



ABET: Toward a New Era in Cybersecurity Education

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General Outline

- ABET General Background
 - Who is ABET?
 - Basics of ABET Accreditation
- ABET and Cybersecurity
 - New ABET Bachelor's Cybersecurity Criteria
- ABET, Cybersecurity and 2YCs
 - Cybersecurity accreditation at Two-Year Colleges?
 - Small group discussions



ABET Background and Accreditation Basics



About ABET

- ABET accredits college and university programs in the disciplines of applied and natural science, computing*, engineering and engineering technology.
- Founded in 1932 as Engineering Council on Professional Development.
- Over 100,000 graduates per year come from ABET-accredited programs.
- US-based but accredits programs in 31 countries.

* **“Computing” is an umbrella term. It encompasses computer science but does not mean computer science.**

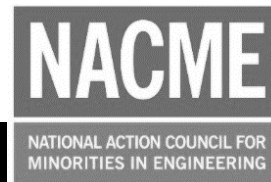
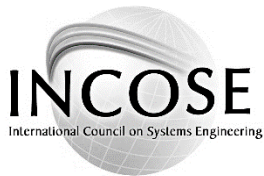
ABET's Core Purpose

With ABET accreditation, students, employers, and the society we serve can be ***confident*** that a program meets the quality standards that produce graduates prepared to enter a global workforce





ABET's 35 Member Societies



ABET Accreditation Statistics

As of 1 October 2017 ... 3,852 Programs

- Accredited programs by commission:

ANSAC: 101	CAC: 487
EAC: 2761	ETAC: 613

Commission	Domestic		Non-Domestic	
	Programs	Institutions	Programs	Institutions
ANSAC	93	71	8	4
CAC	403	317	84	56
EAC	2140	434	531	114
ETAC	556	207	57	14

What Programs Does ABET Accredit?

- Disciplines & level required to enter the profession
- Applied & Natural Sciences (ANSAC): associate's, bachelor's, master's
- Computing (CAC): bachelor's
 - Computer Science, Info Systems, Info Technology,
 - Piloting Cybersecurity
- Engineering (EAC): bachelor's, master's
- Engineering Technology (ETAC): associate's, bachelor's

ABET Criteria Foundations

- Philosophy: “Outcomes-Based”
 - Institutions and programs define mission and objectives to meet their constituents’ needs
 - Outcomes: preparation for professional practice
 - Demonstrate how criteria are being met
- Commitment to Continuous Improvement
 - Process focus: outcomes and assessment linked to objectives; input from constituencies
- Student, faculty, facilities, institutional support, and financial resources linked to program objectives

General Criteria

- 1) Students
- 2) Program Educational Objectives
- 3) Student Outcomes *
- 4) Continuous Improvement
- 5) Curriculum *
- 6) Faculty *
- 7) Facilities
- 8) Institutional Support

* Program Criteria (if any) may amplify these criteria

ABET Accreditation Process

- Programs prepare Self-Study Report for evaluation team
 - Documents how the program meets criteria
- Program review conducted by team of peer colleagues
 - Faculty, industry and government professionals, and administrators in the profession
 - Review the Self-Study Report, conduct the review visit
- ABET Commissions make final determinations on accreditation actions.
- The process takes 18 months from start to finish.



**ABET and the
Cybersecurity
Educational
Landscape: Current
Status**



New CAC Program Criteria

-for BS in Cybersecurity
- Based on the “CEP” effort that was started a few years ago at the Naval Academy and a few other institutions.
- CEP has now become “CSEC 2017” – an effort to lay out a model curriculum similar to related efforts in CS, IS, CpE and IT.
- ABET CyS criteria ↔ CSEC 2017

Criterion 3 *Summary* (for CAC)

Student Outcomes

The program must have documented ... student outcomes that include (1) through (5) below and any outcomes required by applicable Program Criteria...

Graduates of the program will have an ability to:

1. **Analyze** a complex computing problem ...
2. **Design, implement, and evaluate** a computing-based solution ...
3. **Communicate** effectively ...
4. Recognize professional responsibilities ... based on **legal** and **ethical** principles.
5. Function effectively as a member or leader of a **team** ...

