CENGR
  - BS CENGR, BS Engineering with other options
  - BS ECE (EE newly created program)
  - BS Engineering with options (including CENGR)
- B Eng vs. BS?
- Accredit any title?
- Minimum number of grads per year?
- Where to find best consultants?