PLUS this cybersecurity program criteria outcome:

6. **Apply security principles and practices for maintaining operations in the presence of risks and threats.**

Criterion 5 (CAC) – 1

Curriculum

The program's requirements must be ... designed ... such ... that each of the student outcomes can be attained.

The curriculum must combine technical, professional, and general education components to prepare students for a career, further study, and lifelong professional development ...

Criterion 5 (CAC) – 2

Curriculum

Must include:

... mathematics appropriate to the discipline

... at least 30 semester credit hours (or equivalent) of up-to-date coverage of fundamental and advanced computing topics that provide both breadth and depth.

The computing topics (not specific courses) must include:

1. Techniques, skills, and tools necessary for computing practice.
2. **Principles and practices for secure computing.**
3. Local and global impacts of computing solutions on individuals, organizations, and society.

Cybersecurity Program Criteria - Curriculum

(a) At least 45 semester credit hours (or equivalent) of computing and cybersecurity course work. The course work must include:

1. Application of the crosscutting concepts of confidentiality, integrity, availability, risk, adversarial thinking, and systems thinking.
2. Fundamental topics from each of the following:
 - (a) Data Security
 - (b) Software Security
 - (c) Component Security
 - (d) Connection Security
 - (e) System Security
 - (f) Human Security
 - (g) Organizational Security
 - (h) Societal Security
3. Advanced cybersecurity topics that build on crosscutting concepts and fundamental topics to provide depth.

(b) At least six semester credit hours (or equivalent) of mathematics that must include discrete mathematics and statistics.



Cybersecurity at 2YCs



Cybersecurity at 2YCs

- Idea:
 - Adapt the BS in cybersecurity to be appropriate for 2YC AS programs
- Would be complementary to the popular certification efforts
- Questions for today:
 - Is this needed?
 - Is it a good idea to go forward?

ABET and 2YCs - Challenges

- No previous examples of how to do this for computing, but ETAC provides a role model
- Peer driven nature requires a volunteer pool from the 2YC computing/cyber community
- Cybersecurity accreditation is still new for ABET at the 4-year level

Partnership with CAE

- ABET held it's first "listening session" at NICE 2017 in Dayton, Ohio.
- A key concern of participants was linkage with CAE designation.
- ABET and CAE have held several meetings and have set a goal to reduce the burden on programs who wish to seek dual recognition.
- Near term cooperation
 - Joint conference presentations (NCS, CISSE, 3CS)
 - Joint observer visits (CAE evaluator training)
 - Self-study/application coordination
 - Develop mappings between CAE and ABET criteria
- Longer term ideas for cooperation
 - Faculty workshops
 - Coordinate on program naming
 - Joint examination of curricular requirements
 - Explore reciprocity



Backup Slides



Complementary Efforts

- ACM CCECC effort (Cara Tang's work here: <http://ccecc.acm.org/>)
- NSF C5 Workshop (<https://www.c5colleges.org/>)
- CAE-CD2Y effort
- National Cyber Watch effort (funding from NSF) (https://www.nsf.gov/awardsearch/showAward?AWD_ID=1601150)
 - "...focus will be to study and support students' transitions from two-year to four-year institutions in cybersecurity in order to increase the number of community college students who enroll in and complete CyberCorps: Scholarship for Service (SFS) programs."

Organizational Structure

Volunteer-Driven: 2,200+ Volunteer Experts

Board of Directors

- Elected by Board of Delegates
- Provides **strategic direction** and plans
- **Appeals** process

Board of Delegates

- Nominated by & represent the member societies
- Decides **policy and procedures**
- Approves **criteria**

4 Commissions

- ANSAC, CAC, EAC, ETAC
- Make **decisions on accreditation**
- Implement accreditation policies
- Propose changes to criteria

Program Evaluators

- **Visit campuses**
- Evaluate individual programs
- Make initial accreditation recommendations
- **“Face of ABET”**

100% of accreditation decisions are made by volunteers

Basic Requirements

- Programs must have graduates
- Appropriate institutional accreditation or governmental approval
 - U.S. Department of Education, or
 - National/regional accreditation agency, or
 - State authority
 - Outside the U.S.
 - Appropriate entity that authorizes/approves the offering of educational programs

ACCREDITATION TIMELINE

as of July 2016

